

Long Loopstick Antenna

Wound on a 3 foot length of PVC pipe, the long loopstick antenna was an experiment to try to improve AM radio reception without using a long wire or ground. It works fairly well and greatly improved reception of a weak station 130 miles away. A longer rod antenna will probably work better if space allows. The number of turns of wire needed for the loopstick can be worked out from the single layer, air core inductance formula:

$$\text{Inductance} = (\text{radius}^2 * \text{turns}^2) / ((9 * \text{radius}) + (10 * \text{length}))$$

where dimensions are in inches and inductance is in microhenrys. The inductance should be about 230 microhenrys to operate with a standard AM radio tuning capacitor (33-330 pF). The 3 foot PVC pipe is wound with approximately 500 evenly spaced turns of #24 copper wire which forms an inductor of about 170 microhenrys, but I ended up with a little more (213uH) because the winding spacing wasn't exactly even. A secondary coil of about 50 turns is wound along the length of the pipe on top of the primary and then connected to 4 turns of wire wound directly around the radio. The windings around the radio are orientated so that the radio's internal antenna rod passes through the external windings. A better method of coupling would be to wind a few turns directly around the internal rod antenna inside the radio itself, but you would have to open the radio to do that. In operation, the antenna should be horizontal to the ground and at right angles to the direction of the radio station of interest. Tune the radio to a weak station so you can hear a definite amount of noise, and then tune the antenna capacitor and rotate the antenna for the best response. The antenna should also be located away from lamp dimmers, computer monitors and other devices that cause electrical interference.

