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In the war on ballistic missiles, India plods along

By Ajai Shukla

Even as it crosses another milestone in missile defence, analysts warn against excessive optimism

India's most ambitious foray into missile development is the Defence Research and Development Organisation's (DRDO's) anti-ballistic missile (ABM) system, designed to shoot down incoming nuclear-tipped ballistic missiles fired from Pakistan or China at Indian cities.

This technologically challenging and controversial programme has made steady headway. On March 1, an interceptor missile, fired from Abdul Kalam Island in Odisha, detected and destroyed a simulated enemy missile when it was 15-25 kilometres above the earth. The DRDO has claimed full success in most of the dozen-odd ABM tests conducted so far.

ABM systems are controversial because they destabilise the nuclear balance between two adversary countries. When one adversary, eg India, deploys an ABM shield, it incentivises the other, eg Pakistan or China, to build (and in a conflict, fire) more nuclear weapons to defeat that shield by swamping it with missiles. During the Cold War, the US and the Soviet Union guarded against this by signing an ABM treaty that sharply restricted defensive measures on both sides. Pakistan already has the world's fastest growing nuclear arsenal, with its Khushab reactor producing plutonium full-steam.

Then, there is the technological challenge of developing an ABM shield. Striking an incoming ballistic missile is as hard as hitting a bullet with a bullet. Depending upon how far the incoming missile is fired from, it would approach the target at 1,500-3,000 metres per second (the further, the faster). With the interceptor travelling at 1,500-2,000 metres per second, the two missiles would approach each other at a relative speed of 3,000-5,000 metres every second. Guiding the interceptor to the target missile, and exploding within a few metres of it, requires precision of the highest order.

In developing an ABM shield, the designers' first decision is: at what stage of its flight should the incoming missile be engaged and shot down? Depending upon where it is fired from, the incoming missile may have travelled just a few hundred kilometres (from Pakistan) or as much as several thousand kilometres (from China, or North Korea).

Whatever the distance, the missile would journey through three phases: boost phase, mid-course or coast phase, and terminal phase. While an ABM system could be configured to shoot it down in any of these phases, each presents its own technological complexities.

Engagement profile - The boost phase is the most vulnerable stage in a missile's flight trajectory, when it blasts off its launch platform and picks up speed, accelerating into space for 180-300 seconds, depending upon the missile's range. This is when the missile travels at its slowest and cannot perform evasive manoeuvres or deploy decoys or counter-measures. The difficulty, however, is that since the missile is at its launch pad, intelligence satellites would have to monitor enemy territory to pick up indications of a launch. Then, in the short time available, the interceptor missile would have to be fired and travel all the way to the launch area.

Next comes the mid-course phase, in which the missile travels through space towards its target. This lasts just seconds for a short-range ballistic missile fired from Pakistan; or as much as 20 minutes for long-range ballistic missiles fired from several thousand kilometres away. Mid-course engagement provides a longer time-window for sensing, decision-making and engagement; and a shorter distance for the interceptor to travel.

However, ballistic missiles often release decoys in this stage, requiring the interceptor to differentiate between the decoys and the mother vehicle. The final engagement opportunity is in the terminal phase, when the incoming missile starts descending, re-enters the atmosphere and hurtles towards its target. "Terminal phase

engagement” gives the ABM system maximum time for detection and decision-making and requires the interceptor missile to travel the least distance. The downside is that many ballistic missiles are programmed to carry out manoeuvres when they re-enter, making them difficult to target.

India’s ABM shield - An ABM shield has three functional components: First, a radar network that can detect enemy ballistic missiles as soon as possible after launch; and then track them along their flight path. While a ground-based radar’s range is limited by the earth’s curvature, a satellite-based radar can pick up a ballistic missile’s fiery plume as soon as it is fired. The DRDO’s primary ABM radar is the Long Range Tracking Radar (LRTR), developed in partnership with Israeli company Elta.

