Welcome to AntennaSelect™ Volume 34 – October 2017

Welcome to Volume 34 of our newsletter, AntennaSelect™. Every two months we will be giving you an "under the radome" look at antenna and RF Technology. If there are subjects you would like to see covered, please let us know what you would like to see by emailing us at: info@micronetixx.com

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- **Minimizing RFR and De-Tuning of FM Antennas**
- **The Log-Periodic Antenna – *Neat Things to Know!***

UHF and VHF Stacked Antenna Pylons

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So the question comes up, when stacking a UHF and VHF pylon antenna, which one should be on the bottom and which one on the top? There is no one overall correct answer. Let's look at some of the attributes of the antennas and see what factors can help in planning.

VHF high band slot antennas depending on the azimuthal pattern usually have larger pylon diameters than UHF models. Those antennas can be designed with heavier wall pipe and beefed up flange or bury sections to support a wedding cake and top mount UHF antenna. The bay count of top mounted high band antennas averages between 4 and 10 bays, which takes up 30 to 60 feet of vertical space.

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Add 3 feet of vertical space for the wedding cake between the pylons. UHF top mount antennas average 16 to 30 bays – that comes out to 32 to 62 feet long.

The feed line for the top antenna with proper modeling can run through the aperture of the lower VHF antenna. If the VHF antenna is directional, running the line to the rear or main minima of the antenna reduces pattern distortion. If the antenna is Omni-Directional, placing the line between the columns of antenna slots is the way to go. Reducing the size of the transmission line that is routed through the VHF antenna aperture can further reduce pattern distortion. A 3-1/8” EIA line can handle about 20 kW, while a 4-1/16” line can handle about 32 kW. So if the UHF station ERP for example is 500 kW, and the antenna gain is 25, either smaller transmission line option would work.

What about applications where the UHF Antenna is below VHF Antenna? With the proper size and wall thickness of the UHF pylon, this is also a good option. If the UHF station has a directional pattern, running the transmission line up the back side of the pattern is your best option. To minimize pattern distortion, especially on Omni-directional UHF patterns, smaller transmission line sizes can be used. For high band a 1-5/8” EIA line can handle 10 kW, while a 3-1/8” one can handle 35 kW. Finally, proper periodic grounding of the transmission line in the Antenna Aperture is essential.

So what about an FM antenna replacing the VHF pylon? Mounting the FM antenna above the UHF slot makes the most sense. The FM antenna can be mounted on a small diameter monopole, usually in the 6 to 10 inch diameter range. A 1-5/8” EIA line can handle a minimum of 14 kW at FM, while a 3-1/8” line can handle 50 kW.

If you are thinking about a stacked antenna project, let us run up some designs for you. We “think outside of the box” to bring the best value to your station(s). Also all of our top mounted antenna solutions come with PE-Stamped design approval.

Minimize RFR and Detuning of FM Antennas

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Have you had a FM transmitting antenna that had its V.S.W.R. go up (or even sometimes down) with the arrival of icy or rainy weather? Are there a few transmission lines running through the aperture of the FM antenna? The answer may be as simple as how the outer jacket of the transmission line(s) act in relationship with the FM antenna. After all, in many cases they are less than 5 feet apart!

So let's say you install the antenna and adjust the transformer for minimum V.S.W.R. – on a clear day. With the transmission line(s) being that close to the FM antenna there are a lot of induced RF currents flowing on the outside conductor of the line. With EIA line there is some grounding of the induced RF with the hangers, but it might not be adequate. With air or foam flex cable, the only grounding it has is at the antenna input or where a grounding kit is installed. As moisture builds up on the line (with the emphasis being flex lines), the line becomes a ungrounded parastitic element. It is being excited with RF currents and it becomes part of the antenna system. The moisture changes the coupling of the line to the antenna, and with that the V.S.W.R. can change. There is nothing wrong with the FM antenna. The transmitting antenna is "seeing" the transmission line, and acts as an additional element that is changing with moisture or ice.

