Dual-Band Sloper for 60 and 17 Meters

An abridged half-sloper antenna that can help fulfill the needs of hams with space limitations.

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Operating HF from my suburban lot requires some creativity. I reside in Wall Township, New Jersey, and my local codes don't allow for antennas — or their free-standing supports — to exceed 21 feet. And should an antenna fall, it must be completely contained within the boundaries of my property. My wife, Maura Grady, KC2VKN, and I have been operating within these local regulations with a 40-, 30-, 20-, 15-, and 10-meter multiband vertical. As we were interested in adding additional HF bands, Maura suggested using a tree in the center of our property as a potential support for another antenna.

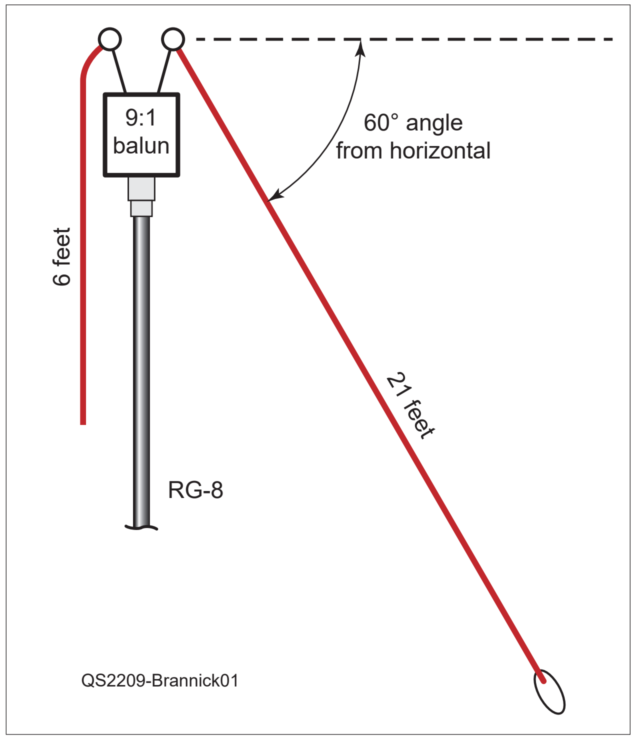

Figure 1 — Assembly details of the dual-band sloper antenna for 60 and 17 meters. This figure is not to scale.

Research and Design

In our research, we read two *QST* articles: "A Reduced-Size Half Sloper for 160 Meters" by Don Kirk, WD8DSB, from the March 1998 issue, and "The Half Sloper — Successful Deployment is an Enigma" by John Belrose, VE2CV, from the May 1980 issue. Both articles discussed restricted-space antennas and suggested a half sloper that's reduced in size, where one leg is ⅛ wavelength, and a counterpoise is attached on the shield side of the coax. Unfortunately, the height requirements precluded operation on 160 and 80 meters. However, it appeared that a reduced-size half sloper for 60 meters was a viable option.

A ⅛-wavelength antenna cut for the lowest 60-meter frequency of 5.332 MHz is 21 feet and 11 inches. Because of my space constraints, I was only able to use a 6-foot counterpoise. Normally, a reduced-size half sloper requires inductive loading (inserting a loading coil in series with the antenna), as it is a shortened antenna. Without inductive loading, the antenna has a high impedance due to its capacitive reactance. Further, this antenna

Table 1 — 60-Meter SWR, Impedance, Resistance, and Reactance

Channel	Frequency (MHz)	SWR	Impedance Ω	Resistance Ω	Reactance Ω
1	5.332	2.6	55.0	37.5	40.2
2	5.348	2.5	56.4	39.6	40.1
3	5.358	2.4	58.2	41.7	40.7
4	5.373	2.3	59.2	43.7	39.9
5	5.405	2.1	63.0	49.5	38.9

Table 2 — 17-Meter Reverse Beacon Network (RBN) Reports

Date: October 7, 2018, 1728Z; SSN: 0, SFI: 69, A: 6, K: 4; Frequency: 18.075 MHz; Speed: 18 WPM; TX Location: Wall Township, New Jersey; Transceiver: Elecraft K3S; Power: 75 W, setting on K3

Call Sign	Frequency (MHz)	Signal-to-Noise Ratio
VE6WZ	18.0753	24 dB
AE4PM	18.0750	2 dB
ACØC	18.0751	36 dB
OH6BG	18.0751	7 dB
N5RZ	18.0750	14 dB
VE6NZ	18.0753	25 dB
PJ2A	18.0749	16 dB
WA7LNW	18.0750	6 dB

is unbalanced. I used a 1:9 commercially built balun at the feed point for matching and reducing common-mode current. This resulted in a worst-case scenario of a 60-meter SWR of 2.6:1. Surprisingly, I found that this configuration also resulted in a 17-meter, full-band SWR of 3.3:1. The automatic antenna tuners found in modern radios should easily handle these mismatches.

The antenna specifics are detailed in Figure 1. To tune the antenna, start with a leg that's 22 feet long. Then trim the length 1 inch at a time while checking for the lowest SWR across 60 and 17 meters. Table 1 shows the SWR, impedance, resistance, and reactance for the 60-meter band. As you can see, the 60-meter SWR varies from 2.1:1 to 2.6:1.

Operating Results

This is when the fun began. While operating on 60 meters, we netted 5 x 9 SSB contacts with hams located in Westport, Connecticut (70 miles northeast of us), and in Mount Laurel, New Jersey (about 45 miles southwest). At a peak height of 14 feet, the sloper was working as well as a near vertical incidence skywave (NVIS) antenna would on this band.

On 17 meters, we operated CW with 75 W output power and yielded a cluster of skimmer stations on the Reverse Beacon Network (RBN) from Finland to Alberta, Canada (see Table 2). The RBN seemed to confirm my suspicion that a tree trunk was blocking the long leg of the antenna to the southeast, resulting in some directivity to the north and northwest.

The design methodology for this antenna involved a review of literature on slopers, a simple calculation of a ⅛-wavelength wire length, and building and testing the antenna. And while I used a commercial 1:9 balun (available from numerous suppliers), an internet search will yield plenty of construction articles, should you wish to build your own. The successful end result was that I've added two more HF bands to my station.

Patrick Brannick, N2BZD, was first licensed in 1979 and holds an Amateur Extra-class license. He obtained his Bachelor of Science in Electrical Engineering from Monmouth College, and a Master of Science in Computer Science from Monmouth University. For 20 years, Brannick worked as an electronics engineer for the US Army and US Navy, mostly in radar system development and testing. Prior to that, he worked in the process control industry and spent a few years as a high school science teacher. Brannick is mostly a CW operator and has earned a DXCC CW award. He can be reached at **pbrannick@gmail.com**.

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