The LRTR is based on Elta’s EL/M-2080 Green Pine radar, which is the nerve centre of Israel’s vaunted Arrow ABM system. Separately, the DRDO is working on a satellite-based sensor that would be integrated into the ABM system, once perfected. The second functional component of the DRDO’s ABM system is a sophisticated, computerised command and control system that plots and predicts the intruder missile’s flight path and assigns interceptor missiles to destroy it. With very little time available for humans to weigh choices, almost all decision-making relating to engagement choices is automated.

The third component is the interceptor missiles, of which the ABM shield has two different types. One is an exo-atmospheric (or “outside atmosphere”) missile called the Pradyumna which intercepts the intruder while it is 50-80 kilometres above the earth. The other, called the Ashvin, is an endo-atmospheric (“inside atmosphere”) missile that intercepts the enemy ballistic missile at altitudes of 20-40 kilometres. They are normally fired together (in a “salvo”) to increase the chances that at least one missile will destroy the target.

After they are launched, the guidance radar directs them towards the target; once in its vicinity, a “proximity fuze” explodes the warhead, damaging the intruder missile and warhead.

Range is a key determinant - Given how close India is to Pakistan, it takes just 5-15 minutes for the entire engagement, from launch to interception. A missile fired from a Pakistani launch site would take just 5-6 minutes to reach targets in north India, a few hundred kilometres away. Targets in south India, 1,500-2,000 kilometres away from Pakistan, would take 10-15 minutes to reach. Paradoxically, being close to India is a disadvantage to Pakistan because the closer a missile is fired from, the slower it travels in its terminal phase, making it easier to intercept. India’s ABM shield is geared to intercept missiles fired from up to 2,000 kilometres away. A short-range Pakistani ballistic missile like the Shaheen 1A (Hatf IV), with a range of 900 kilometres, would have a warhead re-entry speed of about 2,000 metres per second, which Indian ABM interceptors can manage.

The Shaheen-II (Hatf VI), with a range of 2,000 kilometres, would have its payload re-enter at 2,500-3,000 metres per second, which is just within the range of the Indian ABM system.

Pakistan’s longest-range missile is Shaheen III, with a range of 2,750 kilometres, which was developed to bring the Andaman & Nicobar Islands into range. The Shaheen III, like China’s longer-range missiles, cannot yet be intercepted by India’s ABM system. However, paradoxically, Pakistan’s lack of geographical depth means the Shaheen II and III cannot be used against north Indian targets like New Delhi, which is barely 1,500 kilometres from Pakistan’s farthest regions. To avoid overshooting Delhi, Pakistan would have to use the shorter range Shaheen I, which is easier to intercept.

Future of ABM - In 2011, former DRDO chief Avinash Chander told *Business Standard* that an ABM shield would protect the national capital within three years. Chander’s predecessor, VK Saraswat, had provided even more optimistic time-lines, raising concerns worldwide over the erosion of deterrence in South Asia.

Since then, the government has issued strict orders to the DRDO not to speak about the system. Currently, the development of the ABM system can only be gauged mainly from reports of interceptor test flights and the move of radars to sensitive locations like New Delhi. Over recent years, two LRTRs were moved to Delhi and integrated into the Indian Air Force national surveillance network.

Even as the ABM system successfully crosses developmental milestones, analysts warn against excessive optimism and overblown expectations. In most nuclear war-gaming in the US, ABM defences have been overcome relatively easily by expedients as simple as swamping the defences with missile salvos, or with

multiple independently targetable re-entry vehicles (MIRVs), that are essentially several independent warheads fitted onto a single missile.

On January 24, Pakistan test-fired its new Ababeel ballistic missile, which it claimed was a MIRV system, “aimed at ensuring survivability of Pakistan's ballistic missiles in the growing regional ballistic missile defence (BMD) environment”. The cat and mouse game with missile defence seems set to continue.



