Thomas R. Sundstrom W2XQ
Box 175
Vincentown NJ 08088

About the Beverage

—When you say longwire, mean it. Use the remarkable beverage!

No, a beverage is not a drink! This beverage is a super longwire receiving antenna that is absolutely worth all the time and effort that it takes to put it up.

The advantages of a beverage antenna are that it is highly directional, has extremely low noise pickup, and produces excellent signal-to-noise ratios. Its disadvantage is that it requires a lot of ground to put it up in the direction that you want to listen.

The beverage antenna was invented in the early 1920s by Harold H. Beverage. It was first discussed in a paper titled "The Wave Antenna—A New Type of Highly Directive Antenna," written by Beverage, Chester W. Rice, and Edward W. Kellogg for the journal of the American Institute of Electrical Engineers (Volume 42, 1923, page 215 ff). Other writings on the subject are found only periodically thereafter as an editor or writer "rediscovers" the antenna. The several *Radio Engineering Handbooks* edited by Keith Henney and published by McGraw-Hill also have discussions of the antenna.

Results

As a medium-wave DXer in the late 1950s and through the 1960s, I had heard of beverages. Several National Radio Club DXers used them to good advantage. Probably the most spectacular example was Jerry Conrad's 1500' beverage in an orange grove in southern Florida. I heard one tape of 1550 kHz on which 50-kW CBE, Windsor, Ontario, normally is the dominant North American clear-channel station, but, changing from a random wire to the beverage, 50-kW 4QD in Queensland, Australia, completely took over the frequency! As it was later explained, normal daytime reception included regional-frequency stations from Texas and Oklahoma, and twilight reception normally included California and Hawaii stations.

It was not until my wife and I moved to a new locaton in 1980 that I had the room to put up a beverage. Despite summertime static, St. Pierre et Miquelon on 1375 kHz was readable most evenings on the beverage, yet there was no trace of a carrier on a random length 120' wire. Europeans on the standard medium-wave band were present most evenings throughout the fall, and Saudi Arabia on 1521 kHz often put a strong heterodyne on WKBW, 1520, Buffalo, New York. Daytime reception of central and northern New England stations on the regional and local frequencies is commonplace.

The results on 75 meters have been equally satisfying. In the fall and winter of 1980, more than 20 new countries have been added to the log just because I can hear them! The best ones include Faroe Islands, Maldive Islands, Reunion, and Djibouti.

Under normal conditions, the beverage scrubs at least 25 dB and sometimes as much as 40 dB off signals to the sides and to the rear of the antenna. In no-signal conditions, the typical atmospheric noise drops from an S6 or S7 on the dipole to an S2 on the beverage.

What is a Beverage?

The beverage is a very long longwire run in the direction in which you intend to listen. To be effective, a beverage should normally be at least two wavelengths long on the lowest frequency on which it will be used. For example, two wavelengths at 1.8 MHz is 1100 feet; at 3.5 MHz, 600 feet.

At less than two wavelengths, the property of high directionality will be lessened. At less than a wavelength, signals to the sides and rear will not significantly be reduced. The

