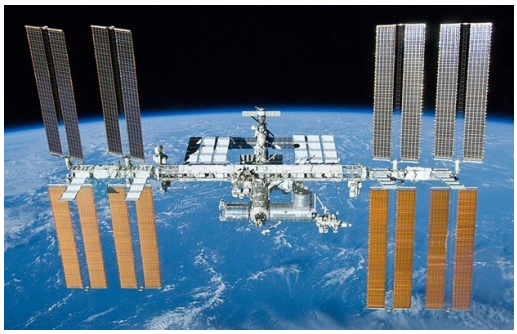
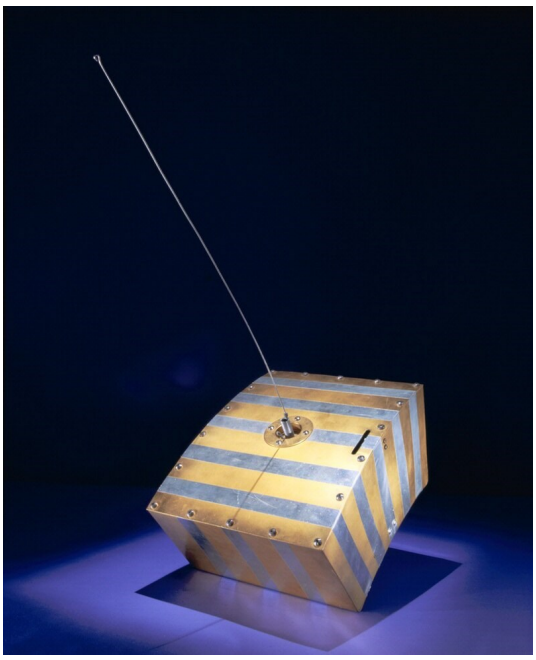
Microvolt

Monthly newsletter of the Utah Amateur Radio Club

April 2025



Extraterrestrial



On 12 December 1961 the Agena rocket *Discoverer 36* blasted off the launch pad at Vandenberg Air Force Base carrying the first non-government and first non-commercial payload, the OSCAR 1 satellite. An acronym for *Orbiting Satellite Carrying Amateur Radio*, OSCAR 1 broadcasted a beacon on 2 meters for 22 days before burning up on re-entry. The fact is, amateurs have not only been interested in space projects since the earliest days of radio, but amateur radio in one form or another has been in space long before that historic launch. Let's explore what that means, and how those might be relevant to us today.

Cover – Amateur radio in space

Actual amateur radio equipment in space is a relatively recent thing, while human-generated radio waves have invaded space outside Earth's atmosphere since the earliest days of radio. Amateurs have placed ham radio on satellites, the ISS (international Space Station), the space shuttle, and even on the Moon. Meanwhile, radio signals by their nature, penetrate space, objects, and even air, depending on the frequency (see the Editorial).

Because electromagnetic radiation (a radio wave or light beam) does not require a traditionally tangible medium, it can travel through space, allowing both sunlight to strike the Earth's surface and a ground station to communicate with space craft. This is what helps your smartphone to communicate with a cell tower so you can speak with a friend or engage the internet from inside your home or a cardboard box.

So, just how far can radio waves travel? In theory, the range is limitless. In fact, we've been able to communicate over 15 billion miles with the Voyager 1 probe. The farthest radio signal ever picked up originated from an object 8 billion light years away. This means we can use radio to communicate with objects in outer space, LEO (low-Earth orbit), and everywhere in between, including the Moon.

On 27 January 1953 Ross Bateman W4AO and Bill Smith W3GKP confirmed the first reliably recorded amateur radio signals transmitted and received by EME (Earth-Moon-Earth, also called *moonbounce*) propagation at 1000 watts on 144 MHz. This event was detailed in the March 1953 issue of QST starting on page 11.

After a couple of years of failed attempts, they successfully used the Moon as a passive reflector on which to bounce a signal, that was then heard by another Earth station. The feat had been achieved by the military a few years prior to that day, but it was on very high power. The lower power limitation of amateur radio rules presented quite the technological challenge for the two, especially since the Moon is a moving target.

On 19 January 2024 the first amateur radio station on the Moon was established by Japanese group JHRC (JAXA Ham Radio Club) JQ1ZVI, and has been transmitting a Morse code signal on 437.410 MHz since the first day.

As we had mentioned, amateurs have installed ham radio equipment on the ISS and satellites. The ones on the ISS serve as regular transceivers, that allow crew members to speak with amateurs on the ground. Those on satellites typically function as repeaters, allowing any two amateurs within view of the same satellite to use it to communicate with each other. Both cases promote interest in STEM (science, technology, engineering, and math) among the interested amateur, especially the youth.

Microvolt editorial staff