Thu, 23 Mar, 2017

Indo-Russia Kamov copter deal hits hurdle

By Ajay Banerjee

Pricing, tech transfer key issues dogging first major 'Make in India' project planned in joint venture

Failing To take-Off

- 200 Kamov copters are to be produced jointly by Kamov, HAL
- Rs 6,500 cr (or Rs 32 cr per copter) is the cost of the deal
- 800 light-utility helicopters needed over the next decade

India and Russia are having a disagreement over the joint production of Kamov-226T light-utility helicopter that was announced as the first major 'Make in India' project some five months ago.

The two long-standing military allies are facing hurdles as Russia is yet to give approval for the project. Top sources told The Tribune that pricing of the copter and related technology transfer through a private Indian partner were the two stumbling blocks.

New Delhi is not satisfied with the price being asked by the Russian side, sources said. The terms of having a private partner were part of the inter-government agreement inked in October 2016 during the Narendra Modi-Vladimir Putin meeting in Goa. It was first announced in December 2015 that Kamov-226T will be copter of choice.

The Russians have public sector giant Hindustan Aeronautics Limited (HAL) as the Indian partner, but the Ministry of Defence is looking to have private sector Indian investors to share a part of the contract that India has to execute under a joint venture with Moscow.

The Indian side will hold 50.5 per cent stake in the joint venture, of which the private sector companies will be strategic partners with HAL. The private partners could be doing various tasks of making the copter at HAL's Bangalore facility. The HAL will remain the lead integrator of the copter, sources said.

The HAL is owned by the Ministry of Defence and has previous experience of making copters. The Indian forces need some 800 light utility helicopters over the next decade, a demand which cannot be fulfilled by the HAL alone. The Indo-Russia joint venture aims to have an annual production capacity of 40-60 helicopters. Under the India-Russia agreement, the Kamov engine will involve a separate partnership. Kamov uses French engine-maker Turbomeca's power plant. The HAL already has a partnership with the same French company to produce engines for its indigenously developed copter, the advanced light helicopter, called Dhruv. The Kamov 226T is also fitted with Turbomeca engines, but a different variant.

The twin-engine Kamov 226T will replace the single-engine Cheetah/Chetak, usually deployed for surveillance, dropping small loads and for rescue, including of troops posted at forbidding heights such as the Siachen Glacier-Saltoro Ridge region.

The three services and the Coast Guard currently have 430 Cheetah/Chetaks helicopters. They are based on the 1950s' designed Alouette Aérospatiale 315B Lama of France.

In a First, IAF Heads for Drills to Israel

By Manu Pubby

As big as it could get - Multi-nation exercise to include US, Germany and France; involve nearly 100 aircraft

India in the process of acquiring advanced Heron UAVs for armed role from Israel

In a first, Indian forces are set to head for Israel to take part in joint military drills that will have significant strategic implications given the list of participants that includes US, France and Germany. The joint aerial drills are being described as the biggest and most complex ever to be hosted by Israel.

While details are yet to be worked out, defence ministry sources confirmed that an Indian Air Force team will participate in the Blue Flag exercise that is being hosted by Israel later in the year. "The participation is confirmed but details on which assets or how many personnel will take part are not yet available," sources said. This would mark the first time that India will take part in a multinational military drill in Israel, which has emerged as one of the primary weapons supplier to New Delhi with systems ranging from unmanned aerial vehicles to missile protection and small arms.

Reports from Tel Aviv quoting Israeli Air Force officials say that the Blue Flag exercise would involve seven nations besides Israel and could see participation by nearly 100 aircraft from around the world. The other participants include Poland, Greece and Italy. The Indian Air Force has gained valuable expertise in the past during multi nation drills in the US, having participated in the Red Flag series of exercises. The last exercise was held in Alaska in May 2016 in which India sent four Su 30 MKIs, four Jaguar fighters and two IL 78 mid air tankers.

