Microvolt

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Antenna Time

Do you like antennas? Do you like to build antennas? Do you like to install antennas? Do you like how they look? If so, then let's talk antennas!

It's well-known in the amateur community, that if you have the worst radio on the market, but attached to a good antenna, you can likely make your signal heard far and wide. By the same token, if you have the world's best radio and a lousy antenna, your signal is not likely to reach across the street any better than with a dummy load, if even that well.

So, if your antenna is really what matters, which antenna is the best? If not the *best*, just what does it mean to have a *good* antenna? We amateurs have a double-burden of designing and creating antennas that can not only receive well but can transmit well too.

Cover – The antenna

Norman Rockwell painted ***New Television Antenna*** for the 05 November 1949 issue of ***Saturday Evening Post*** in an effort to bridge generations. Today's modern reader could not imagine how happy new TV owners were, just to see a blurry, flickering black-and-white image for the first time.

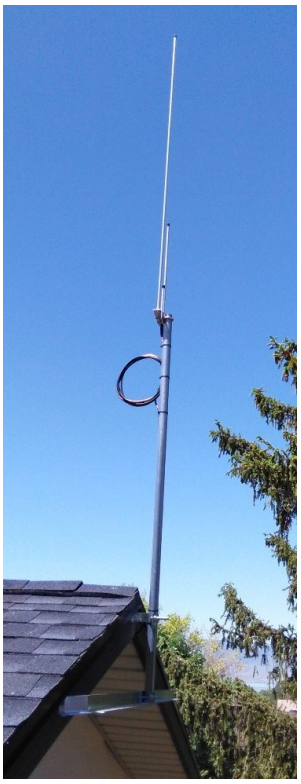
Ever since the first antenna by **Heinrich Hertz**, the challenge has been to design the ultimate antenna. The term ***antenna*** was coined by **Guglielmo Marconi** when he raised some transmitting wires by a tent pole, called *l'antenna centrale* in Italian, a reference to a ship's mast. The shortened *antenna* soon caught on, and the word was born.

An antenna can be any electrically conductive object or material, can passively (doesn't require an additional power source) collect radio waves and convert them into electrical signals, and/or can passively convert electrical signals into radio waves. Most metallic objects (car body, house wiring, chain-link fence, tooth filling, aluminum siding, screwdriver, etc.) are not designed to work as antennas, but antennas they are. The objects that *are* designed to be antennas still appear in a variety of shapes such as copper wire, aluminum tubing, and parabolic dishes.

Through the mysteries deep in the branch of physics known as ***electrodynamics***, an antenna performs its magic by interactions between moving electrical charges and the invisible fields that influence them. We mere mortals experience these interactions when we communicate with another station by means of these magical devices.

Perhaps the simplest of antennas is the ***dipole***, ideally a half-wavelength long at the target frequency. Indeed, it can be said that most amateur radio antennas are dipoles in one form or another. These include the center-fed dipole, off-center-fed dipole, fan or parallel dipole, Yagi beam, end-fed, J-pole, monopole, inverted-L, and the random or long wire.

Antenna properties



An antenna is said to have ***gain*** if more of its transmitted signal is directed (focused) in one direction than in others, like the effect of a flashlight reflector dish on its light. And the principle of ***reciprocity*** states that an antenna's receive properties are identical to its transmit qualities, so the same antenna will exhibit its strongest "receive gain" in the same direction. But an antenna can exhibit strongly transmitted and received signals in more than one direction, with weak spots between them. This three-dimensional combination is known as its ***antenna pattern***, and is often drawn to illustrate how much of its signal is aimed in multiple directions, to aid in antenna design or placement.

The antenna feed point impedance is an important quantity for ***matching*** to its feed line, or coaxial cable in most cases. If not matched, some of the signal delivered to the antenna can be ***reflected*** back to the radio, often measured by ***SWR (standing wave ratio)***. And just as often, to reduce your antenna's SWR might require you to use a matching circuit or ***tuner***.

We can talk about antennas until we're blue-in-the-face, but you can read more in **this short but informative discussion on antennas** and how they work, without getting too bored or lost.

Microvolt editorial staff