STUDY NOTES · BASIC CONCEPT

All about Skyroot’s Vikram-1 and Mission Aagaman : India’s First Private Orbital Rocket

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What?

Skyroot Aerospace's Vikram-1 represents a historic milestone: it is India’s first privately developed orbital-class rocket. Developed by the Hyderabad-based aerospace startup, the launch of Vikram-1 marks the official transition of India's private space sector from experimental suborbital flights to active, commercial orbital deployment.

The rocket is fully stacked on the historic First Launch Pad (FLP) at ISRO’s Satish Dhawan Space Centre in Sriharikota for its highly anticipated maiden orbital test flight, "Mission Aagaman" (meaning arrival in Sanskrit).

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The Rocket Blueprint: Tech Specifications

- Vikram-1 is named in honor of Dr. Vikram Sarabhai, the father of the Indian space program. Unlike its predecessor, the Vikram-S (which was a smaller, suborbital sounding rocket launched in 2022), Vikram-1 is a heavy-duty, multi-stage commercial vehicle.
- Physical Scale: A 7-story tall orbital launch vehicle.
- Structure & Build: Constructed using ultra-light, high-strength carbon fiber composites to shed dead weight and maximize fuel performance.
- Payload Capacity: Capable of lifting up to 300–350 kg into a 450 km to 500 km Low Earth Orbit (LEO).
- Target Market: The hyper-growth global small-satellite market (communications, Earth observation, and IoT constellations).

Advanced Propulsion Architecture

The vehicle uses a highly innovative multi-stage propulsion system:

Solid Fuel Stages (Kalam Series): The lower propulsion stages use custom solid-state motors (Kalam-1200 and Kalam-250) integrated with a flexible nozzle system for precise aerodynamic vector steering.

Liquid Fuel Upper Stage (Raman Engine): The final orbital insertion stage is powered by the Raman engine, named after C.V. Raman. It features 3D-printed liquid engine injectors and multi-start capabilities to precisely

steer, roll, and drop individual satellites into different orbital slots.

Mission Aagaman: What's on Board?

As a maiden test flight, Mission Aagaman is designed to validate all aerodynamic structures, guidance systems, staging mechanisms, and terminal thermal shields in an active flight environment.

However, it is not flying empty. The rocket is carrying technology demonstration payloads for both domestic and international clients:

- DCUBED (Germany): Deployable space structures.
- Varaha Space & Cosmos Space: Specialized data and tracking tech demos.
- Symbolic Tributes: The flight carries custom micro-payloads celebrating Indian space legends like Dr. Vikram Sarabhai, Dr. A.P.J. Abdul Kalam, and Prof. Satish Dhawan.

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Why Vikram-1 Changes the Game?

Until recently, the Indian space sector was entirely state-run, managed exclusively by ISRO. Following government space sector reforms that created IN-SPACe (the single-window clearing agency for private space firms), startups were given access to ISRO facilities, test benches, and launch pads.

Skyroot, founded by former ISRO scientists Pawan Chandana and Naga Bharath Daka, has scaled operations dramatically. Operating out of their 200,000-square-foot Infinity Campus in Hyderabad, the company has built a standardized manufacturing pipeline capable of producing one orbital rocket every month.

If Vikram-1 cleanly clears its staging sequences and achieves orbit, it will position India as a premier hub for low-cost, high-frequency private commercial satellite launches, directly competing on the global stage.

Feature	**Vikram-S (2022 Proof-of-Concept)**	**Vikram-1 (2026 Commercial Model)**
Flight Type	Suborbital (Up and down like a sounding rocket)	**Orbital** (Achieves the velocity to stay in space)
Propulsion Stages	Single-stage solid motor	**4-Stage Architecture** (3 solid lower stages + 1 restartable liquid upper stage)
Peak Altitude	~89.5 km	**450 to 500 km** Low Earth Orbit (LEO)
Payload Purpose	Sensory data collection	**Active commercial satellite deployment**