



MORGAN SYSTEMS

Technical Bulletin

Modern Beverage Receiving Antenna Construction and Installation

One of the most beneficial station antennas that offer good low noise directional or non-directional performance at a very affordable price is the beverage, or "wave" antenna. It is constructed from a single wire, end-fed from the station end, and elevated 5-10 feet above ground on insulated standoffs.

Beverage antennas fed through a wideband impedance converting transformer offer broadband low noise performance for low to mid-frequency applications in the 0.5 to 9 MHz range, more or less. If you're interested in directional performance, plan on erecting a beverage antenna in a straight line toward the desired direction of at least 1 wavelength at the operating frequency of choice. The longer the wire is in that direction the more directive the antenna becomes. Essentially the beverage is a piece of unshielded parallel line transmission line in the 400-600 ohm range, respective to earth. Feeding the antenna requires a broadband transformer which is simple to wind and is featured in many technical books and articles. But here are a few observations we would make that you won't find in published literature or at least in few of them...

1. In terminated beverages after the installation is done check the impedance matching and load resistor choice by simply inserting about 1 watt or so of power into the system and measuring the match system with a simple VSWR measurement. Sweep the frequency range of desired use in this manner and you can see if the impedance transformation and resistance used is correct, or if some alterations have to be made. We found at the original I.C.E. factory station that for our 600-800 foot terminated straight beverages resistance and matching of 450 ohms worked best, offering a near 1:1 match from 1 to 30 MHz
2. Be sure to include blocking-type lightning protection in the match system to prevent developed voltages from destroying your radio equipment. Blocking the DC path with a .01 capacitor is beneficial if a drain-to-ground matching system is employed. A beverage of only a few hundred feet can be electrified up to as high as 10,000 volts respective to ground with an overhead cloud-to-cloud lightning blast (we know - we measured it).
3. Be sure that from the feed point to the wire that the wire ascends slowly to its regular height of travel down the rest of the antenna. Don't feed the antenna and then go vertically up 10 feet, turning horizontal for hundreds

- of feet or the antenna will look like a vertical receiving antenna partially and some of the low noise and directivity effects will be compromised.
4. Use steel, galvanized wire where possible. Since the antenna is voltage fed (high-Z) there's no advantage to be realized from using copper wire. Contrarily, copper is soft and stretches easily, causing sag. Also, it is easy to break if tree limbs or ice land on the wire span, causing the copper to sag further or break. Best choice, electric fence wire used by cattle farmers, it's #18 #19 in size, galvanized, solid steel with a 1,000 pound strength, and can take a lot of punishment. It's also 60-80% cheaper than copper, costing around \$8.00 per quarter mile (1,250 feet) and sold in farm stores and some hardware stores.
 5. Use carbon composition or flameproof non-inductive resistors for terminating the beverage, and use 10 watts or better of power handling capacity. During transmit your beverage can be really hot with RF and can easily burn out small resistors. The larger power resistors also help prevent lightning burnout. Wire wound power resistors work fine if the frequency limit of the beverage is less than 5 MHz or so. Including a gas-discharge unit in the 75V range is helpful.

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