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## Aditya-L1 completes key orbit manoeuvre

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**NEW DELHI:** Aditya-L1 has successfully performed its first Earth-bound manoeuvre, indicating it is healthy and "performing optimally", the Indian Space Research Organisation (Isro) said on Sunday — a day after India's first solar mission embarked on a 125-day journey before it is placed in a halo orbit about 1.5 million kilometres from Earth.

The process for the satellite's final placement at L1 point will require a series of intricate manoeuvres, the first of which was performed at 11:45am on Sunday.

"The satellite is healthy and operating nominally. The first Earth-bound manoeuvre (EBN#1) is performed successfully from ISTRAC, Bengaluru. The new

### Solar mission on track

The satellite is healthy and performing as intended, Isro said in a statement on Sunday

1 **SEPT 2:** Aditya-L1 was on Saturday released into an orbit of 235kmx19,500km

2 **SEPT 3:** Orbit raised to 245kmx22,459km

3 **SEPT 5:** The next manoeuvre is scheduled for 3am on Tuesday, India's space agency said



#### Why is it important?

Through these manoeuvres, Isro will raise the satellite's orbit near Earth for a fortnight so it gathers enough momentum to be launched into its 1.5 million km journey

orbit attained is 245km x 22,459 km," the space agency said in a post on X, formerly Twitter.

"The next manoeuvre (EBN#2) is scheduled for September 5, 2023, around 03:00," it added.

Four other such manoeuvres are scheduled, during which the space agency will raise the satellite's orbit near Earth for a fortnight, so that it gathers enough momentum to be launched into

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perhaps be understood by taking the example of when a person is on a swing — to make the swing go higher, a pressure (by shifting body weight) is applied in the phase when the swing is coming down towards the ground. In Aditya-L1's case, once it gains enough velocity, it will slingshot around to its intended path towards L1.

The L1 point refers to Lagrange Point L1, where gravitational forces of celestial objects work in such a way that the spacecraft can be parked in what is known as a halo orbit — an oval that shifts on three axes. Once Aditya-L1 arrives at the L1 point, another manoeuvre will be performed to bind the craft to the orbit, the space agency said.

"The satellite spends its whole mission life orbiting around L1 in an irregularly shaped orbit in a plane roughly perpendicular to the line joining the Earth and the Sun," an Isro document read.

The strategic placement will ensure that Aditya-L1 can continuously monitor the Sun. "This location also allows the satellite to access solar radiation and magnetic storms before they are influenced by Earth's magnetic field

and atmosphere," the document said.

The gravitational stability at this point will also minimise the need for frequent orbital maintenance, it added.

Aditya-L1 is equipped with seven payloads to study the Sun's corona, chromosphere, photosphere and solar wind. From L1, the spacecraft will be able to see the effect of particles and radiation from heightened solar activity, while also studying the outer surface of the star in close detail — something that is normally not possible from the Earth, or even its orbit.

Scientists said that after 125-day period, the seven scientific instruments will draw readings and the first of the data is expected in February or March next year. While the mission is designed to provide data for the next five years, experts said that there is a possibility of it going on till 10 or even 15 years.

The space agency has in the last fortnight successfully conducted two significant missions that have cemented its place among the world's foremost space programmes.

### ADITYA-L1

its 1.5 million kilometre journey.

Earth-bound manoeuvres involve the firing of rockets and some adjustments to angles, as required. How this will work can

## Reaching for the Sun and Moon

Twice in two weeks, scientists have pushed Indian space ambitions into the next orbit

At 11:50am on Saturday, India's space ambitions blasted off into a higher orbit. That morning, the country's maiden solar mission, Aditya-L1, was launched from the Sriharikota spaceport, marking the second time in as many weeks that the Indian Space Research Organisation (Isro) had put the country firmly in the top echelons of space-faring nations. The trajectory of the solar mission might be less dramatic than Chandrayaan-3 — which galvanised a nation with its perfect touchdown on the hitherto unexplored southern pole of the moon on August 23 — but it is no less important scientifically. For the next 124 days, Aditya will make its way to the Earth-Sun lagrange point 1, or L1 point, a region 1.5 million km from Earth towards the Sun, where the gravitational forces of celestial objects are balanced in a way that the spacecraft can be parked in what is known as a halo orbit — an oval that shifts on three axes. Once there, the spacecraft will use its seven payloads to study the Sun's corona, chromosphere, photosphere and solar winds. It will be able to see how particles and radiation from heightened solar activity interact, while also studying the outer surface of the star in close detail — something that is normally not possible from the Earth, or even its orbit. Data will stream into control centres for at least the next five years, enriching our understanding of solar behaviour, space weather and how to better protect space assets from anomalies and flare-ups.

There is little doubt that the technological advancements that every interplanetary mission precipitates — the United States' competitive advantage in the knowledge economy and cutting-edge innovation is often traced to the breakneck pace set by Nasa in the 1960s — will be invaluable not just to the Indian scientific community but also its industry.

Missions to the great beyond have a way of helping nations see beyond the morass of everyday divisions and focus on what's important: The advancement of humankind. After touching the Moon, why not take a break? Why go to the Sun? Because it's what's next. By literally reaching for the Sun and the Moon, and doing so while overcoming constraints that their peers in advanced countries didn't even dream of, India's scientists have delivered an important lesson. We should internalise it.