The easiest way to minimize these effects is to install grounding kits on all transmission lines in the aperture of the antenna. This is most important for flex type transmission lines. A grounding kit, (with leads as short as possible), installed every 8 feet or so tames down the changing coupling. On EIA line installing a positive ground every 10 feet, (again with short flat lead lengths), is also a great help. So here is the additional bonus: Lower RFR!

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By grounding the transmission lines near the aperture of the transmitting antenna, less RF currents are excited on the outer conductor. Less currents mean less radiation along the transmission line above and below the transmitting antenna. Towers that use guy wires will see less coupling of these currents from the transmission line outer conductor to the guy wires as well. This will lower the radiation in both the E and H planes near the end of the guy wires. And yes -that can be a good contributor or RFR especially with multi user sites. The RFR contribution can be nearly equal with full or half wave spaced antenna arrays.

We will have more on this subject in a future AntennaSelect™ newsletter. Stay tuned…

The Log Periodic Antenna; -Neat Things to Know

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The Log Periodic turns 60 next year. It was developed at the University of Illinois in 1958. The antenna consists of a number of pairs of half-wave spaced dipoles. The dipoles are tapered down in size until the last pair is slightly above the higher frequency of interest. Taper factors of 0.92 to 0.95, (or shorting of element to element are), are common.

Gain is fairly flat across the operating band. For an 8-element array at FM the gain is about 5 to 7 dB. Another way of thinking of this antenna is, that it is a group of three element Yagis staggered In frequency. There two booms that form the transmission line. The antenna's terminal impedance is a function of the spacing of the two booms.

On the next page, a depiction of an 8 element log periodic antenna for the FM band is presented. The longest element is cut about 5% longer than a ½ wavelength at 88 MHz. The element pairs taper in size down to about 5 to 10 percent shorter than a ½ wavelength at 108 MHz.

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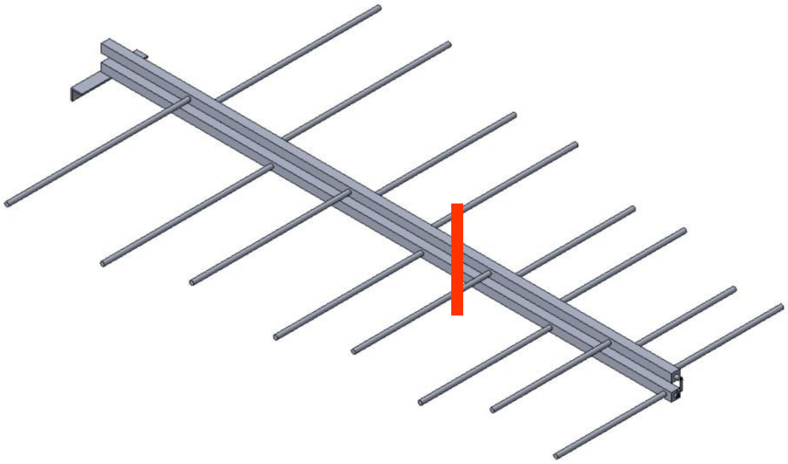
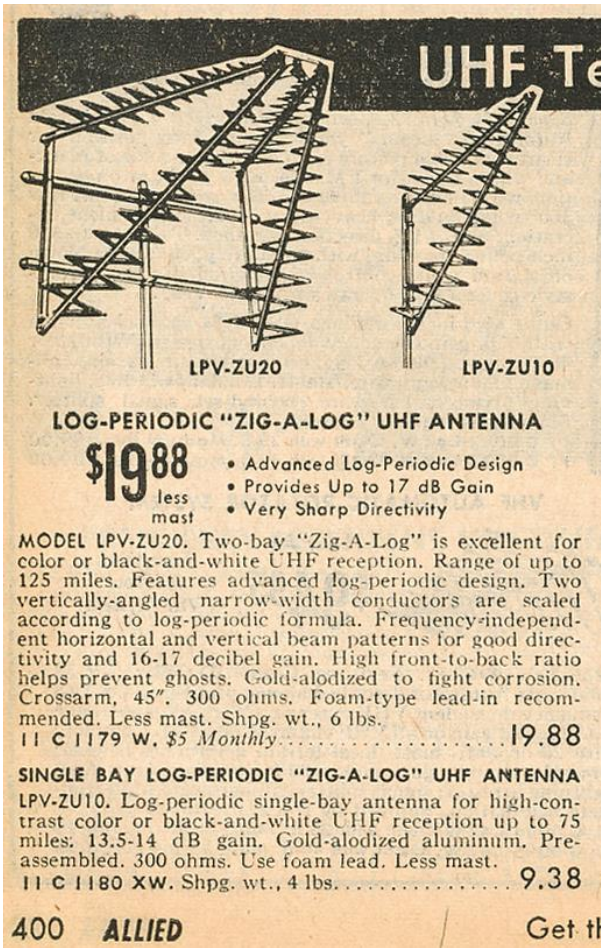


