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Missile Programme of India

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Abstract

India is a nation that has always been truly devoted for nuclear disarmament and peaceful settlement of disputes among the nations, to its international relations. In background India was the first country to raise the voice against the nuclear tests to save the environment and human health in April 1954, when the first Prime Minister Pt. Jawahar Lal Nehru proposed a draft called 'The standstill agreement on nuclear weapons' in U.N. General Assembly. But very unfortunately all efforts made by India have never been taken seriously by the big players of international community, specially the defeat in 1962 against china and enforcement of NPT (Nuclear non-proliferation Treaty) along with all its discriminations in 1970, left India with no options but to go to keep its option open and to be prepare for nuclear armament to ensure its national security, even after the discriminatory provisions of CTBT in 1996.

Here the real credit in this regard goes to Late Indira Gandhi the then prime minister and her core team including Dr. APJ Abdul Kalam to commence a comprehensive missile programme to fulfill our need of credible nuclear deterrence called 'IGMDP' in 1984. Later on that was completed by the Pokharan-II nuclear explosions carried out by the NDA govt. head Mr. Atal Behari Vagpayee in May 1998. This paper deals with Indian Missile Programme which is very vital Issue among researchers.

Keywords: *Defence Research and Development, Indian Space Research Organization, Surface to Surface Missile, Anti-tank Guided Missile, Cellular Error Probable*

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1. INTRODUCTION:

Though, international peace and security have been one of the primary objectives of India nuclear policy, through nuclear disarmament but the changing scenario of its strategic environment and many strategic competitors enforced India to take concrete steps to meet successfully the for coming dangers to its security and sovereignty. The missile programme is one of the important developments in this regard.

India's advances in the field of space science and technology have contributed much to its ballistic missile development. India made a modest beginning in 1962 to organize space research. The task was assigned to a team consisting of scientists of the Department of Atomic Energy called the Indian National Council for Space Research. In 1969 the ISRO (Indian Space Research Organization), Bangalore was formed to plan, manage and execute the country's growing activities in space science and technology and in the field of space applications. A full-fledged department of Space and an Indian Space Commission were set up in 1972. On April 19, 1975 India launched the Aryabhatta, the first indigenously made 360 Kg satellite. The Bhaskar-I was India's second satellite. It was launched on June 7, 1970. India built indigenously a space launch vehicle. The maiden launch of a 4-stage space launch vehicle (SLV-S rockets) took place on August 10, 1979. A successful launch of the SLV-3 was made on July l, 1980. It gave India entry into the exclusive club of countries (the Soviet Union, the USA, France, China and Japan) having global orbiting satellites.

Soon after the successful launch of the SLV-3 accompanied with the aim of exploring, space for peaceful purposes the Indian government decided to apply the acquired capability for military purposes. In 1983 the Indian government drew up plans for an Integrated Guided Missile Development Programme (IGMDP). A sum of Rs.780 crores was allocated for the IGMDP for next ten years. The R & D laboratory dealing with military programme is the Defence Research and Development Laboratory (DRDL), Hyderabad. It was set up on the eve of the Sino-Indian War in June 1962. For most of the 1960s and 1970s it remained under funded and worked in the area of reverse engineering. The work of the DRDL was mainly focused on SS-II wire guided ATGM and the Soviet SAM-2 missile. Unfortunately, success in the form of reverse engineering on a SAM-2 under the "Devil" programme was not supported and the laboratory suffered from acute morale and resource problems and verged on being shut down in the 1970s. In 1982 Dr. A.P.J. Abdul Kalam was shifted from the Civil Space Programme to the DRDL as its head. Along with the GMB the IGMDP programmes came under his charge. The task of the IGMDP was to develop 2 SAMs, One ATGM and other is SSM.

The IGMDP envisaged production on the following lines: "Prithvi" as a 250 km range surface-to-surface missile, "'Trishul" as a 10 km range quick reaction surface-to-air missile, "Akash" as a 25 km multi-target surface-to-air missile, "Nag" as an anti-tank missile with a 4 km range "fire and forget" missile to replace the Italian origin "Milan" being produced under license and "Agni" as a long-range ballistic missile with a range of 2,500 km.The first trump of the programme was announced in the Indian Parliament of April 29, 1987, when it was disclosed that a successful launch of "Trishul" had been accomplished in 1986. The first successful demonstration of the "Prithvi" came on February 25, 1988. One May 22, 1989 'Agni' was test fired.

Before the details about Indian ballistic missiles are given, it may be pointed out that Indian has

imported all types of tactical missiles whether they may be the wire guided ATGM, SS-II or the sophisticated air-to-air R-27R beyond visual range missile or the free fall rockets of the BM-21 multi-barrel rocket launchers India has fielded a range of Soviet/Russian surface-to-air missile (SAMs) beginning with SA-2 to SA-6 and reportedly SA-II.

2. PRITHVI:

It is 8.5 metres long with a diameter of one meter. Its frame is made of locally developed light aluminum alloy, and magnesium based material is used for production of its wings. It is a single-stage missile powered by a cluster of twin liquid fuel rocket engines. The guidance and control system of Prithvi forces it to move on a predetermined optimized trajectory stored in an on-board computer, which carries out all tasks of flight control. These include a host of post-launched sequences, check out of sub-system and technology of a large volume of digital and analog data for the guidance of the missile to its target. Each missile is estimated to cost Rs. 1.7 crores. Prithvi can carry 1,000 kg payload including a tactical low-yield nuclear weapon.