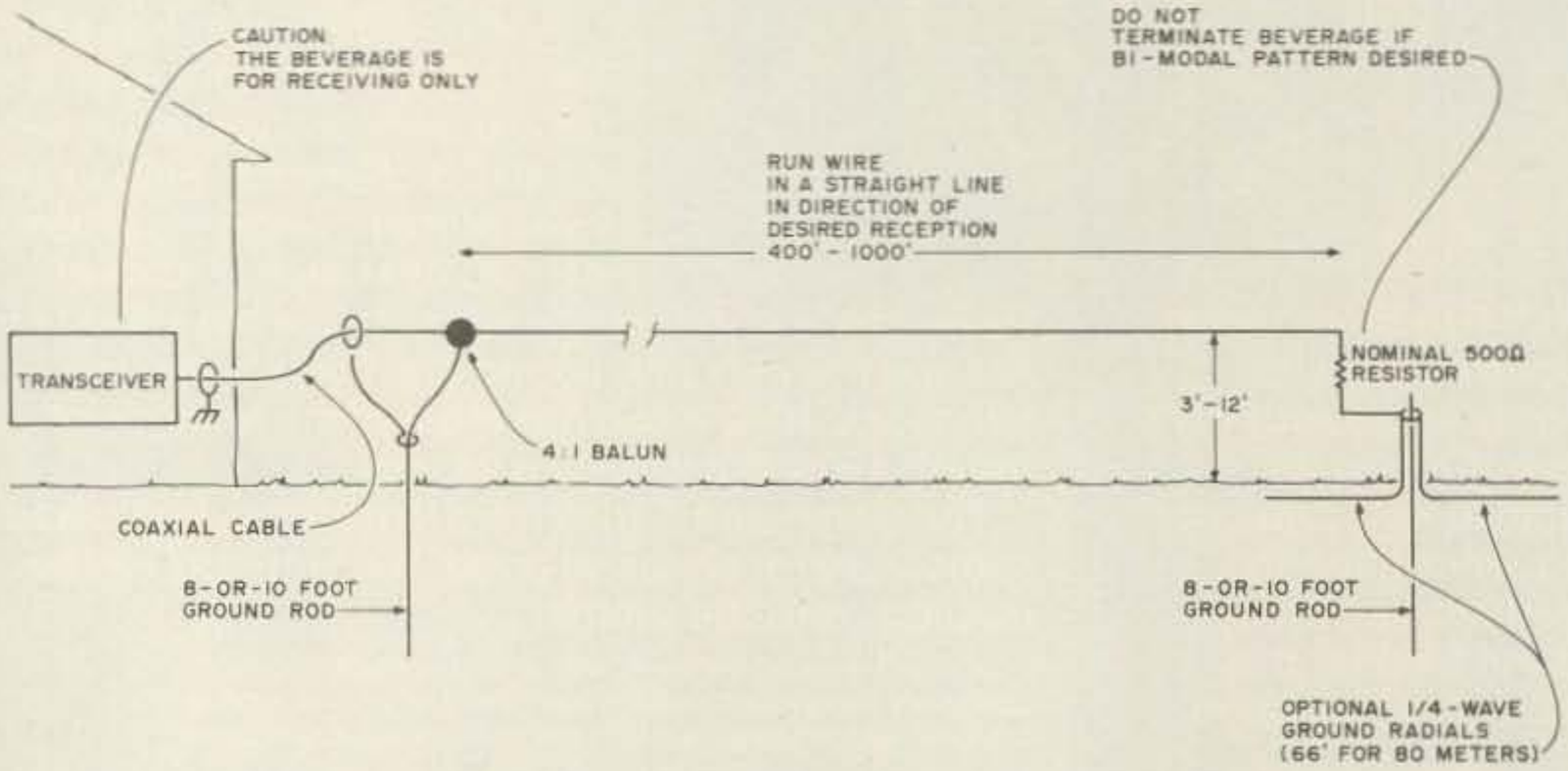

Fig. 1. Installation of the beverage antenna.

advantage of improved signal-to-noise ratio will be retained, however.

Increasing the number of wavelengths on the wire is not normally effective when the number exceeds eight to ten. The front acceptance angle also becomes smaller. That was exemplified here by back-to-back QSOs on October 5, 1980, with XT2AW, Upper Volta, on 40 and 75 meters. Whereas my beverage, running northeast, offered no advantage over the dipole on 40, on 75 it was significantly better and provided solid copy. XT2AW was just barely audible on the dipole.

At certain times, particularly in the twilight hours, the beverage will not appear to be functioning. The changing, tilting ionospheric layers in transition tend to produce high-angle signals without any worthwhile low-angle components.

How It Works

The long antenna wire pointed in the direction of a passing radio wave has a high degree of exposure to the horizontal component of the wave. This induces a continuously building series of voltages that are propagated along the antenna from one end toward the receiver. The effects are cumulative over the long length. Energy collected from a radio wave traveling in the opposite direction is dissipated in a terminating resistor and so does not enter the receiver. Radio waves arriving from the sides have relatively little effect on the receiver.

Installation

Installing a beverage is relatively simple. As a minimum, you will need antenna wire, a 4:1 balun, a ground rod, a 500-Ohm 1- or 2-Watt carbon resistor, and coaxial cable to feed the receiver.

I used a surplus 1000' roll of insulated #18 hook-up wire. Others use copperweld; almost anything will suffice. The wire should be installed at a more-or-less uniform height 3' to 12' off the ground. Mine averages about 8' so that deer walking through the area won't snag the wire and pull it down.

Run the wire—at least 400' and preferably 600'-1000'—in a straight line. A few degrees of bending over the course is acceptable but anything more than a 10- or 20-degree bend should be avoided. Run the antenna wire in the direction of primary interest.

At the far end, install an 8' or 10' ground rod. Connect the end of the beverage to the ground rod with a nominal 500-Ohm resistor in series. Use a non-inductive resistor if one is readily available, otherwise a small carbon resistor will be fine. The value of the resistor is subject to experimentation; values ranging between 200 and 600 Ohms are normally found to be best.

If you need to improve the effectiveness of the ground because of poor conductivity at the point of the ground rod, connect some 66' radials to the ground rod. Run one of them away from the ground rod, continuing in the direction that the beverage was pointed.

A terminated beverage is unidirectional in the direction that the beverage runs, i.e., from the receiver end to the terminated end. If you want the antenna to be bi-directional along its axis, leave the far end unterminated.

