

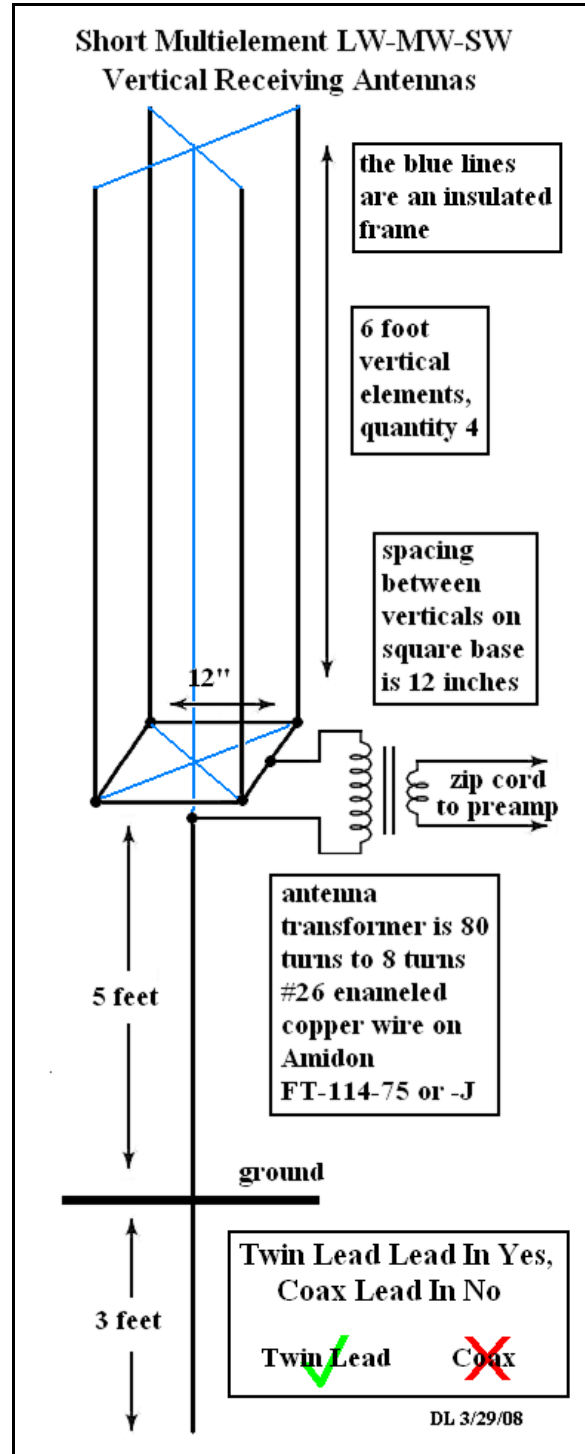
# Short Multielement LW-MW-SW Vertical Receiving Antennas

## Made With One Foot Spaced Parallel Vertical Elements

Dallas Lankford, 4/1/08

While thinking about the mathematical model of short vertical receiving antennas, like my 15 foot amplified verticals which are described in several of my articles in [The Dallas Files](#), it occurred to me that even shorter vertical receiving antennas might be feasible provided they were constructed with multiple vertical elements to increase signal output. If signal loss due to interaction between the multiple vertical elements was negligible, then presumably the signals from each vertical element would add, the capacitance of each vertical element would add, and the result would be an even shorter LW-MW-SW vertical receiving antenna which used the same antenna transformer as the 15 foot vertical when 3 or 4 vertical elements 5 or 6 feet long were used. Details of these new SMV (short multielement vertical) receiving antennas are given in the figure at right. At first I used three 5 foot long vertical elements made from #18 insulated copper wire, mounted flush on a 0.75 inch diameter piece of PVC pipe, with the bottom of the PVC pipe mounter a few inches above the ground, but signal levels were unacceptable low. Suspecting that the low signal levels were due, at least in part, to insufficient element spacing, I made X supports from 0.5 inch hardwood dowel at the top and one foot from the bottom of a 7 foot length of 0.75 inch diameter PVC pipe which provided 12 inch or greater spacing of the vertical elements. Signals levels were better, but still less than a 15 foot vertical. As is well known, raising the elevation of the active part of a short vertical increases the signal level output, so I used an 8 foot ground rod to elevate the bottom of the SMV about 5 feet above the ground as shown in the figure at right. The ground clamp of the 8 foot ground rod was mounted 1 foot from the top of the ground rod which provided a stop when the PVC pipe was slipped over the end of the ground rod. With the wider element spacing and the greater elevation of the multiple elements the resulting signal levels were virtually the same as for a 15 foot whip.

To the best of my knowledge based on my somewhat limited experience at this point in time with these new SMV LW-MW-SW receiving antennas they are no better and no worse in terms of sensitivity and man made noise reduction than the 15 foot amplified verticals I designed several years ago, and from which these short multielement vertical receiving antennas are derived. If the receiver with which a SMV is used is not very sensitive or if two MW verticals are used as a



phased array, then a 10 dB gain, such as one of my push-pull Norton transformer feedback amplifiers, will be needed, especially if you have low levels of man made noise. Such preamplifiers are described in several articles in [The Dallas Files](#). A schematic of the Norton amplifier is given below. Note that both the 15 foot verticals and SMV's are noise reducing verticals and that they are not active antennas (the amplifiers are low input impedance amplifiers, and are not mounted at the antennas). They are as quiet as or quieter than any loop antenna I have used, including ALA-100's as long as the ALA-100 is not used to null local noise sources, which, of course, is "cheating." And as is well known, if you want to null noise, you are better off doing it with a phased array, provided you use a good phaser. Also, vertical receiving antennas are omnidirectional and do not suffer from the common defects of loop antennas. And vertical receiving antennas, including these new SMV receiving antennas, make excellent close spaced phased arrays.

As I have said before elsewhere, you should not use coax lead in rather than twin lead lead in. This is because the 2<sup>nd</sup> and 3<sup>rd</sup> order intercepts of the receiving antenna system (which includes the lead in) are degraded by coax compared to twin lead. Recently I discovered a second reason not to use coax lead in for these small vertical antennas, namely that coax lead in reduces SW signal levels by 10 dB or more compared to twin lead. This excessive signal loss is unacceptable for such small amplified antennas because the noise figure of the amplifier may and often will degrade the signal to noise ratio of the antenna system.

And no, this is not an April Fool's joke.

