

Agni V- MIRV Strengthening Nuclear Deterrence

Introduction

Defence Research and Development Organisation in the flight test named Mission Divyastra, conducted first successful flight test of indigenously developed Agni-5 missile, with Multiple Independently Targetable Re-Entry Vehicle (MIRV) technology.^[1] The test was long awaited and will strengthen India's deterrence capabilities. India already has a successful missile series starting from short range Prithvi and Agni I to the intermediate range Agni III and now the Inter Continental Ballistic Missile (ICBM) Agni V with MIRV capabilities. The missile programme was started under the Integrated Guided Missile Development Programme (IGMDP) in 1983 and it was sanctioned to develop Prithvi, Trishul, Akash, Nag and a Technology Demonstrator Agni Missile.^[2] Considering India is one of the few countries which is flanked by two Nuclear Weapon States (NWSs), namely, China and Pakistan, it is imperative that India's nuclear forces has enough punch to deter the adversaries. The MIRV capabilities will help them in strengthening this.

History of MIRV

MIRV technology has been there for quite some time and most of the NWSs had coveted this technology. The inherent advantage of this technology is it enhances the targeting capabilities, as also can be used to disable Ballistic Missile Défense (BMD) systems. **MIRV**, any of several nuclear warheads is carried on the front end, or 'bus', of a ballistic missile, and each MIRV allows separately targeted nuclear warheads to be sent on their independent ways, after the main propulsion stages of the missile launch have shut down, further the warheads can be released at different speeds and on different trajectories.^[3] The missile can carry from 3 to 12 nuclear warheads can be used for targeting single or multiple location many kms apart.

It was first developed in the 60s. The United States was the first country to develop MIRV technology, deploying a MIRVed ICBM in 1970 and a MIRVed Submarine-Launched Ballistic Missile (SLBM) in 1971.^[4] This was quickly followed by the then Soviet Union. Currently France, UK and China have this technology. It is alleged that even Pakistan has this technology. The development of MIRV technology is not easy as it requires the combination of large missiles, small warheads, accurate guidance, and a complex mechanism for releasing warheads sequentially during flight.^[5]

Current trajectory

Most of the NWS are modernising their nuclear inventory. As far as MIRV is concerned, amongst the major players the US ICBMs is equipped with the W78/Mk12A version and could be uploaded to carry two or three independently targetable warheads each, as also, the US Air Force occasionally test-launches Minuteman III missiles with unarmed MIRVs, to maintain and announce the capability to reequip the Minuteman III missiles with reentry vehicles.^[6] The most recent such test occurred on 07 Sep 2022, when a Minuteman III equipped with three reentry vehicles was launched approximately 4,200 miles (6,759 kMs) to the US ICBM testing ground at the Kwajalein Atoll in the Marshall Islands.^[7] As far as Russia is concerned the focus of the current and larger phase of Russia's modernization is the SS-27 Mod 2, known in Russia as the RS-24 (Yars), which is a modified SS-27 Mod 1 (or Topol-M) that can carry up to four multiple independently targetable reentry vehicles (MIRVs).^[8] Next major phase of Russia's ICBM

modernization will be the replacement of the SS-18 (RS-20V) with the SS-29 (RS-28) Sarmat, and rumours are that the SS-29 could carry 15 or more MIRV warheads.[9] From the Indian perspective it is significant to know the Chinese and the Pakistani trajectories. As far as China is concerned DF-5 ICBM can carry up to five warheads, and rumours are that the DF-41 can carry six to 10 warheads, further Chinese JL3 SLBM, can also deliver ‘multiple’ warheads per missile.[10] For Pakistan its alleged that they have **the Ababeel** which is Pakistan’s first surface-to-surface medium range ballistic missile, reportedly capable of carrying MIRVs and this is a three-stage, solid-fuel missile which was unveiled in a test on 24 Jan 2017.[11] Thus, it has become amply clear that all our adversaries are perfecting this technology. Therefore, it is time that this missile technology demonstrator, without further delay, becomes a part of our defence forces. MIRVed AgniV in good numbers is a prerequisite for a credible nuclear deterrence, especially considering that China has also acquired the S400 and is developing its indigenous BMD system.

