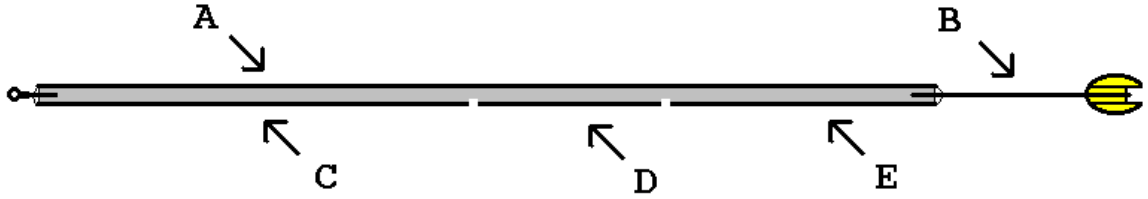
The STR radial theory of operation.

After downloading some of the manuals for Butternut HF vertical antennas I noticed there is no technical description on how the STR 300-ohm ribbon line covers the 40, 20, 15, and 10-meter bands as a solution for replacing three individual 1/4-wavelength radial wires. I sat down with a calculator and figured it out.



A along with the added length of **B** forms a 1/4-wavelength radial for the 40 and 15/meter bands. **C** is a 1/4-wavelength radial for the 20-meter band. **D** does nothing; the notches remove this section of the twin lead from the radial element. This is where things get tricky! **E** is a 1/4-wavelength stub decoupler for the 10-meter band and operates in the same way the 15-meter stub decoupler operates on the Butternut vertical element. **A** in conjunction with **E** form the 10 meter stub tuned radial. Running the numbers through the calculator confirm everything except the length of **A**. The formula used for the lengths are 240 divided by the frequency in MHz times the velocity factor which gives lengths in feet. The suggested twin lead is Belden 8230 or Columbia 1007, which has a velocity factor of 91. It took me a while to figure out that the extended length of **A** was compensating for the stray capacitance caused by **C**, **D**, and **B**! Understanding how this works allows you to figure out how to use some other type of parallel line. 300-ohm twin lead is getting hard to find at local electronic and TV shops and it costs more than some of the 450-ohm ladder line available for sell at amateur radio retailers.