

Steve & Debbie Russell's Telescope Clinic

Watching the International Space Station

The International Space Station is bright and easy to watch with just your unaided eye. The ISS is very bright because it has several large solar panels, and at times it will seem brightest just before fading over the horizon, as those solar panels are reflecting sunlight that can be more “aimed” at the observer.

How to identify the ISS: There are no flashing lights and no sound. It moves at a steady pace that you are more likely to recognize on subsequent observations. It moves at about 17,000 miles per hour and it is more than 200 miles above Earth. The orbiting astronauts fly through sunrise and sunset 15 times every day! It is very bright, generally brighter than the planet Jupiter or even as bright as our brightest night-sky planet, Venus.

It will usually become visible while fairly low on the horizon, move steadily and silently across the sky, and fade low on the horizon. For the ISS to be visible requires that certain conditions be met: the Sun must be far enough below the horizon to have a fairly dark sky, but sunlight must still be able to illuminate the spacecraft. In winter there is a narrow window of opportunity for this just before sunrise and after sunset, but for a few weeks around summer solstice it can be seen all night long if it flies over your location.

NASA publishes sighting opportunities but we prefer <http://heavens-above.com/>. Under “Configuration” click “Select from map” to use Google maps. Find your observing location and choose the correct time zone (DST, Darkness Squandering Time, is automatically added). Make sure you bookmark it after all that effort. Precision is not critical; ~70 miles along Earth's surface is about one degree.

Click “ISS” for a 10-day listing of opportunities to see the International Space Station. Flyover times for the Hubble Space Telescope are available as “HST” although it frequently seems low and dim; and “Daily predictions for brighter satellites” will give a daily list of various satellites and rocket pieces flying overhead. Click 3.0 or 3.5 to list only brighter satellites and space junk, or click 4.5 or 5.0 for a list of fainter ones also. Those numbers use the conventional magnitude system whereby a brighter object has a lower (or even negative) number. If viewing from a city or when the Moon is near full, magnitude 3.5 may be hard to see. Clicking “Next” will extend the time period of the list but the accuracy may be off slightly. The trajectory of the International Space System is explained on a link, as well as much info on planets, many help screens, and a chart of the entire sky. ISS passes that are not visible are available (of potential interest to astrophotographers and amateur radio enthusiasts) so click “Visible” to make the passes listed ones that can be seen.

Date	Brightness	Start			Highest point			End			Pass type
	[Mag]	Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.	
21 Jun	-2.8	22:04:49	10°	NW	22:08:03	53°	NNE	22:11:01	12°	ESE	Visible

The listing above is dated June 21. Heavens-Above gives times in twenty-four hour mode. The ISS will become visible low in the northwest at 10:04 PM. This pass's highest elevation will be 53 degrees while it is in the north-northeast, then it will fade from view low in the east-southeast. Especially cool are those flyovers that start or end when the ISS is high in the sky, at maybe 40 or 50 degrees altitude. The spacecraft is flying into or out of Earth's shadow, and that will be seen as a 5 or 10 second fade.

Flyovers are easier to spot if the satellite will be high in the sky, as noted in the "Highest point" column. The higher flyovers last longer, giving you more opportunity for a positive identification.

Accurate time is important and we allow a few minutes outside before it's scheduled. This allows the eyes to adapt to being in the dark, and if the time is off a bit we don't miss the show. And a few extra minutes standing outside looking at the sky is always welcome.

Iridium flares are also interesting. These appear from nowhere, become very bright (sometimes as bright as Venus), and fade again to invisibility within maybe half a minute. We sometimes catch them in our peripheral vision without knowing in advance they would be seen, but they are too bright to ignore.