By Dr. H. Paul Shuch,* N6TX

DR. SETI'S STARSHIP

Searching For The Ultimate DX

Big Enough

Regular readers of this column may recall the W2ETI Moonbounce Beacon, which we've discussed on these pages on several occasions. A precisely calibrated 1296-MHz transmitter bouncing carefully timed CW signals off the Moon, this facility was built and operated by members of the non-profit, membership-supported SETI League, and used for several years by dozens of the world's amateur SETI enthusiasts to ensure the proper operation of their backyard radio telescopes. It was even used by scientists at the great Arecibo radio observatory in Puerto Rico, and the Jodrell Bank radio telescope in the UK, to verify the sensitivity of their research systems. Unfortunately, this useful facility, once operational whenever the Moon was above the horizon from its New Jersey QTH, is no longer available to the world's amateur and professional radio astronomers. It seems we improved it to death.

When first activated in 2001, The SETI League's Lunar Reflective Calibration Beacon sported a modest antenna array consisting of eight small helices on an automated azimuth-elevation rotor (see photo A), built for us by Dave Clingerman, W6OAL. The relative low gain of these antennas facilitated ready tracking of the Moon under computer control. Their beamwidth was sufficiently broad as to be quite tolerant of tracking imprecision, affording us high system reliability and minimal downtime.

The downside of this arrangement is that the effective isotropic radiated power (EIRP) of the beacon was relatively low, producing weak echoes receivable by the likes of Arecibo and Jodrell Bank, but only the best-equipped amateur SETI stations. Clearly, if the beacon were to perform its intended function of providing calibration signals that could be used by the average amateur, it was going to need to shout more loudly. This could be accomplished in one of two ways: We could add more transmitter power or a bigger antenna.

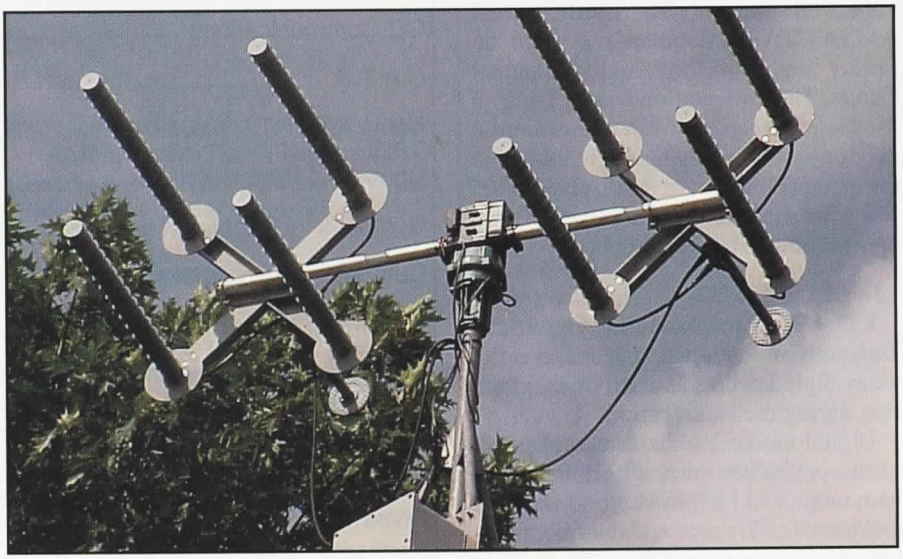

Photo A. Original helix array at the W2ETI EME Beacon.

Ultimately, station trustee and SETI League president Richard Factor, WA2IKL, opted to do both. A quarter-kilowatt, solid-state power amplifier from Kuhne Electronics in Germany replaced the less-reliable 100-watt homebrew PA, and the helix array was removed (photo B) to make way for a new array of Directive Systems long loop Yagis (photo C). Between these two upgrades, system EIRP was effectively increased by over 7 dB, placing our echoes well within the grasp of modest receiving stations using the ubiquitous 10-foot–diameter backyard TVRO dishes which dot the countryside.

Photo B. Helix array removed from service to make way for new loop Yagis.

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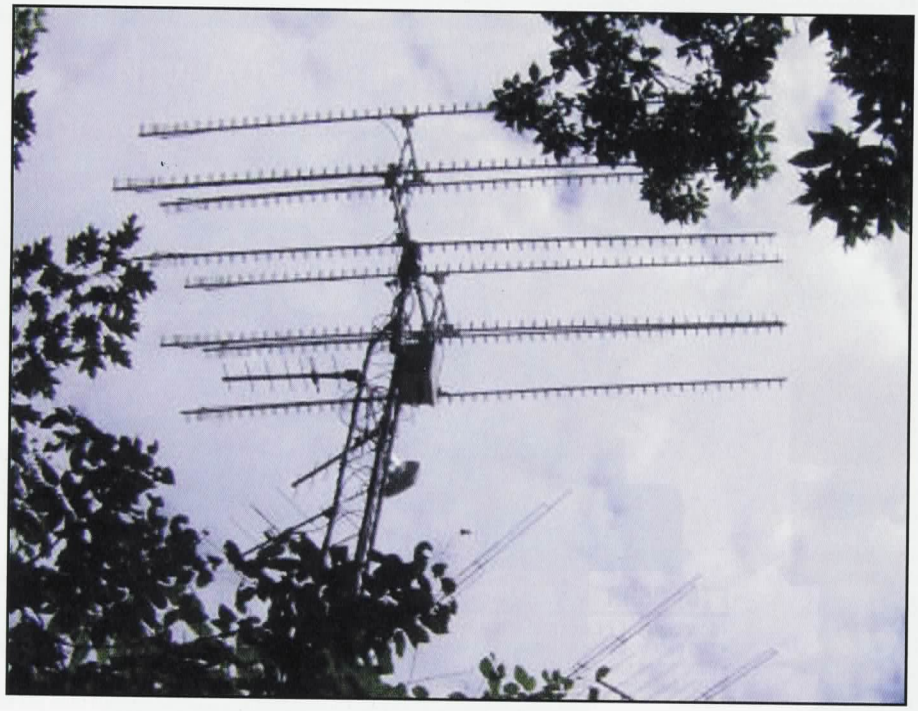

Photo C. Array of eight long loop Yagis installed at W2ETI Moonbounce Beacon.