While it is still unclear if India would send its fighters for the Israeli exercise, the common platforms being operated by the two nations includes the Heron unmanned aerial vehicle. India is in the process of acquiring a number of more advanced Heron UAVs for an armed role from Israel as well. Though Israel is a prime weapons supplier to India it has won major contracts to supply avionics for Russian origin aircraft as well joint military drills have remained a sensitive topic till now. The two nations discreetly exchange small teams of experts for cross training, including special operations but have not taken part in a joint military drill till now.

Assault Choppers to Remain with IAF, says Chief

By Manu Pubby

The Indian Air Force will continue to operate assault choppers and will not transfer its assets to the Army that is also raising a fleet of attack helicopters, Air Chief Marshal BS Dhanoa has said. He added that the IAF was looking forward to inducting the Apache attack helicopter, which he described as one of the best in the world, and would continue to support the Army during operational needs.

He made it clear that IAF was not keen on transferring either its new Apache choppers that are to be delivered or the Mi 3525 already in operation.

"On induction of attack helicopters by the Army, the IAF has maintained that, it has no objection to any internal restructuring within the Army as long as this does not pre-suppose the transfer of assets of the Air Force or impinge on the enunciated role of the IAF. We will continue operating and maintaining the attack helicopter fleet comprising Mi-2535, Apache and LCH and will provide all necessary support to the Army," the Air Chief responded to queries by ET.

Pay revision 'letter' goes viral

The Defence Ministry said here on Wednesday that a letter in circulation since Tuesday on the Seventh Pay Commission recommendations for the armed forces was fake. The letter follows a pattern of false communication on social media in recent times on the pay commission and one rank, one pension.

With the subject line "Revised scale of pay in 7th CPC", the letter said: "It is submitted that the JCM proposal has been approved by the Cabinet on March 16, 2017 with the conditions placed by the commission. But the same is not included for defence employees (combatant)." It further stated that during the Cabinet meeting on March 16, the proposal was approved and it would be implemented with effect from April 1.

The origin of the letter remains unknown, but it went viral among military and veteran groups on social media.

'Makes no sense' - Defence Ministry spokesperson Nitin Wakankar said the letter was fake. A defence source said the contents did not make any sense in the first place. "This is a fake, planted one to create unrest among the ranks so that an odd revolt type situation will force the Army to accept the recommendations as they are," another official said. A few weeks ago, a message on WhatsApp went viral among military personnel, promising better salaries. When the OROP protest flared last year, similar communication created confusion.

While the Seventh Pay Commission's recommendations have been implemented for civilian staff, it is yet to be implemented for the services because of some core anomalies pointed out by them.

THE ASIAN AGE

Thu, 23 Mar, 2017

North Korea missile explodes after launch

US, South Korean militaries detect failed launch as urgency over North threats grows.

Seoul: A North Korean missile appeared to have exploded on Wednesday just after it was launched, the US and South Korean militaries said after detecting the latest in a series of weapons tests by the nuclear-armed state that have alarmed the region.

The launch attempt was made from near the city of Wonsan, on North Korea's east coast, the same place from where it launched several intermediate-range missiles last year, all but one of which failed.

"US Pacific Command detected what we assess was a failed North Korean missile launch attempt... In the vicinity of Kalma," Commander Dave Benham, a spokesman for US Pacific Command, said, referring to an air field in Wonsan.

"A missile appears to have exploded within seconds of launch," Mr Benham said, adding that work was being carried out on a more detailed assessment.

A South Korean military official said the missile appeared to have exploded just after it was launched. "It may have exploded right after it took off from a launchpad," said a military official.

It was not clear what type of missile it was. The South Korean defence ministry said it was conducting analysis to determine further details. The increasing frequency of the missile tests has fuelled a growing sense of urgency over how to respond to the isolated, unpredictable state.

North Korea launched four ballistic missiles on March 6 and this week conducted a rocket engine test that Kim Jong-un said opened "a new birth" of its rocket industry.