The Prithvi has been viewed essentially as a battlefield missile to be integrated into the artillery arm of the army and quite similar to the US ATACMs. But from the technical point of view it is a propulsion module with a variety of applications ranging from SSMs, long-range SAS, as well as an upper-stage for a long-range missile.

The accuracy of a missile is generally measured by a factor termed as circular error probable (CEP). It is the radius of an imagery circle formed around the target within which a missile can hit. In simple language, it is the distance between the missile hit-point and the planned target. The CEP of the Prithvi is about a metre.

3. AGNI:

It is a 14.2 tonne missile of one metre diameter and has a height of 19 metres. It is capable of carrying a 1,000 kg payload, with a maximum range of 2,500 km. Its first stage is a modified version of SLV-3, which had demonstrated its success in early 1980s. The second stage is a liquid fuel section much like the Prithvi. The warhead is guided on to its target by inertial guidance system with the help of an onboard computer. The system is pre-programmed to a specific target before the launch and guides the missile right to the target without any ground control or mid-air correction. This system is "unvulnerable to external interference like jamming or electronic counter measures". The guidance and control of the system of Agni is a replica of Prithvi.

Three test flights of the Agni have taken place. The first test flight took place on May 21, 1989. Its objectives were to establish re-entry vehicle design and technology, control navigation and guidance for long-range missiles. The second test of the Agni, which took place on May 29, 1992 was a failure. The failure was because of a trivial error of not changing the location of the sensors, which the vehicle itself was elongated by 2 metres. The third test occurred on February 19, 1994. This test confirmed the missions of the Agni-II which were to establish maneuvering re-entry technology and long range evidenced by the changed shape of the re-entry vehicle as well as the additional 5 tonnes of weight, presumably in terms of additional fuel in S-2 which had longer burn phase of 100 seconds. Another modification was the open trass type inters stage. The system also tested a Changed Reaction Control System using a bi-propellant with enhanced specific impulse rather than cold gas. Some other modifications were also carried out as a result of the

analysis of the causes of the earlier failure of the Agni-II.
The success of the third test, therefore, confirmed the validity of these changes as well as met the kay mission objective, i.e. terminal maneuvering during re-entry.
"The Agni mission," according to Dr. Abdul Kalam, "calls for design and development of re-entry vehicle structure. It was not conceived as a missile system as such. The aim of the project was to concentrate on the crucial technology such as re-entry to structure, guidance and control. Thus, according to India; Agni is only a technology demonstrator. But in the Western circles it is perceived to be a deadly missile.

4. TRISHUL:
It is India's premier ground-to-air missile. There are three versions of the Trishul for use by each of the services. The projectile for the army is mounted on the chassis of the BMP-2 Vehicle, allowing it to be moved along with tank columns for their protection. A sky scanning radar and the fire control radar, part of the autonomous system, are mounted on the same platform. Each vehicle boards a bank of six missiles. The naval version of Trishul will be mounted on a platform. The "sea skimming missile" will be fitted with an altimeter, enabling it to fly seven metres above the water. The naval version can destroy anti-ship missiles such as the Exocet and the Harpoon. The 29th test of the missile took place on November 8,1995. It is a missile still in the making.

5. AKASH:
It is a medium-range surface-to-air missile with a 25 km. range. It is being developed for the defence of strategic installations against air attack. It is 6.5 metre long two-stage guided missile, whose first stage will fall off after a 2.5 seconds burn out. Its 'phased array' radar is reported to have a vaguely stated capability of engaging multiple targets. The maximum use of carbon based composite materials will be made in its fabrication in order to reduce its over-all weight and give it the capability to withstand the expected high temperature during flight. In the initial phase of its flight the missile will be guided by the ground based trekking radar, which would look on the target. The onboard radar will guide it to the target in the final phase of its flight. The end-speed of Akash is expected to be as high as 3.5 Mac (3.5 times the speed of sound). The mobile deployment plans envisage a battery of 12 missiles mounted on three treakked vehicles with the radar and guidance-control computer carried in sep-vehicle.

6. NAG:
It is an anti-tank missile. It will have an all-weather, day and night operational capability. It has a range of four to six kilometres. It will be carried by helicopters and infantry combat vehicles - the latest version of armoured carriers. Being equipped with an entirely new guidance, it is known as 'fire and forget' weapon system. The currently available anti-tank missiles need operator controlled electronic guidance during the flight after the launch, till it finally reaches its target. The guidance system in Nag, after launch, will lock it on to the target, which will attract the missile to itself. The terminal guidance will be provided by on-board, passive infrared imaging. Propelled by a high-energy solid fuel motor, the missile will carry a payload of specially designed amour piercing tandem shaped charges for destruction of tanks. The field deployment of a Nag carrying detachment would cater for the tactical requirement of high mobility. A line of sight radar will acquire the target, feed the data to the missile and fire it. Since. The terminal guidance

will be provided by the target itself, the launch vehicle can change its location immediately after firing the missile. It is reported that in order to eliminate the chances of possible visual detection of the missile firing personnel by the enemy, the propellent used for the missile has been made smokeless.

7. CONCLUTION:

About 30 Prithvi (surface-to-surface) missiles have been inducted in the Indian Army but they are yet to be deployed on the ground. Prithvi's Air Force version is still being developed. The Agni intermediate range ballistic missile project has been capped after three tests.

Concluding this it will be inevitable to say India did its best efforts for complete and non-discriminatory nuclear disarmament through its nuclear policy but in a deteriorated strategic environment like South-Asia. India had no option, but to empower itself through all the possible measures to meet the challenges successfully on its national security.

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