

Bill Brown, WB8ELK: Master of High-Altitude Balloon Projects

This ham estimates that he's launched more than 500 high-altitude balloon projects over the course of 3 decades.

Jen Glifort

After watching a documentary about Joseph Kittinger's 1960 record-setting parachute jump from a research balloon 103,000 feet in the air, Bill Brown, WB8ELK, felt the need to reach for the highest heights himself. Bill said, "Kittinger's description of viewing the curve of the Earth and the blackness of space from his stratospheric perch inspired me to find a way to see this incredible view for myself." This led to more than 500 launches of high-altitude balloon projects over the span of 30 years.

The Edge of Space

Bill's first flight took place from Findlay, Ohio, on August 15, 1987. For his first flight, Bill designed a remote viewing platform, using a P.C. Electronics amateur TV transmitter on 434 MHz, and a 50 mW, 2-meter FM beacon to track and direction-find the payload (this was, of course, before GPS). The balloon was a latex weather balloon, able to carry up to 12 pounds of Amateur Radio equipment (at 6 pounds per payload) up to about 100,000 feet without needing an FAA waiver. "Amateur TV stations across the midwest had beautiful reception from this tiny, 1 W amateur TV transmitter as far as 250 miles away," Bill explained. "The 2-meter beacon was heard over 400 miles away."

The payload was found by a farmer in a soybean field 6 weeks later, roughly 1 mile from Bill's estimated landing zone. A few months later, Bill was at it again, this time with the smallest TV camera available at the time, weighing

8 ounces and able to take live, black-and-white video footage from the stratosphere. "The view was incredible," Bill said. The Amateur Radio community took an interest in this new endeavor, and a large foxhunting effort took place during the launch — including a chase helicopter. The payload landed in the Mojave Desert, allowing the helicopter to land right beside a sand dune to recover the equipment. Since his first flight, Bill has launched high-altitude balloon projects in 21 states (see Figure 1).

Skytracker

Small balloons designed for high-alti-

tude projects are known as "pico balloons." The goal in a pico balloon project is to make everything very light. Bill's most recent pico project involved the design of an Amateur Radio tracker weighing less than half an ounce. "The goal was to create a tracker transmitter — called the Skytracker — that is small enough to be flown on such a small balloon for days or weeks at a time," Bill said. The tracker ran entirely on solar power, sent down position reports every 2 minutes via the low-power APRS transmitter's GPS receiver, and flew on a Mylar foil party balloon (see Figure 2).

Bill's latest Skytracker project used a larger balloon, from Scientific Balloon Solutions (scientificballoonsolutions.com). The payload used a 34-gauge magnet wire dipole and weighed 17 grams. It stayed in the air for over 75 days, floating at 40,000 feet, and circled the world more than six times before coming down in the Ivory Coast, in Africa. This flight used WSPR mode to operate on the 20-meter band. Bill said, "The weak-signal capability of the WSPR mode, combined with a distributed network of worldwide receive stations, makes it possible to use a 20 mW HF transmitter to send position reports and telemetry thousands of miles away. And, in fact, it was heard several times during its flight from the other side of the world."

In order to track the flight nearly in real time, Bill wrote a *Python* script, which took reception reports from www.wsprnet.org/drupal, reformatted the data, and sent it to the aprs.fi website.



Figure 1 — A balloon project from Bill Brown, WB8ELK; Paul Verhage, KD4STH, and Ann Boes, KD0QCA, carrying a 4-H Lab Revolution student experiment at 53,000 feet. This photo was taken by a balloon launched by Jeff Ducklow, N0NQN, of the Mayberry Galactic balloon group. [Jeff Ducklow, N0NQN, photo]



Figure 2 — Bill Brown, WB8ELK, and his Mylar party balloon, carrying a 12-gram Skytracker APRS tracker. [Bev Teter, WB4ELK, photo]

There is also tracker.habhub.org for tracking these balloons, which has a map display of the aprs.fi data, showing all Amateur Radio high-altitude balloons flying at any given time (see Figure 3).

Student Launches

Bill has mentored many school and university high-altitude balloon programs over the years. Bill said these projects are “a great way to teach students about space and science,” and lead to more students getting their



Figure 4 — An Angry Bird, scowling from near-space orbit. [Bill Brown, WB8ELK, photo]

Amateur Radio licenses. There are frequent student launches of high-altitude balloon projects, sometimes involving photography. Some students have even taken part in launches to the stratosphere using GoPro cameras, often with a toy in the background. A Spaceport Indiana summer science camp Bill mentored sent up an Angry Bird (see Figure 4). He also recalled a senior class design project at the University of Alabama in Huntsville’s College of Engineering that involved students designing, building, launching, and recovering a payload that flew on a balloon up to over 100,000 feet. Many of the students in this class went on to earn their Amateur Radio licenses as a result.

Small trackers use less than 4 cubic feet of helium and, as Bill said, “can be inflated right in the classroom as a great way to learn about Amateur Radio and inspire STEM [science, technology, engineering, and math] activities with students.” Students can even find ways of tracking balloon projects from their smartphones. These accessible and economic projects inspire students to get involved with Amateur Radio, and to become engaged in hands-on science experiments. “Over the course of 10 years,” Bill explained, “the BalloonSat class has launched 63 balloons and exposed hundreds of students to high-altitude ballooning and Amateur Radio.”

High-Altitude Balloon Resources

You can find more information about Bill’s latest projects on his websites at wb8elk.com and elktronics.com.

More resources related to high-altitude balloon projects can be found on sites such as arhab.org, superlaunch.org, eoss.org, kaymont.com, and sphera-chutes.com. Bill can be reached at wb8elk@gmail.com.

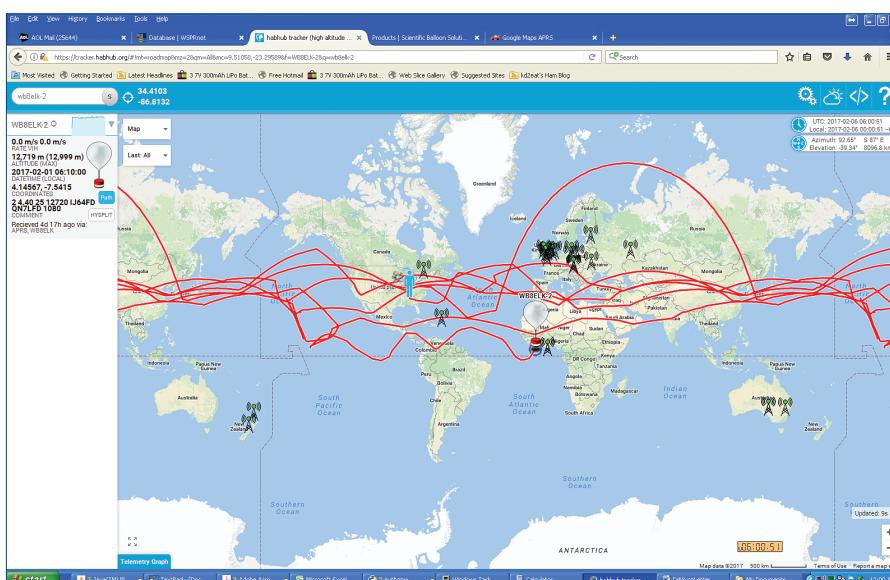


Figure 3 — The map from tracker.habhub.org showing which high-altitude balloon launches are taking place at any given time. The WB8ELK-2 Skytracker balloon went around the world six times in 75 days. [Bill Brown, WB8ELK, photo]

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