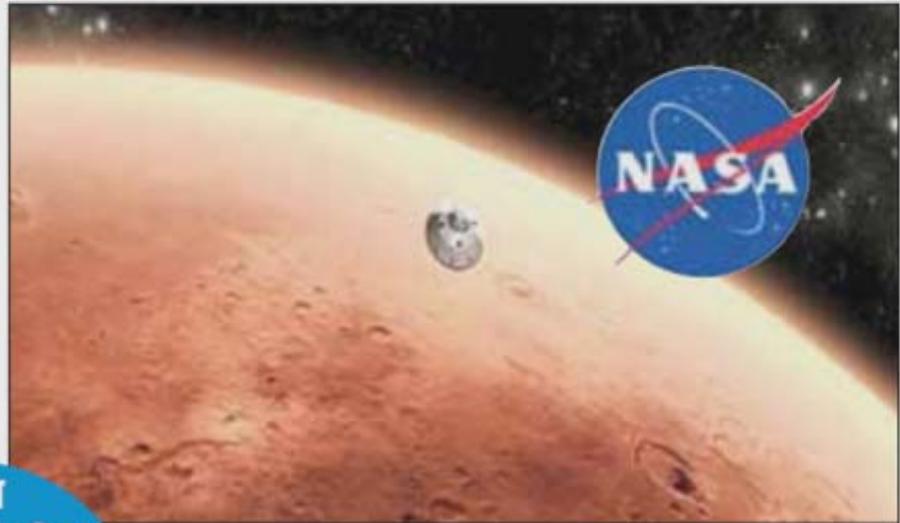
मानव को मंगल ग्रह पर भेजने की योजना

वाशिंगटन, (भाषा) : अमेरिकी राष्ट्रपति डोनाल्ड ट्रंप ने एक नये विधेयक पर हस्ताक्षर किये हैं जिसमें नासा कार्यक्रमों के लिए करीब 20 अरब डालर की मंजूरी का प्रावधान है। इन कार्यक्रमों में मंगल ग्रह पर मानव को भेजने की योजना भी शामिल है। नासा संबंधी यह विधेयक एजेंसी को 2018 के लिए 19-5 अरब डालर की मंजूरी देता है। विधेयक में उससे

“वर्ष 2030 के दशक में मंगल ग्रह के लिए चालक दल के सदस्यों वाला मिशन” भेजने की योजना बनाने के लिए भी कहा गया है।

ट्रंप ने व्हाट्स हाउस में अपने ‘ओवल आफिस’ में इस विधेयक पर हस्ताक्षर किये और इस प्रकार

नासा
कार्यक्रमों के लिए
करीब 20 अरब डालर
की मंजूरी वाले विधेयक
पर ट्रंप ने किए
दस्तखत



उन्होंने अंतरिक्ष में मानवों को भेजने की नई योजना का रास्ता खोल दिया। इस दौरान उपराष्ट्रपति माइक पेंस उनके साथ खड़े थे। उन्होंने

कहा कि यह विधेयक वर्तमान कानून में संशोधन करके एजेंसी के लक्ष्यों में मंगल ग्रह पर मानवों को भेजने

की योजना शामिल करने की व्यवस्था करता है। ट्रंप ने कहा कि यह विधेयक व्यवस्था करता है कि नासा के सर्वाधिक महत्वपूर्ण कार्यक्रम जारी रहें। राष्ट्रपति ने कहा कि करीब छह दशकों से नासा के काम ने लाखों अमेरिकियों को पृथ्वी पर दूर की दुनिया एवं बेहतर भविष्य की कल्पना करने के लिए प्रेरित किया है।

THE HINDU

‘Futuristic’ clock for space

NASA is set to send its atomic clock to space in late 2017

In a key advance for safely navigating future human exploration of the solar system, NASA said it is set to send its next-generation atomic clock to space in late 2017.

This clock will be smaller, lighter with magnitudes more precise than any atomic clock flown in space before, NASA said.

Engineers at NASA’s Jet Propulsion Laboratory in Pasadena, California have completed integration of the instrument, the Deep Space Atomic Clock, with the spacecraft that will take it into orbit later in 2017, the U.S. space agency said in a statement on Tuesday.