Another significant news was, in the nuclear energy sector, - the ‘Core Loading’ at India’s first indigenous Fast Breeder Reactor (500 MWe) at Kalpakkam, Tamil Nadu. It was the mission of Bhartiya Nabhikiya Vidyut Nigam Ltd, to construct and operate India’s most advanced nuclear reactor-Prototype Fast Breeder Reactor.[12] Once commissioned, India will be the second country next only to Russia to commercially operate this. Dr Bhabha the father of India’s nuclear programme, had envisioned a three-stage nuclear programme primarily to use thorium which is found in abundance in India and this Fast Breeder Reactor (FBR) will be a stepping stone for India’s third stage nuclear energy programme. ‘The FBR will initially use the Uranium-Plutonium Mixed Oxide fuel, the Uranium-238 ‘blanket’ surrounding the fuel core will undergo nuclear transmutation to produce more fuel, thus earning the name ‘Breeder’ and the use of Thorium-232, which in itself is not a fissile material, as a blanket is also envisaged in this stage’.[13] By transmutation, Thorium will create fissile Uranium-233 which will be used as fuel in the third stage.[14]

Conclusion

By testing MIRV technology, India’s indigenous programme has got a boost, but it is equally important to induct these missiles on time to prevent the strategic gap from widening. In the past, India had also demonstrated the hypersonic air-breathing scramjet technology with the flight test of Hypersonic Technology Demonstration Vehicle, but we have still not seen any Hypersonic glide and cruise missiles being inducted. The pace with which the technological innovations are taking place is phenomenal hence it is imperative that India does not lag behind and the flight tests are operationalised timely.

End Notes

[1] DRDO successfully conducts Mission Divyastra, 11 MAR 2024, (Release ID: 2013549) Visitor Counter: 4470, at <https://pib.gov.in/PressReleasePage.aspx?PRID=2013549>

[2] Missile Development Programme, Press Information Bureau, Government of India, Ministry of Defence, 13-August-2012, at <https://pib.gov.in/newsite/PrintRelease.aspx?relid=85986>

[3] MIRV, Weaponry, science & tech at <https://www.britannica.com/technology/MIRV>

[4] Multiple Independently-targetable Reentry Vehicle (MIRV), The center for Arms control and Non Proliferation at <https://armscontrolcenter.org/wp-content/uploads/2017/08/MIRV-Factsheet.pdf>

[5] Ibid

[6] Hans M. Kristensen & Matt Korda, United States nuclear weapons, 2023, Bulletin of the Atomic Scientists, 79:1, 28-52, DOI: 10.1080/00963402.2022.2156686

[7] Ibid

[8] Hans M. Kristensen, Matt Korda & Eliana Reynolds (2023) Russian nuclear weapons, 2023, Bulletin of the Atomic Scientists, 79:3, 174-199, DOI: 10.1080/00963402.2023.2202542

[9] Ibid

[10] *Hans M. Kristensen, Matt Korda, and Eliana Reynolds, Chinese Nuclear Weapons, 2023, Bulletin of the Atomic Scientists, 79:2, 108-133, DOI: <https://doi.org/10.1080/00963402.2023.2178713>*

[11] Ababeel, Missile Threat, July 31, 2021, at <https://missilethreat.csis.org/missile/ababeel/>

[12] PM witnesses the historic “Commencement of Core Loading” at India’s first indigenous Fast Breeder Reactor (500 MWe) at Kalpakkam, Tamil Nadu, 04 MAR 2024 6:25PM by PIB Delhi, at <https://pib.gov.in/PressReleaselframePage.aspx?PRID=2011347>

[13] Ibid

[14] Ibid

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