



THE LOVE SPACE GUIDE N. 002

How the International Space Station Actually Works

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Right now, roughly 400 kilometres above your head, a structure about the size of an American football field is moving at close to 28,000 kilometres per hour - fast enough to circle the entire planet once every 90 minutes. The crew aboard watches the sun rise and set sixteen times a day. This is Guide 002 in The Love Space Guide series.

What the Station Actually Is

The International Space Station is a permanently crewed research laboratory in low Earth orbit, assembled piece by piece beginning with the launch of the Russian Zarya module in November 1998. It is a partnership between five space agencies: NASA (United States), Roscosmos (Russia), JAXA (Japan), ESA (Europe),

and CSA (Canada). Over more than 40 assembly missions, modules, trusses, and solar arrays were carried up and joined together in orbit, making it the largest structure humans have ever built in space.

The station has been continuously occupied since the arrival of Expedition 1 in November 2000, meaning there has been at least one person living off the planet every single day for over two decades. It typically hosts a crew of seven, who rotate on missions that usually last around six months.

How It Stays Up There

A common misconception is that the station floats because there is no gravity in space. In fact, gravity at the station's altitude is still roughly 90% as strong as it is on the ground. What the crew experiences is not the absence of gravity but continuous free fall: the station is falling toward Earth constantly, while also moving sideways so fast that it keeps missing. That balance between falling and forward motion is what we call orbit, and it produces the weightlessness seen in every video from aboard.

Because the thin traces of atmosphere at that altitude create a small amount of drag, the station gradually loses height and would eventually re-enter if left alone. To counter this, its orbit is periodically boosted higher using thrusters on visiting spacecraft or attached modules - a maneuver known as a reboost.

Air, Water, and Power

Keeping people alive requires a closed-loop life support system. Oxygen is generated largely by splitting water into hydrogen and oxygen through electrolysis, and the station's water recovery systems reclaim moisture from humidity, wash water, and even urine, recycling a large share of the water on board. Carbon dioxide breathed out by the crew is scrubbed from the cabin air so it does not build up to dangerous levels.

All of this runs on electricity from the station's large solar arrays, which convert sunlight into power and charge batteries so the systems keep running through the roughly 45 minutes of darkness during each orbit. The arrays are among the features that make the station bright enough to see from the ground with the naked eye.

What the Crew Actually Does

The station exists first and foremost as a laboratory. Astronauts spend much of their working time running experiments in microgravity - studying how the human body changes over long missions, growing protein crystals, testing materials, and observing fluids and flames behaving in ways impossible on Earth. This research informs both future deep-space travel and practical science back home.

Beyond experiments, crews spend significant time on maintenance, exercise, and the occasional spacewalk. Because bones and muscles weaken without the constant load of gravity, astronauts exercise around two hours a day using a treadmill, a stationary bike, and a resistance device that simulates lifting weights.

Seeing It From Your Own Backyard

You do not need a telescope to spot the International Space Station. On a clear evening shortly after sunset or before sunrise, it appears as a steady, bright point of light moving smoothly across the sky over a few minutes - not blinking like an aircraft, because what you are seeing is sunlight reflecting off its solar arrays and body. NASA's free "Spot the Station" service will send you the exact times and directions to look for passes over your location.

Myths Worth Retiring

Myth: There is no gravity on the space station. Gravity there is nearly as strong as on the surface. The floating you see comes from the station and everything in it being in constant free fall together, not from gravity switching off.

Myth: The station just hangs motionless in space. It is racing around the planet at about 28,000 kilometres per hour and completes a full orbit roughly every 90 minutes.

Myth: You can see the Great Wall of China from the station but not the station from Earth. It is the reverse that holds up better: the station is easily visible to the unaided eye from the ground, while individual human-made structures are extremely hard to pick out from orbit.

Frequently Asked Questions

How high up is the International Space Station?

It orbits in low Earth orbit at an altitude of roughly 400 kilometres (about 250 miles), though this varies slightly and is periodically raised to counteract atmospheric drag.

How long has the station been continuously occupied?

People have lived aboard without interruption since November 2000, when the Expedition 1 crew arrived - more than two decades of unbroken human presence in space.

How many people are on board at once?

The station typically houses a crew of seven, who usually stay for around six months before returning to Earth and being replaced. The number can rise briefly when a visiting spacecraft arrives during a crew handover.