BETTER SIGNALS

ANTENNAS AND SIGNAL IMPROVING ACCESSORIES

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Indoor/Outdoor Antenna And Reference

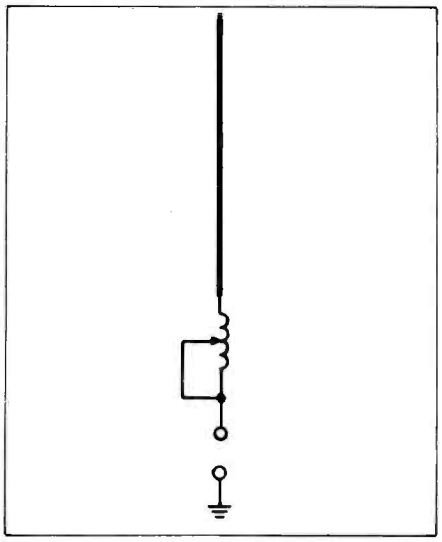

Figure 1: Basic plan of a base-loaded vertical.

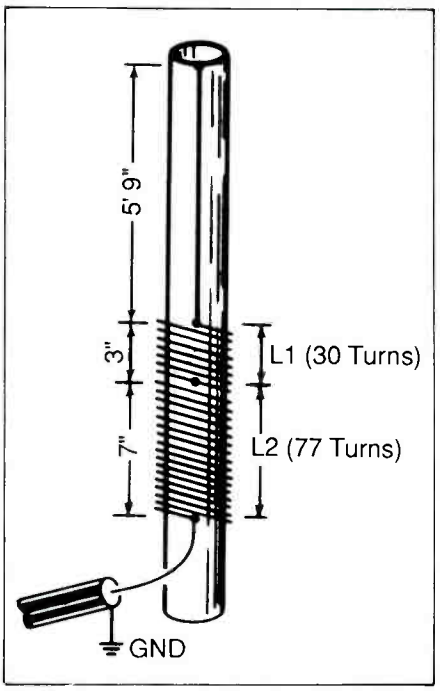

Figure 2: Loading coil assembly. Coils are tapped as per instructions.

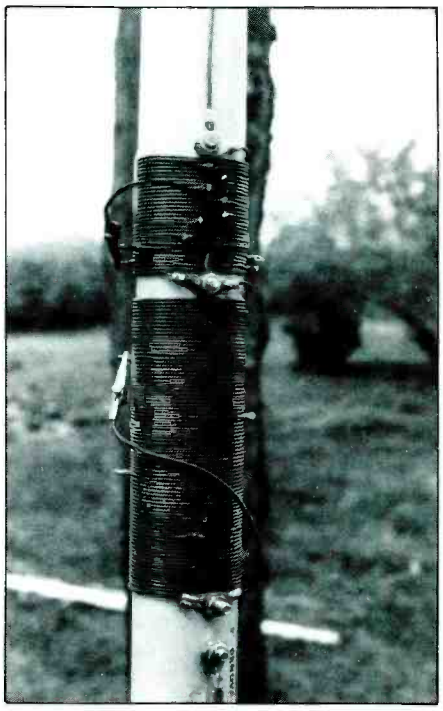

Figure 3: Multiband loading coils.

Often the length of an indoor antenna wire must be restricted severely. Such a short wire, by itself, responds poorly to the great range of frequencies allocated to shortwave broadcasting. Even on the higher frequency bands, such as 19 meters, where its length can be cut to one-quarter wavelength, the wire may not intercept much signal because of poor placement and shielding. The same short antenna outdoors would do well on high frequencies. These and other problems plus a number of improvement suggestions were detailed in the October '86 column. The coil information in this issue may also be applied to the antenna covered in March.

There is one more technique to be considered as a means of adapting a short antenna for good all-band reception. A loading coil can be attached to the base of such a short wire, Figure 1. Such an arrangement tunes the antenna to resonance and helps to transfer as much signal as possible to a short length of line that connects to the receiver input. Additionally, a series of taps is used to find an optimum coil length for each individual shortwave broadcast band.

To be efficient, the coil must have a low loss and a high ratio of inductance to capacitance over a wide range of frequencies. Such conditions are obtained conveniently by using a large diameter coil wound on a low-loss form. A tapped coil wound with #16 vinyl wire on a short piece of 2" PVC piping is an economical and effective answer.

A practical assembly is mounted on a 7'6" length of 2" ID piping, Figure 2. This length was chosen because it can be used indoors, outdoors in a tight spot, and is transportable. There are two separate windings, L1 and L2, close wound with #16 vinyl covered wire, Figure 3. Coil L1 was wound from a 20' length of wire with taps spaced 1' apart; coil L2 a 50' length of wire with taps separated by 10'.

An appropriate short piece of wire with clips is attached to the bottom of each coil with a length just sufficient to reach the furthermost tap and also to jump the individual coil completely. Total numbers of coil turns are 30 and 77, respectively. A vertical wire runs from the top of the top coil to a terminal at the top of the mast. Its length is about 5'9" as in Figure 2. The terminals of the antenna system are attached beneath coil L2, Figures 2 and 3. The bottom terminal connects to whatever ground system you use indoors. Our own ground seeks out a cold water pipe, Figure 5. For outdoor use, several resonant radials do a fine job.