Timekeeping plays a critical role in spacecraft navigation and will be especially important for future deep space missions.

Most spacecraft are tracked using “two-way” methods — the ground-based antenna ‘pings’ the spacecraft and waits for the signal to return.

By measuring how long the signal takes to travel, the distance to the spacecraft can be calculated. A navigation team then processes this information to determine the spacecraft’s flight path and also determine if any course corrections are required.

The next-generation atomic clock developed by NASA enables “one-way” tracking, where the spacecraft does not need to send the signal back to Earth.

The tracking measurements could be taken on board and processed with a spacecraft-based navigation system to determine the path and whether any manoeuvres are needed to stay on course.

This will be a key advance for safely navigating future human exploration of the solar system by providing astronauts with their position and velocity when they need it, according to NASA.

It will lighten the load on the antennas in NASA’s Deep Space Network, allowing more spacecraft to be tracked with a single antenna.

The Deep Space Atomic Clock would also improve the precision and quantity of the radio data used by scientists for determining a planet’s gravity field and probing its atmosphere, NASA said. *IANS*



Thu, 23 Mar, 2017

Jaitley strongly defends PAN-Aadhaar link

The biometric security of the identity document will prevent tax evasion, Finance Minister tells Lok Sabha

One card for everything?

Aadhaar is becoming mandatory for a slew of services

No. of cards issued: **108 crore**, according to Finance Minister Arun Jaitley

As many as 31 schemes have been identified by the Centre for mandatory use of Aadhaar. Carry your card if you want to:

- File income tax returns or apply for PAN
- Avail benefits under the Pradhan Mantri

Kaushal Vikas Yojana for skill development

- Get subsidised grain under the National Food Security Act
- Avail jobs under the MGNREGA
- Claim benefits under the Employees Pension Scheme

Aadhaar has biometric details, so its chances of misuse become minimal. When the country has so much technology, and when it is being put to use, why create such a hue and cry about it? ARUN JAITLEY, Union Finance Minister

Finance Minister Arun Jaitley has defended the amendment to the Finance Bill, cleared by the Lok Sabha on Wednesday, making an Aadhaar number mandatory for issuing a PAN card. The biometric security of Aadhaar, he said, would prevent individuals holding multiple PAN cards and evading tax.

“In a situation where it has come to light that one citizen has up to five PAN cards, to avoid that, we have linked the PAN to Aadhaar,” Mr. Jaitley said in the Lok Sabha.

“So we have said, either give Aadhaar or an application for Aadhaar. About 98% of the adult population is covered by Aadhaar and 108 crore cards have been issued.” “If tax fraud is lessened, who would have a problem with this?” he asked in response to Opposition criticism that the linkage was wrong since the matter of Aadhaar’s legality was still in the Supreme Court. “It is an anti-evasion measure and for the benefit of the country.”

I-T searches - He also sought to allay concerns in Parliament about aggressive and unwarranted searches and seizures by Income-Tax officials. The assessing officer, he said, could only make searches after recording the source of their information regarding undisclosed income.

Mr. Jaitley said the Central Board of Direct Taxes had so far identified 18 lakh names whose large bank deposits did not match their income profile. Communications had been sent to all the 18 lakh assesseees and 8.78 lakh people had already responded. “The fear is that there will be many searches and seizures under Section 132A,” he said. “But before searching, the assessing officer has to get the information about undisclosed income. The source of the information and all other details have to be explained.”

The political verdict of the people on demonetisation was clear, the Finance Minister said alluding to the performance of the BJP in the recent Assembly elections in five States.

GST regime

“One of the benefits of demonetisation is that the anonymity associated with cash has been hurt and this will have an effect on the economy. Crime does not end. But does cash incentivise crime? Experience from around the world has shown that more cash leads to more tax evasion and more crime.”

Mr. Jaitley said the Goods and Services Tax (GST) Council was trying to implement the new tax regime by July 1. “The GST Council has met 12 times so far and all the significant decisions were taken by consensus.”