Welcome to AntennaSelect™ Volume 39 – August 2018

Welcome to Volume 39 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

In this issue:

Lowering RF Levels Near FM Translators

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One problem that keeps coming up is that a new translator can put too much signal on the ground near the tower, interfering with adjacent or second adjacent FM stations. If there is population nearby, the new translator antenna must be designed to limit RF levels hitting that population. There are several methods we use in designing antennas to lower radiation nearby,

Bay Count of the Antenna – most of the translator antennas we supply are two-bay models. Full Wave-Spaced models have a gain of 1.00, while half-wave spaced models have a gain of 0.68, needing between 300 Watts to 400 Watts of transmitter power; (this assumes some line loss).

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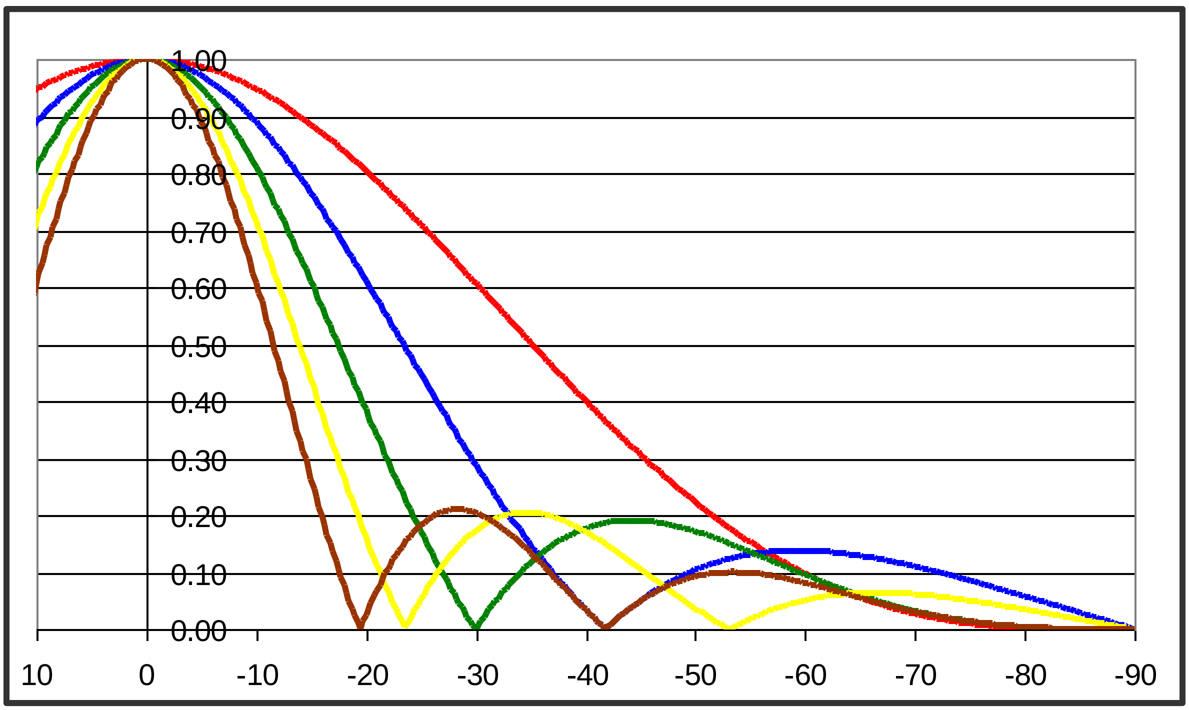
So if you do have an interference issue, going to a higher bay-count can help mitigate the problem. Let's compare 5 half-wave spaced elevation patterns: The **Red** plot is a 2-bay antenna, the **Blue** plot is a 3-bay antenna, the **Green** plot a 4-bay antenna, the **Yellow** plot is a 5-bay antenna, and finally the **Brown** plot is a 6-bay model. If you are having excessive RFR right around the tower base, all of these patterns produce much less radiation at high depression angles as compared to full-wave spaced models. And if your RFR is excessive from about 65 degrees to 90 down, the 2-, 4-, and 6-bay antennas have the same field levels. Running a 250 Watt translator, at -70 degrees the Effective Radiated Power, (ERP), hitting the ground would be about 0.40 Watts.



Typically a 4- or 5-bay antenna on a 200 foot structure would be used where population is just a few hundred feet away. But what if your design placed higher RF levels over just one or two houses near the tower? …The second way we can solve the problem is with the **relative pacing of the antenna bays**.

