



## Dr. Kalam: The Missile Man of India

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**Avul Pakir Jainulabdeen (A. P. J.) Abdul Kalam** (15 October 1931 – 27 July 2015) was the 11th President of India from 2002 to 2007. A career scientist turned politician, Kalam was born and raised in Rameswaram, Tamil Nadu, and studied physics and aerospace engineering. He spent the next four decades as a scientist and science administrator, mainly at the Defence Research and Development Organisation (DRDO) and Indian Space Research Organisation (ISRO) and was intimately involved in India's civilian space programme and military missile development efforts. He thus came to be known as the *Missile Man of India* for his work on the development of ballistic missile and launch vehicle technology. He also played a pivotal organisational, technical, and political role in India's *Pokhran-II* nuclear tests in 1998, the first since the original nuclear test by India in 1974.

Kalam was elected as the 11th President of India in 2002 with the support of both the ruling Bharatiya Janata Party and the then-opposition Indian National Congress. Widely

referred to as the "People's President", he returned to his civilian life of education, writing and public service after a single term. He was a recipient of several prestigious awards, including the Bharat Ratna, India's highest civilian honour.

Democratic India's missile programme dates back to the late 1950s, when Jawaharlal Nehru was the Prime Minister of India and Dr.

**Abdul Kalam Island**, formerly known as **Wheeler Island**, is an island off the coast of Odisha, approximately 150 kilometres (93 mi) from the state capital Bhubaneswar. The **Integrated Test Range** maintaining a missile testing facility is located in the island. In September 2015, Chief Minister Naveen Patnaik declared that the island would be renamed to honour the late Indian president, APJ Abdul Kalam.

D. S. Kothari was the Scientific Advisor to the Defence Minister. In 1958, the government of India constituted a team of Indian scientists - called the Special Weapons Development Team - to research guided missile weapons development.

Motivated to strengthen its defences after the 1962 Sino-Indian War, and the prevailing international scenario of the time, the government of Independent India renewed its focus on Indian missile technology development. Initially, the scientists of the Special Weapons Development Team worked from Met Calfe House (New Delhi), but the establishment later shifted to Hyderabad after the state government granted them the former Nizam's army barracks. This was



the genesis of the **Defence Research and Development Laboratory (DRDL)** – earlier known as the **Special Weapons Development Team** – under DRDO, solely formed for missile technology research and development.

Its first anti-tank missile was a totally indigenous product, which was successfully test-fired. The project laid the foundation of India's missile programme and many from this group who were involved in the development of the anti-tank missile to be used in Sarath ICVs manufactured at Ordnance Factory Medak, went on to set up the Bharat Dynamics Limited (BDL), Hyderabad in the proximity of the ordnance factory, which became the production agency of missiles in India. (In the 1970s, SS-11B anti-tank missiles were manufactured under license from France at the BDL.)

As Indian science and technology was curtailed before it became independent, and missile technology had developed at a fast pace after the second world war, India decided to update itself on missile technology by reverse engineering a surface-to-air missile. This project was code-named Project Devil and it worked, from 1970 to 1979, on reverse engineering the Russian SAM-2 (which Russia supplied to India). Dr. B. D. Nag Chaudhri (then Scientific Adviser to the Defence Minister) advocated the need to build technologies needed for the future, such as liquid propellant powered engines. Thus, a parallel program called Project Valiant was also initiated to build a rocket engine powered by liquid propellants. V. K. Saraswat was part of the team that built the engine between 1971 – 1974.

Other scientists at DRDO simultaneously focused on building a guidance package – an essential part of a long-range missile that determines its path and accuracy to hit a target. A

platform-based inertial navigation system (INS) was developed and tested, on board an Avro aircraft, in 1974–75. Subsequently, an INS was built for both missiles and an aircraft, and this was tested in 1979 on board a Canberra aircraft.

By the start of 1980's, DRDL had developed competencies in the fields of propulsion, navigation and manufacture of materials. Thus, India's political and scientific leadership, which included prime minister Indira Gandhi, Defence Minister R. Venkataraman, V.S. Arunachalam (Scientific Advisor to the Defence Minister), decided that all these technologies should be consolidated.

This led to the birth of the Integrated Guided Missile Development Program and Dr. Abdul Kalam, who had previously been the project director for the SLV-3 programme at ISRO, was inducted as the DRDL Director in 1983 to conceive and lead it. He decided that DRDL would pursue multiple projects in this area simultaneously. The Agni missile was initially conceived in the IGMDP as a technology demonstrator project in the form of a re-entry vehicle, and was later upgraded to a ballistic missile with different ranges. As part of this program, the Interim Test Range at Balasore in Orissa was also developed for missile testing.

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