So here is a question – If this antenna was used to transmit a signal at 107.1 MHz and we short-circuit the booms in the middle of the array, what would happen?

While thinking the answer over, enjoy the pictures of zig zag log periodic UHF antennas from JFD. The image is from the 1969 Allied Radio catalog. And yes these antennas could really pull-in deep fringe UHF stations.



UHF Te

LPV-ZU20

LPV-ZU10

LOG-PERIODIC "ZIG-A-LOG" UHF ANTENNA

$19.88 less mast

- Advanced Log-Periodic Design
- Provides Up to 17 dB Gain
- Very Sharp Directivity

MODEL LPV-ZU20. Two-bay "Zig-A-Log" is excellent for color or black-and-white UHF reception. Range of up to 125 miles. Features advanced log-periodic design. Two vertically-angled narrow-width conductors are scaled according to log-periodic formula. Frequency-independent horizontal and vertical beam patterns for good directivity and 16-17 decibel gain. High front-to-back ratio helps prevent ghosts. Gold-alodized to fight corrosion. Crossarm, 45". 300 ohms. Foam-type lead-in recommended. Less mast. Shpg. wt., 6 lbs.
11 C 1179 W. *$5 Monthly*.................... 19.88

SINGLE BAY LOG-PERIODIC "ZIG-A-LOG" UHF ANTENNA

LPV-ZU10. Log-periodic single-bay antenna for high-contrast color or black-and-white UHF reception up to 75 miles: 13.5-14 dB gain. Gold-alodized aluminum. Pre-assembled. 300 ohms. Use foam lead. Less mast.
11 C 1180 XW. Shpg. wt., 4 lbs................ 9.38

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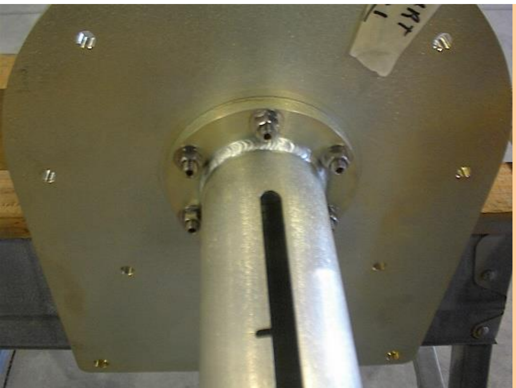
So what is the answer to the question about shorting the antenna mid-boom? For all practical purposes the antenna still works great at 107.1 MHz – same gain and almost the same V.S.W.R.!

Be on the lookout for the next volume of AntennaSelect™ coming out in December



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70 Commercial St. Lewiston ME 04240 U.S.A.
V 207-786-2000 www.micronetixxantennas.com