The beverage is a high-impedance antenna. It will perform by connecting the receiver end of the beverage antenna wire to the inner conductor of the coaxial cable feeding the receiver. I'll leave it to the engineers to do the calculations on exact impedances and tell you to install either a commercial or homemade 4:1 balun. Almost anything to get the impedance match into the ball park will do.

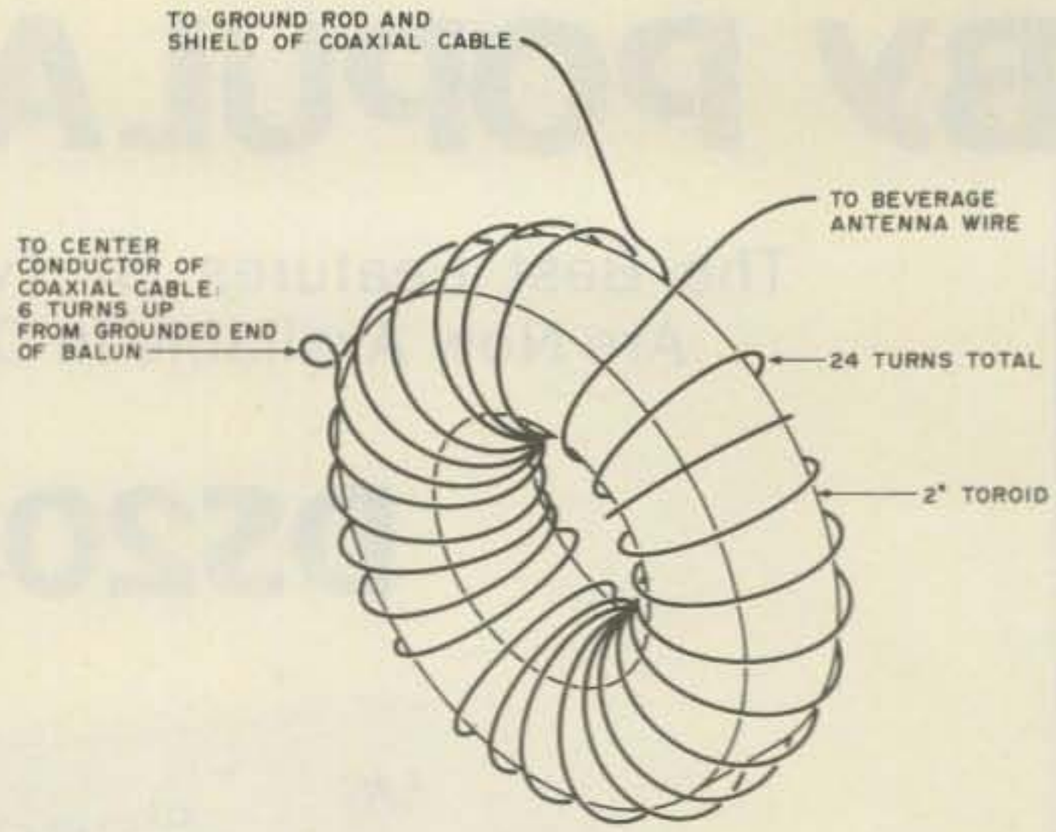

Fig. 2. A homemade 4:1 balun.

I wound 24 turns of hook-up wire onto a surplus 2" toroid, tapping it at 6 turns for the coaxial center conductor (see Fig. 2); it works just fine. If the beverage is only for amateur band use, i.e., above 160 meters, one of the small antenna tuners, such as marketed by Den-Tron or MFJ, will perform equally well. A fixed balun should be mounted at the receiver end of the beverage wire, whereas an antenna tuner should be placed by the receiver.

Although this beverage antenna is a *receiving-only* antenna, some users will adjust the antenna tuner for maximum by loading a small amount of power (less than 5 or 10 Watts) into the beverage. Don't forget the terminating resistor!

At the receiver, install switches or relays to listen with the beverage and transmit on your normal antenna(s). If you have a separate receiver and transmitter, that task is simple.

If you have a second ground rod available, install it at the end of the beverage wire. Tie the ground side of the fixed balun and the coaxial shield to ground with a short piece of wire.

Some final installation notes are in order here. An ohmmeter connected in series between the receiver end of the beverage wire (temporarily disconnected from the balun) and the second ground rod should read 10k to 15k Ohms, assuming the far end of the beverage is terminated. The circuit is completed through the earth. An infinite reading indicates a break in the beverage antenna wire.

If you install multiple beverages for multiple listening directions, the antenna selection device should ground the beverages not being used. Otherwise, signals built up on the other beverages (or random wires) in the area will be inductively coupled to the beverage in use, causing extraneous signal pickup and blunting of the nulls.

Conclusion

The beverage has opened new vistas for me despite a very modest station installation. The ability to hear is of paramount importance, and I attribute some excellent DX on 80 and 40 meters to that antenna. If you have the room to install a beverage, go ahead and do so. You'll be surprised at what comes out of the noise levels! ■