If you're a suburban home-owner and have neither the desire nor room to erect a big beam, you've probably been scratching your head about what to do. W3KNG has some suggestions for those who don't care to have an imposing antenna on their property.

Wire All-Band Antennas

BY JAMES M. FISHER*, W3KNG

For the suburbanite, living on a lot 50 by 150 feet, the all band wire antenna is a needed investment. It serves well if you do not care to mount a beam or if your beam is temporarily out of service. It will also work well when you need 360 degree coverage.

If your home is like many in this part of Pennsylvania, it will be a single dwelling set at or near the front of the lot. Your antenna farm will be 80 to 100 feet long and perhaps 50 feet wide. Available supports for the ends will be the house and a utility pole or tree at the rear of the lot. Height will probably be 18 to 24 feet. Such a space is fine, if properly utilized, and if you will be satisfied to yield the most remote DX to specialists. (Sometimes it is easier, or more desirable, to add an amplifier than to struggle with a beam. The end result may be the same level of signal at the other end.)

The wire you stretch through your back yard is going to be the radiating element, so the main concern is to establish a feed line to move energy from your transmitter to this radiating element. Regardless of the feed method chosen, you will end up with a good strong signal on 80, 40, 20 and 15, with indifferent results on 10. Having used such antennas for years, I am satisfied that there is no noticeable directivity. The pattern is no doubt broken up by power and telephone lines, aluminum foil house insulation, and house wiring.

The feed method you choose should be considered with respect to the radio location in the home. The groundwire must be short for end-feed or off-center-feed. It may be necessary with some installations to place your operating table next to a ground pipe or a metal post in the cellar. With a balanced center-feed you have much more leeway in your grounding.

Financial considerations may also influence the type of feed. A tuner for the center fed antenna is the most expensive of the types considered here. You may be concerned with the exposure of a wire hot with r.f. to children or pets, although any open wire is more dangerous than coaxial cable. With the above considerations in mind, how do you choose the best antenna for you?

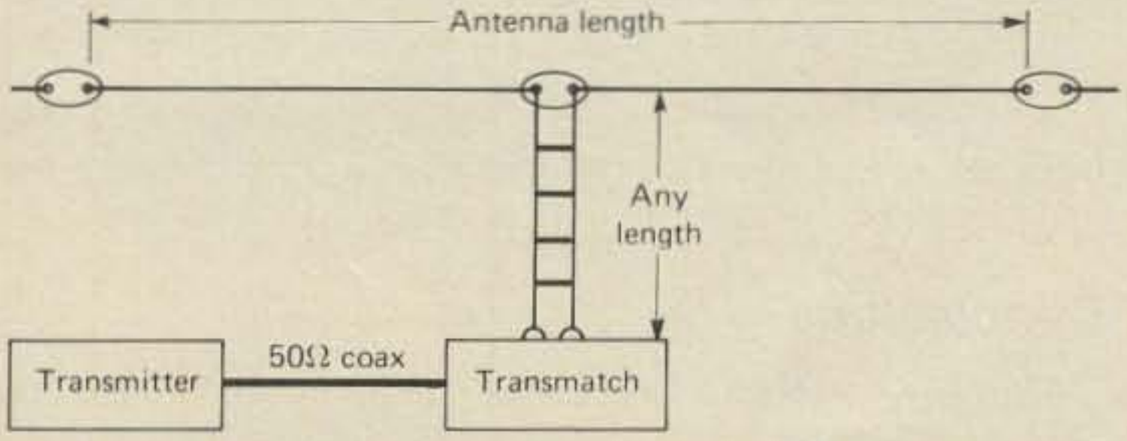

Fig. 1 – The balanced center-fed antenna. The feedline may be an open wire line or 300-ohm twin lead.

Balanced Center-Feed

Let us first examine the balanced center fed antenna. The feed line may be an open wire line or 300-ohm twin lead. I have had excellent results with TV "track." It is not too heavy for the antenna to hold and it seems to be very efficient. It stands 600 watts of r.f. output without trouble. This antenna is not critical in either length or height. The only catch to this method is the complicated tuner required. This tuner must transform the radiation resistance as presented at the transmitter end of the feeders to 50 ohms and cancel out the reactance which is also present at the same point. This is done by tuning a link for the 50 ohm side and coupling this link to a balanced and tuned "secondary." It is necessary to tap in on this secondary in most cases. This tap may be mechanical or by means of a special differential dual capacitor. Such a tuner is quite expensive if

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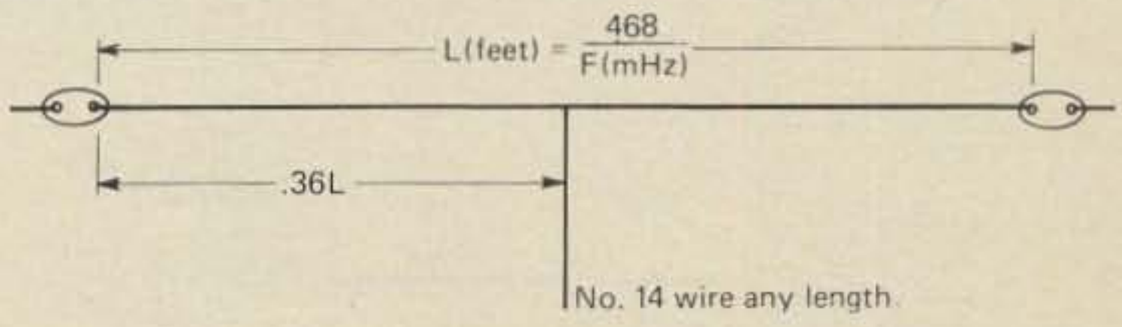

Fig. 2 – The end-fed "Hertz" antenna.

purchased in the kilowatt size. It is a tricky job to build a big one. The switch must be a good one. Resonances can develop in the unused portions of the coils. Different antennas which you may have later may require moving the taps to change the effective sizes of the coils. The whole thing gets pretty complicated. If you simplify the tuner by using plug-in coils, which is not a bad scheme, you have a very efficient tuner which you will enjoy using until you get tired of plugging in and removing coils. I have seen no really high power switched units described which would do the necessary job, however, so plug-in coils would be my choice unless I just wanted to spend a lot of time tinkering. Good examples of medium sized tuners for this feed method are one described by Lew McCoy in *QST* for July 1965, using plug-in coils, and another by Mr. McCoy in *QST* for June 1964 using a switching arrangement.