The arrangement of Figure 5 is our indoor reference antenna. Notice that the antenna assembly is positioned at the operating table and tap positions can be changed with ease as indoor antennas are tested band-by-band. However, it is an excellent antenna by itself if you do not mind making the tap changes. Its all-band performance pretty much duplicates, up and down a shade, the stretched-out 48' wire antenna described in October.

An extra length of wire was stretched out from the top of the mast over to a fastener screwed into the top of the window sill. Actually, the total length of the basic antenna from the end of this wire to antenna terminal, with both coils jumped, is only 15'3". This corresponds to a quarter wavelength on 19 meters. Sections of coil are then tapped in for the remaining SWB bands including the lowest frequency band of 120 meters.

In our installation, an antenna meter was connected across the antenna terminal and the proper taps were located to obtain resonance on each band. These were recorded, making it possible to change bands quickly. You may also locate the proper tap for each band by observing the S-meter readings on your receiver as you tune in a station on each band. This takes a little additional time because you must take into consideration the fast propagation changes that occurs. However, you can double check your work very easily. When you find what you consider to be the best tap position for a given band, quickly change to one tap higher and one tap lower to notice if there is a slight drop-off in the signal. If this happens,

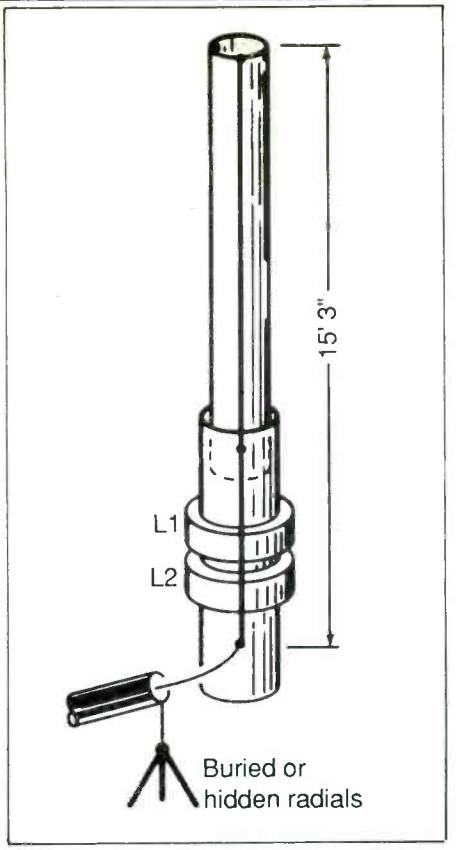

Figure 4: Outdoor version of base-loaded vertical.

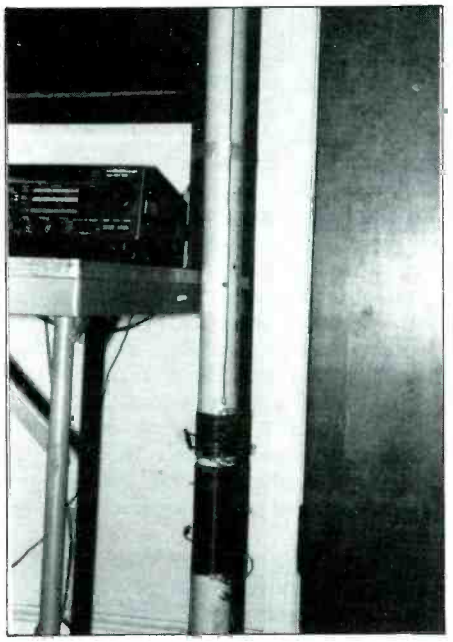

Figure 5: Indoor antenna and loading coils near receiver—a top-performance reference antenna.

then you know you have located the correct tap. Our tap positions are listed in Table 1. They may not be exactly the same for you.

The tapped loading coil antenna is rather elaborate but it does result in good indoor antenna operation. For a shielded location, position the assembly and especially the antenna wire near a window. Perhaps you can let a good portion of the wire be positioned on the outside of the window. When aluminum siding is the problem you may be able to find a way to attach some of the antenna wire exterior to the siding.

Table 1

Band	L1 Tap	L2 Tap
19 M	shorted	shorted
21	2	"
25	3	"
31	5	"
41	8	"
49	11	"
60	16	"
75	16	Tap 1

Table 1: Tap positions for various bands using tapped loading coil indoors. The best tap positions vary with installation.

Sometimes an antenna cannot be used outside because of space limitation or even restrictions such as are often found in association with mobile home parks. Perhaps you can come up with some decorative scheme that would permit the assembly to be mounted right outside of a window or in association with a small porch. This would take your entire short antenna system outdoors.

In other situations, such as when only a small amount of space is available outside and height itself is not a special problem (within reason), the entire 15'3" length required for a quarter wavelength on 19 meters can be obtained by telescoping another section of tubing (1½" diameter) into the top as shown in Figure 4. This too can be mounted near the window that permits a short transmission line link into the interior. The complete antenna mast can be attached to the dwelling or supported by a metal fence post or fence pole.

When making changes in the antenna, or when locating at a new position, it is necessary to go over the tap sequence once again. The ideal tap positions are influenced by the overall length of the antenna and its associated ground system as well as nearby metallic surfaces. It summary, the antenna system is a little more trouble but it can be a help where it is needed.