

The Handy Yagi Antenna

A merger of transceiver and antenna eliminates many design issues.

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After 38 years in Amateur Radio, I finally decided that it was time to try the 440 MHz band. Some decisions should not be rushed.

After using my new Yaesu FT-60 dual band handheld transceiver for a few months, I decided to investigate antenna options on 70 cm. My goal was to build an antenna that travels easily and requires minimal setup. A little daydreaming resulted in a 38 inch long design that supports the handheld transceiver and four directors (see Figure 1). A bicycle handle bar grip permits easy aiming. Finally, a speaker-mic simplifies aiming the antenna while talking or listening.

Simplest is Best

The key to simple feed line and mechanical connections was to mount the transceiver on the antenna in place of a driven element. Director size and spacing data was taken from *The ARRL Antenna Book*.¹ The FT-60 mounts easily using the belt clamp on the rear of the radio (see Figure 2).

Making it Happen

Construction is straightforward. A 38 inch long 3/4 inch diameter dowel serves as the boom. The directors were cut from 1/8 inch steel rod stock. The radio holder is made from two pieces of 1/8 inch fiberboard and 1/4 inch rubber spacers. Two bolts hold the bracket in place.

Checking it Out

In the absence of proper analytical instruments, I resorted to on-air reports and *EZNEC 4.0* analysis.² My initial test involved calling the K1BFD 440 MHz repeater. I am unable to raise Barry's machine from my home location with the FT-60 alone. By adding the Handy Yagi, I had no trouble accessing the machine. The receiver meter was nearly full scale with the antenna pointing at the repeater. By turning the antenna in an arc toward and away from

K1BFD/R, I could see the received signal strength rise and fall.

The second field test involved climbing to the top of the Blue Hill Ski Area, near Boston. I called Dick, K1HC, on 446.0 MHz simplex. According to my Magellan *Topo 3D* software, K1HC is 3.05 miles from the top of the ski lift platform at a heading of 282°. I ran 1/2 W for the tests.

A QSO with K1HC verified my earlier observation that the Handy Yagi shows directivity. While making a long call, I swung the antenna back and forth slowly. Dick reported that the signal strength increased and decreased with the changes in direction. When K1HC transmitted, the same effect was apparent as I moved the antenna back and forth while receiving.

Model Analysis

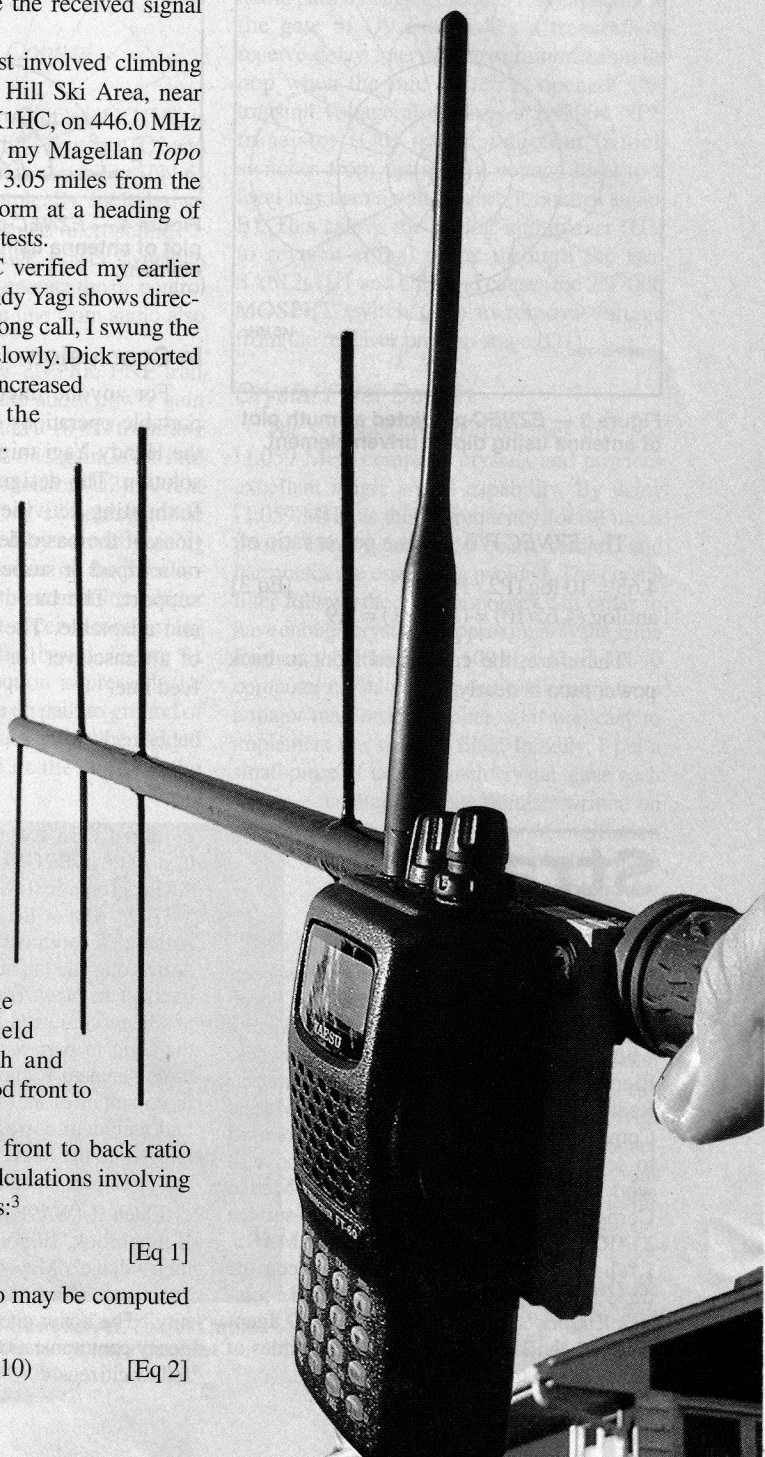
The *EZNEC* computations involved entering a driven element and four directors. In a compromise, my model uses a 1/2 wavelength ($\lambda/2$) center fed dipole to represent the FT-60. The *EZNEC* predictions provide reasonable agreement with the field observations. Azimuth and elevation plots show good front to back gain.

EZNEC computes a front to back ratio (F/B) of 4.65 dB. For calculations involving power, the relationship is:³

$$\text{dB} = 10 \log (P_2 / P_1) \quad [\text{Eq 1}]$$

Then, the power ratio may be computed from:

$$(P_2 / P_1) = \text{antilog} (\text{dB} / 10) \quad [\text{Eq 2}]$$



¹Notes appear on page 38.