It is also possible with this feed method to use a balun and a single ended network. I have not tried this yet, but when I do, I'll watch for high voltage on the balun. 600 watts can produce really high voltages on a resonant or semi-resonant line.

To sum up the center fed antenna system: rate the performance excellent, dimensional requirements extremely flexible, ground requirements nominal, and tuner convenience poor.

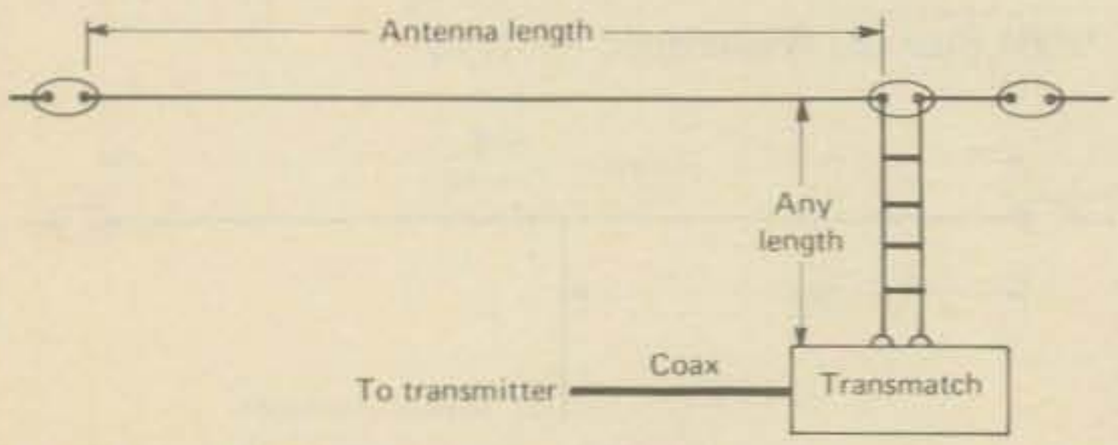

Fig. 3 — The off-center-fed antenna (sometimes called a "Windom" antenna).

End-Feed

The second system under consideration is the rudimentary "Hertz" or just plain end-fed wire. Where the flat top ties to a gable end or chimney, the wire is brought down the side of the house and into the operating area. Mine comes in above a cellar window, crosses the ceiling to a point above the operating table, and terminates at a tuner placed next to the transceiver.

My system is approximately 130 feet in overall length. The whole wire radiates. The wire is hot for r.f. Guards are necessary. My friends think this is a real haywire antenna, but it is like an old shoe: a good worker and no trouble. A tuner for this is a cinch to build at any power level. If you install one, try as your first experiment in tuners an L-network, with the coil in series with your line and the variable capacitor across the output of the coil. To set up this tuner, start with low power. Pick any likely looking 80 meter type coil, and any normal 100-200 pF variable. Start tapping and tuning, watching an s.w.r. meter in the line from the transmitter to the tuner setup. You will soon find a pair of settings which will show a 50 ohm load on the transmitter. Do the same thing to verify the configuration for each of the higher bands. If you are getting good results, repeat the same procedure using coil stock at least three inches in diameter and a variable with at least 4 kV ratings. You want big parts to keep down losses and stand the awesome voltages you can develop here with a kilowatt. Expense goes down with complexity in this tuner. If you shop prudently for surplus, cost is the least of your worries.

I have tried both the tapped coil and roller coil methods of construction. The roller is more flexible but a bother to turn. Once the tap points are established, the tapped method is a very quick and easy tuner to use. A good example of this tuner is shown in *QST* for December 1960—but make it bigger! This feed method requires a good *short* ground. Even with a fifty inch ground line my microphone would burn my lip on 15 meters, although the "hot" state of the transmitter did not seem to have any other ill affects. Such a situation may be corrected by installing a series resonant ground line for the offending band. This worked for me, even though it paralleled an existing d.c. ground.

With this end feed, you may rate performance as excellent, dimensional requirements flexible, ground requirements stringent and tuner convenience excellent.

Off-Center Feed

The last antenna to be considered is the 1929 model Windom. It is now almost fifty years old and still a good antenna. With this, it is best to stick to a radiator length of 120 to 130 feet, even if you have to bend the ends down or sideways. The feeder, one wire, taps 14 percent off center. Use a good splice, because the feeder has a habit of breaking off at the antenna. This single wire is also hot with r.f., and should be guarded. A ground is necessary, usually a short one. Tuner requirements are close to that of the end-feed and the tuner can be designed the same way. Voltage at the tuner will usually be less. This antenna is not a good choice unless you have an operating area near the center of the flat top. Large trees at the front of the lot may make this a good choice but in most locations these trees are not available.

Conclusions

Normally, end feed is best for the suburban home. Balanced center-feed is over-engineering unless grounding is a problem. Off-center feed is a substitute for center-feed when the operating position is near the center of the antenna.