By Gil McElroy, VE1PKD

Keeping Track of OSCAR: A Short History Amateur Radio's Race for Space

Making contacts through a long chain of ever-more-sophisticated Amateur Radio satellites has made satellite QSOs an everyday occurrence. But as we wait for the launch of the Phase 3D "supersat," this fascinating look at our first faltering steps into space is a dramatic illustration of just how far we've come!

Years in the making—and in the waiting!—AMSAT's Phase 3D satellite is the most sophisticated and expensive Amateur Radio satellite ever built. With transmitters and receivers spanning 21 MHz to 24 GHz, it will bring satellite communication to virtually every ham with only modest equipment. "Large expensive satellite stations will be a thing of the past," wrote Steve Ford, WB8IMY, in May 1995 *QST*.

According to recent reports, our wait for Phase 3D may soon end. While we're waiting for "launch day," though, let's take a look at the truly remarkable story of how hams came to have their own satellites.

Most of us know that science fiction writer Arthur C. Clarke, in an October 1945 article in *Wireless World* magazine titled "Extra-Terrestrial Relays, Can Rocket Stations Give World-Wide Radio Coverage?", first proposed placing an artificial satellite in geosynchronous Earth orbit. What most of us don't know, however, is that Clarke's proposal called for a manned, steam-powered satellite! At the time, vacuum tubes were the order of the day; transistors hadn't been invented. Neither had solar cells and, given the state of WW II technology, Clarke could come up with no better means of converting solar energy into usable power.

Clarke did, however, correctly envision the satellite's role in television and radio communication.[1] But in 1945, Earth-orbiting objects (other than the Moon, the usual space debris and perhaps an alien spacecraft or two!) existed only in science fiction novels. Something far more down to Earth—or at least closer to it—was needed.

On August 10 of that year, the *New York Times* reported that Westinghouse had a plan that would revolutionize broadcasting. A system of 14 airplanes continuously flying at an altitude of 30,000 feet would blanket most of the US with radio and television signals. Nicknamed "Stratovision," it never came to be.

First in Space

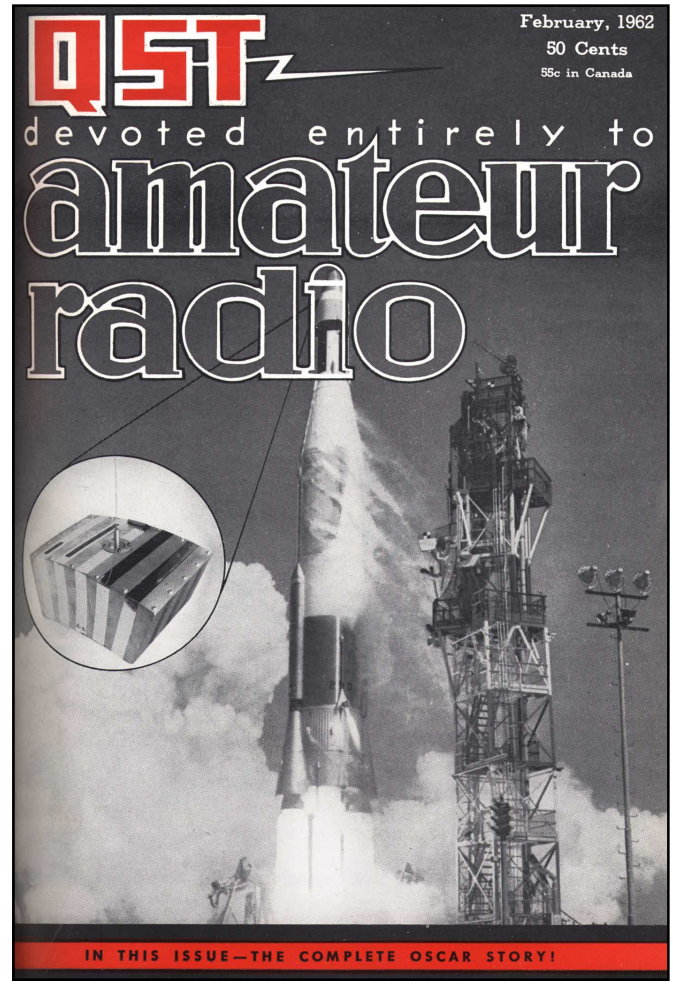
I was almost two years old when the Soviet Union launched *Sputnik I* (its full name was actually *Prosteyshiy Sputnik*, or "simplest satellite") on October 4, 1957. I was too young to understand its implications and possibilities. Others, however, weren't, and hams led the way. According to Helen Gavaghan in *Something New Under the Sun: Satellites and the Beginning of the Space Age*, *Sputnik*

