

# The Final Frontier...

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This is being written just a few weeks after all the hubbub about the near-space trip of “Captain Kirk” (otherwise known as actor William Shatner) aboard Jeff Bezos’s New Shepard space tourism capsule. Space, it seems, is cool again. But ham radio, it seems, is not ... particularly in the eyes of many hams. Our technology, in their view, isn’t very high compared with such things as smartphones, tablets, and space travel. And many of these hams pass along this impression to neighbors, friends, and reporters. “Well, it’s not very hi-tech but it still gets through ...” This is the second big lie that hams tell about themselves and their hobby (the first is that ham radio is dying, when licensing numbers are at record levels and keep growing).

Let me let you in on a little secret (and feel free to tell your friends and neighbors) ... if space is hi-tech, then so is ham radio. Amateur radio is a spacefaring hobby — best as we can tell, the *only* spacefaring hobby — and has been since the dawn of the space age (actually, even longer, but we’ll get to that). This month marks a very important milestone in the history of amateur radio space communications (actually, two, but we’ll get to that, too). Sixty years ago this month, in December 1961, the first amateur radio satellite, OSCAR-1, was launched into orbit. It was not only the first amateur radio satellite but the first privately built satellite ever launched, period.

The birth of the amateur radio space program can be traced to the pages of *CQ* in April 1959, when then-Semiconductors Editor Don Stoner, W6TNS (SK), wrote about plans for a balloon-carried, solar-powered, transistor repeater and mused, “can anyone come up with a spare rocket for orbiting purposes?” That throwaway line set in motion Project OSCAR (Orbiting Satellite Carrying Amateur Radio), in which Don and two other *CQ* columnists, George Jacobs, W3ASK, and Bill Orr, W6SAI (SK), became heavily involved.

Since 1961, over 100 satellites designed and built by hams have been launched into orbit, providing long-range communications without worrying about the vagaries of propagation. OSCAR-100 is the first geosynchronous amateur radio satellite, appearing to remain in one spot in the sky, just like those hi-tech TV satellites. Its “footprint” covers all of Africa and Europe, most of Asia and some of South America. Oh, and did we mention that OSCAR-94 is orbiting the Moon?

Nearly 40 years ago, in 1983, Astronaut Owen Garriott, W5LFL (SK), took a 2-meter handheld with him into space aboard the shuttle Columbia and made the first ham radio contacts from Earth orbit. Today, amateur radio is a staple aboard the International Space Station, many astronauts hold ham licenses and the ARISS (Amateur Radio on the International Space Station) program has introduced thousands of young people to both amateur radio and careers in science, technology, engineering, and math (STEM), not to mention space travel.

Actually, amateur radio space communications extends back even farther. The first two-way amateur radio moonbounce (EME) contact was made in 1960, and pioneering hams had been hearing their echoes off the moon since 1953. Hams began conducting experiments with meteor-scatter communications in the 1940s. The digital modes used for most meteor scatter contacts today have their roots in software developed by K1JT for cutting-edge radioastronomy.

Even everyday HF DX communications involve bouncing our signals off different layers of the ionosphere, which — while tech-

nically part of Earth’s atmosphere — creates the boundary between our atmosphere and outer space. In fact, William Shatner’s suborbital flight climbed to an altitude of 65 miles, the lower boundary of the ionosphere’s E-layer. Our HF signals typically travel much higher, to the F-layer.

The first recorded use of ionospheric propagation for HF communication occurred 100 years ago this month (our second significant anniversary this December) and the likely mechanics behind the paths those signals took is the subject of our lead article in this issue. Making the most of ionospheric propagation requires at least a basic knowledge of “space weather,” as our ability to communicate over great distances depends heavily on what’s happening on the sun and in the solar wind. Example: A solar flare and Earth-directed coronal mass ejection (CME) two days before the CQ World Wide DX Contest’s SSB weekend at the end of October threatened to severely degrade HF propagation. Fortunately for us, it missed us and propagation was excellent on the contest weekend. But the well-prepared contester was aware and ready to make adjustments in strategy if needed. And our non-contesting colleagues in HamSCI <www.hamsci.org> were monitoring the CME’s impact on our ionosphere with their personal space weather stations. (In what other hobby do people have personal space weather stations?)

All of this brings me around to the real reason for this rant: This issue is our annual Technology Special, in which we spotlight not only the hi-tech aspects of our hobby but some of ham radio’s vaunted tradition of repurposing existing technology for new functions. And in case you were wondering, in addition to analyzing propagation paths of a century ago, this issue’s articles include just about everything we’ve discussed so far on this page plus more: Moonbounce, satellites, a webSDR that will let you listen in on OSCAR-100 even if you aren’t in its footprint, microcontrollers and FLdigi, monitoring digital transmissions from aircraft, a new look at old antenna technology, and a new theory on long-haul propagation on 2200 meters.

So, if you’re looking for a magazine about “making do” with aging technology to prop up a shrinking and aging hobby, you’ve come to the wrong place. But if you’re looking for a resource on making the most of a spacefaring hobby that’s open to anyone, that blends internet and RF technology to maximize your enjoyment of what AA6JR calls the “magic in the sky,” then look no farther than right here. Because ham radio — and *CQ* — have been taking you to “the final frontier” for decades and will continue to do so as we turn to the next page of our “captain’s log.”

## Beyond Technology

Of course, ham radio isn’t all about technology. It’s about using technology to communicate, and having fun in the process. Highlights of the communication-focused features in this issue include our Periodic Table of Contests for 2022—a handy chart of major on-air competitions for the entire year—and two looks at making the most of simplex communication on VHF-FM.

Finally, we want to wish all of our readers a Merry Christmas, Happy Hanukkah, Happy Kwanzaa, or whatever other holiday you may celebrate to bring a little more THz-range radiation into our lives in these dark winter months.

– 73, W2VU