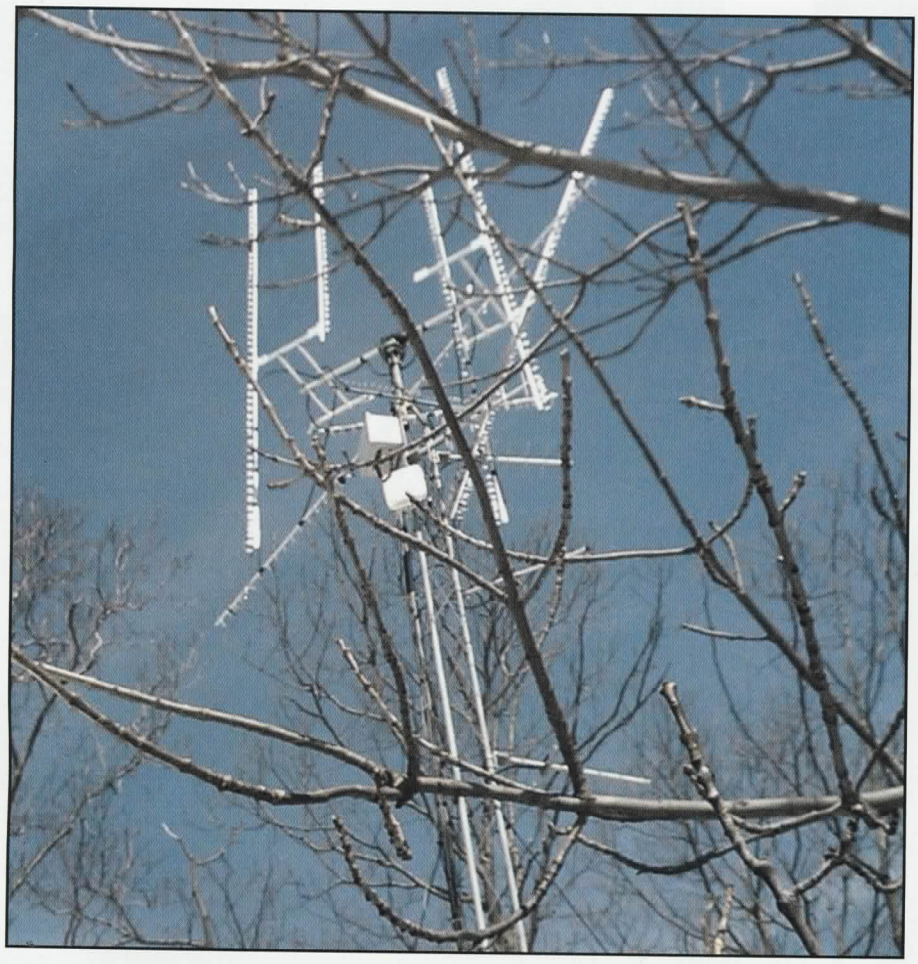

Photo D. The winter storms of March 2009 rendered the loop Yagi array a jumbled mass of aluminum, proving that the antenna was indeed big enough.

Winters in the northeast U.S. can be especially harsh on antennas. The late EME pioneer Sam Harris, W1FZJ, participated in the first-ever EME contact from this region and was always rebuilding his antennas. Sam knew a thing or two about SETI, and radio astronomy, having built the parametric amplifier used by Frank Drake for Project Ozma, the first modern SETI experiment, conducted in Green Bank, West Virginia in 1960, and later working as the chief engineer of the monster Arecibo radio telescope in Puerto Rico. He used to say that if your antenna didn't come down in last winter's storms, it wasn't big enough!

The new W2ETI Moonbounce Beacon's antennas, it would appear, were big enough. Photo D shows what happened to the big loop Yagi array during its very first winter in service. Since The SETI League is a private ham club, receiving no government funds whatsoever, it lacks the resources to replace the array, nor would it be prudent to do so even if we could afford it. The same thing would probably happen again the following winter.

Moonbounce guru Allen Katz, K2UYH, who chairs The SETI League's EME Committee, is of the opinion that Yagi arrays are not the best solution for 23-cm EME. He prefers big dishes, and has for years operated a 28-foot–diameter Kennedy parabolic reflector from his QTH within line of sight of the W2ETI beacon facility. Allen maintains that a 10-foot TVRO dish (the same antenna many amateur SETIzens use for their receive stations) would make an ideal uplink antenna for the W2ETI beacon. If it sits close to the ground, rather than being installed at the top of a tower, such a dish at least has a fighting chance of surviving the winter wind, snow, and ice.

The challenge is automating the aiming of such a dish so that it will track the Moon in real time, unattended. That problem was solved with both the helix and the Yagi arrays through the use of a Yaesu G5600B Az/El rotator, driven by the popular Nova software by Mike Owen, N9IP. However, the Yaesu rotor can't handle a 10-foot dish, so some other arrangement will be necessary to get the station back on the air.

Until the antenna challenge is resolved, the W2ETI Moonbounce Beacon remains off the air. Thus, until such time as it is restored to service, SETI League members will have to use something else to calibrate their stations. I suggest that a confirmed extraterrestrial signal would do nicely! 73, Paul, N6TX