> …was broadcasting at 20 and 40 MHz, frequencies that the network of American radio tracking stations set up to follow U.S. satellites...could not detect, even though every ham radio operator in the world could hear the satellite's distinctive "beep beep."[2]

It would take a week before American satellite stations could accomplish what hams were able to do from the start. Satellites weren't too much of a stretch for technologically progressive hams. After all, we'd been bouncing signals off of the Moon since 1953, only seven years after the US military had paved the way. Why should artificial satellites be a problem?

On January 31, 1958, *Explorer I*, the first US satellite, was put into orbit, and ham operators were involved right from the start. *QST* reported in the March 1958 issue that the Voice of America was offering QSL cards to amateurs who reported receiving *Explorer*'s signal. *QST* also offered a handy tip to those interested in this new technology:

> If you don't have a special converter for picking up signals from the Explorer and its successors, an f.m. tuner can be pressed into service. Simply poke a wire in near an i.f. plate lead, connect to your communications receiver set at 10.7 Mc., and tune.



The cover of the February 1962 *QST* celebrated the launch of OSCAR 1.

A year and a half later, on August 12, 1960, *Echo I* was launched. It was the first true communications satellite and the first artificial satellite that could be seen from Earth with the naked eye. *Echo I*, a large mylar ball that efficiently reflected radio waves, was a passive repeater from which signals could be bounced. Using it wasn't all that different from moonbounce, but it was a start. *Echo I* was also a better solution that one that had seriously been proposed by the Air Force—placing 500,000,000 tiny copper wires into orbit 2000 miles above the Earth to create an artificial ionosphere!

But what about a satellite of our own—one built by and for hams? The idea was first seriously proposed in an article by the late Don Stoner, W6TNS, in the April 1959 issue of *CQ* magazine. "Currently being tested," he wrote, "is a solar-powered six-to-two-meter transistor repeater that could be ballooned over the Southwest. Could anyone come up with a spare rocket for orbiting purposes?"

Fred Hicks, W6EJU, didn't have a rocket, but he did have the requisite enthusiasm and, having worked for a missile contractor and witnessing six satellite launches, some background in the field. He contacted Stoner and the dream began to be take shape. Hicks eventually became chairman of the Project OSCAR—*O*rbital *S*atellite *C*arrying *A*mateur *R*adio—Association located in California, and Stoner wrote the first major article about amateur satellites, published in the February 1961 issue of *QST*. "Be assured," he wrote, "that this is not an April Fool joke."

In the article, Stoner went on to note that the idea of an amateur satellite really took root when the US launched its first satellite with a remotely controlled transmitter and receiver. If the government could do it, why not hams? On September 10, 1960, Stoner, Hicks and an ARRL representative met with the chief of the Space Instrumentation Section at the Jet Propulsion Lab in California to craft a plan. Two phases were originally envisaged. The first was the design, construction and launch of a beacon transmitter. The second was an orbital repeater. The Amateur Radio space race was on! Stoner made an appeal in the pages of *QST*:

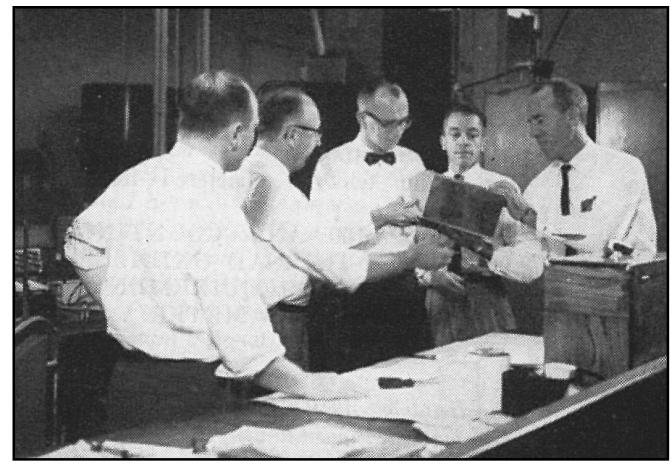
> There is no other group of 200,000-plus persons with the technical knowledge or the equipment to carry out the OSCAR program. With all available amateurs contributing to the effort, it would be possible to supply the scientific world with volumes of communication data gathered by observing and using the OSCAR satellite.[3]

