The AudioPrism Indoor FM Antenna

A novel approach to the problem of indoor antennas.

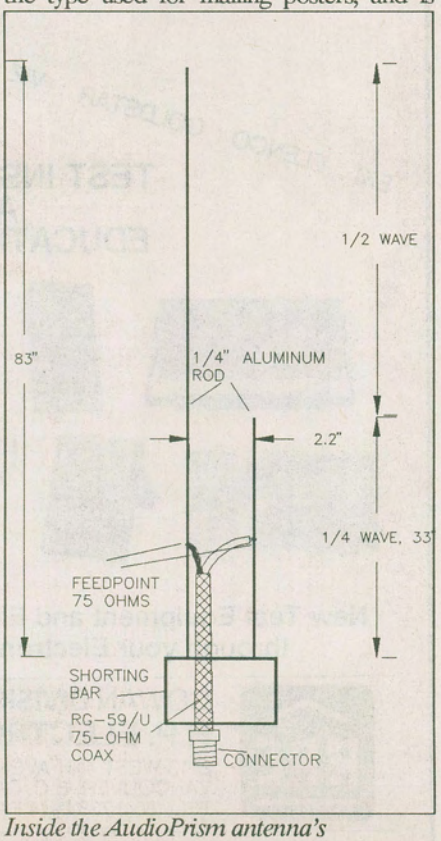
TIMOTHY PALMER-BENSON

There are few short cuts in designing an FM antenna. Its elements must be tuned to receive the FM broadcast band of 88MHz to 108MHz. The best antenna is a multi-element, half wavelength array mounted as high as possible and capable of receiving signals from only one direction. Such horizontal antennas, like their TV counterparts (that often incorporate FM tuned elements) require a rotor so one can point the antenna directly at the station. As we all know, such installations are expensive, cumbersome and sometimes impractical. Urban dwellers often need something more useful.

The bi-directional, single half wavelength dipole is the most common alternative for indoor use. This ubiquitous piece of 300- ohm twin lead, cut and molded into a "T" is found packed with virtually every receiver. It is the industry standard against which the efficiency of all other antennas are measured. The indoor dipole can give acceptable results but it is not omni- directional and if one is after performance closer to the ideal of the multi-element array, a more exotic design is required.

The AudioPrism 7500 is such a design. It is an omni-directional, half wavelength, passive, indoor antenna. The specification that comes with the AudioPrism says that its gain is 5.1dBi, which means it can draw in a signal with three times more power than that of the home dipole. Its Voltage Standing Wave Ratio (VSWR) is less than 1.9 to 1 from 88MHz to 108MHz. This is the ratio of the voltage delivered by the antenna to the receiver as compared to the reflected voltage returned back toward the antenna due to impedance mismatch. Perfect VSWR would be 1:1. Good outside antennas usually have a VSWR of 1:5 or less, meaning that there is a signal loss produced by an impedance mismatch. Loss of signal usually becomes worse at the frequency extremes.

As a piece of furniture, I find the AudioPrism somewhat astonishing, which is probably why it came to my attention while strolling the aisles in the winter CES in Las Vegas. The outside of the antenna consists of a cylinder tube 89.5 inches high with a diameter of four inches. The tube is made out of 1/4 inch thick hardboard, similar to the type used for mailing posters, and is covered with a beige coarse weave fabric. A 75-ohm "F" type coaxial connector protrudes from one end and fits into a hole in a solid 13-inch diameter wood base that has a thin sheet of aluminum-covered paper stapled to its underside. The tube is secured to the wood base with two machine screws so that a ground plane is formed from the physical connection of the aluminum sheet in the base and the grounded part of the antenna element inside the tube.



Inside the AudioPrism antenna's hardboard tube are two aluminum rods cut to multiples of a quarter-wavelength.

As can be seen in the accompanying diagram, the inside element is shaped like the letter "J" which is why the configuration is called a J-Pole Shunt Fed, half-wavelength antenna with ground plane. Both elements consist of solid 1/4 inch diameter aluminum rods. The ground side is 85 1/2 inches long while the quarter-wave rod is 33 inches. The two rods sit 2.2 inches apart on a shorting bar.

Approximately seven inches up from the base of the shorting bar — at the antenna's resonance point — a 75 ohm cable is attached with its outside shield connected to the ground side. The inside conductor is connected to the other leg. A simple choke (using three turns of the coax) is employed before the cable makes its connection with the 75 ohm "F" fitting on the bottom. Even though a ground plane is not necessary for this configuration, a spokesman for AudioPrism says that it was installed to avoid interaction between the antenna and the 75 ohm antenna lead-in that must exit the base of the antenna at 90 degrees. The company says customers concerned that interaction still exists can avoid any reactance in the coax by installing a broadband RF choke about a 1/4 wavelength away (about 20 inches away) from the base of the antenna. The choke is available free from AudioPrism.

I tested the AudioPrism using a Magnum Dynalab FT-101 tuner. This is considered one of the best tuners on the market. Among other things, this Canadian-made unit has an easy to read signal strength meter and a meter that indicates multipath conditions. Perhaps of more importance than this is the fact that the FT-101, unlike less professional units, is carefully constructed to provide the same sensitivity at either end of the FM band as well as in the middle of it. I was able to prove this by setting my 1000A Sound Tech Alignment Generator to feed the same strength of RF signal into the antenna input of the FT-101 at 88 and 108MHz and then noting the position of the signal strength meter. The meter read the same in both instances.

Having established this to my satisfaction, I carefully graded the meter on the FT-101 so that I could directly read signal strength indbf units, the customary way of presenting antenna gain measurements. What you see in the accompanying table (bar graph) is a list of 14 frequencies. Each frequency represents a station that can be received in the Montreal area. The weaker station are in Burlington, Vermont.

As can be seen, the AudioPrism consistently shows more sensitivity than the indoor dipole at the two ends of the FM dial. The first station at 87.8MHz was received with 5dB more gain than the indoor dipole gave. This is significant, because at 42dbf even the Magnum Dynalab is on the point of muting and dropping out of stereo. With the extra 5dB of gain going into its antenna input, it had no difficulty reproducing this station with clarity. The most significant difference between the two antennas occurs at the other end of the dial at 107.3MHz where the AudioPrism produced a signal strength of an astounding 83dbf over the 47dbf reading obtained with the dipole. I am inclined to discount this reading because it may have been caused by the different polar responses of the two antennas.

While the results in midband are inconclusive, the figures show that the AudioPrism is a worthwhile investment for anyone who cannot use an outside antenna and wants a passive, omni- directional unit. The antenna will be distributed by May Audio in Montreal, with the Canadian price expected to be just over $200.00. The manufacturer is AudioPrism, P.O. Box 1124, Issaquah, WA 98027. Tel: (206) 392-0399. ■