In the spring of 1961, the ARRL officially endorsed Project OSCAR. In May, *QST* began running a series of articles preparing amateurs for the imminent launch of *OSCAR I*, a number of them written by Ray Soifer, K2QBW. With titles like "Space Communication and the Amateur," and "The Feasibility of Amateur Space Communication," Soifer's series spread the satellite gospel and laid the groundwork for widespread interest in amateur space communications.

The project progressed rapidly. In July, the ARRL formally requested the cooperation of the State Department in backing the amateur satellite program, noting that the Air Force would allow *OSCAR I* to be carried into space in conjunction with the launch of a *Discoverer* series satellite from Vandenberg Air Force Base in California. In September, Project OSCAR at last received the backing of the FCC and the blessing of the State Department. Amateurs had a date with space! As William Orr, W6SAI, later dramatically reported in the pages of *QST*:

> On December 12, 1961, at 2042 GMT, Discoverer XXXVI was launched into orbit, carrying into separate orbit OSCAR I guided in its flight into history by the thoughts and prayers of thousands of radio amateurs who stand on the threshold of tomorrow.

It was 60 years to the day since Marconi first heard the faint sound of a Morse "S" atop a hill in Newfoundland transmitted from the far side of the Atlantic. What hams heard of *OSCAR I* from its first transmissions on the afternoon of December 12, until it ceased transmitting on the 30th, was a Morse code "HI." The satellite completed more than 300 orbits before burning up as it reentered the atmosphere on January 3, 1962.



OSCAR 1 completes its final checkout. From left to right: Gail Gangwish; Nick Marshall, W6OLO; Don Stoner, W6TNS; Chuck Towns, K6LFH; and Fred Hicks, W6EJU.

QST reported that more than 3000 reception reports had been received by Project OSCAR, which kept track of the satellite's internal temperature by asking hams to count the number of "HI"s transmitted over a set period of time. The faster the rate, the higher the temperature. It wasn't sophisticated by today's standards, but it worked, and the technique was used to determine the failure of *OSCAR II*, launched in the summer of 1962, after transmitting for 18 days.

It would be three years before hams would again venture into space. *OSCAR III* was launched in March 1965. This was a satellite with a difference. *OSCAR III* wasn't a simple beacon. It was equipped with a transponder, or "translator" as it was then called, operating at 2 meters. It took only a little bit of doing for hams to catch on to working what was really a rapidly moving repeater.

By the satellite's ninth orbit, the first two-way amateur satellite QSO occurred between HB9RG in Switzerland and DL6EZA in Germany. Two meters became the hottest band that March as hams the world over sought the ultimate DX. Congratulations poured in to the Project OSCAR offices. *QST* ran pages of "Calls Heard" in the May issue that year, at the same time sadly noting that *OSCAR III*'s translator had failed on March 24 after 206 orbits.

Other OSCARs would follow, and AMSAT, the "Radio Amateur's Satellite Corporation," as it was announced in the June 1969 *QST*, would take a place in space as well. Many OSCARs would follow, with the latest being UoSat-OSCAR 36. Through the years their capabilities have expanded. Now ham satellites are relaying not only voices or Morse, but also high-speed digital information.

Acknowledgment

"Keeping Track of OSCAR" was the title of an article by Ralph Burhans, W8FKC, and Ray Rankins, W8CMC, that appeared in the May 1962 issue of *QST*.

Notes

[1]As reported in January 1978 *QST*, Clarke was made an honorary life member—number 2001, no less—of AMSAT in recognition of his important role in the origins of satellite communication.

[2]Gavaghan, Helen, *Something New Under the Sun: Satellites and the Beginning of the Space Age* (New York: Copernicus, 1998), p 33.

[3]Stoner, Donald L., W6TNS, "Project OSCAR—Something of the Future," *QST*, February 1961, p 146.

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