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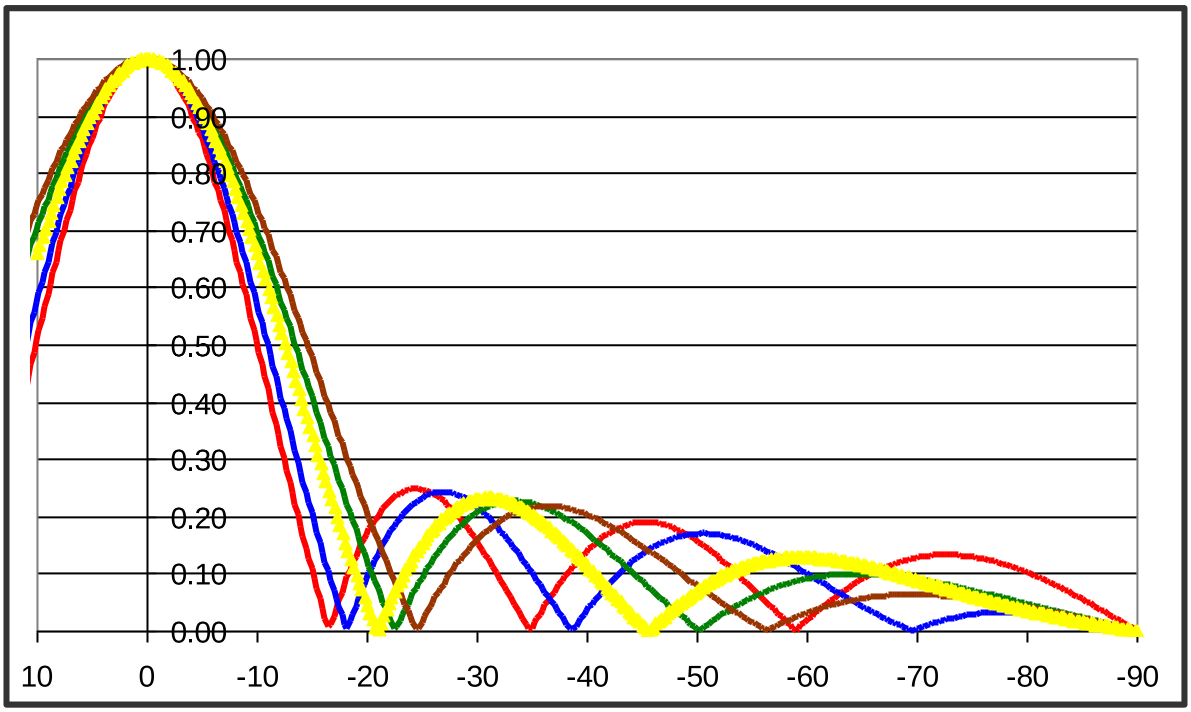
So lets model a 4-bay design. On the previous page, the elevation plot showed 5 half-wave spaced (180 degree electrical spacing) patterns. FM antenna bay spacings can range from half wave to full wave spaced (360 electrical degrees). So let us try a few spacings to see if we can mitigate interference on a property near the transmitter site. In this case the interference would land just a few hundred feet away at at a depression angle of -25 degrees. So let's look at 5 four-bay patterns with different spacing and see if any would work:



The **RED** plot is 315 degrees (0.875 L), the **BLUE** plot is 288 degrees (0.800 L), the **YELLOW** plot is 252 degrees (0.700 L), the **GREEN** plot is 234 degrees (0.650 L), and the **BROWN** plot is 216 degrees (0.600 L. As the interbay spacing decreases the main beam becomes wider and the elevation gain drops from 2.07 for the 315 degree spaced antenna to 1.53 for the 216 degree-spaced model. In this case we are interested in the spacing producing the least radiation at -25 degrees. The winner is the 216 degree spaced model which produces only 0.014 percent of full field.

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So with this very low field value the Effective Radiated Power at -25 degrees is a whopping 0.098 Watt. That eliminates the interference. If you are placing the antenna on a multi-user tower utilizing either the 234 or 216 degree-spaced arrays will greatly reduce radiation from -50 to -90 degrees, keeping your public RF exposure contribution down to a minimum.

At Micronetixx we have the tools to quickly engineer a solution to find a great outcome for you. Give us a call and tell us your constraints. We will quickly work magic for you.

LPF8 FM Antenna Now Available in Stainless Steel

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Our **LPF8** FM log periodic antenna is now available in stainless steel. This new rugged version has a higher wind zone rating (150 M.P.H. basic), and is also great for salty marine environments.

The elements of the antenna are solid stainless steel rod, which fasten to heavy wall square wall tubes that are the boom of the antenna. The **LPF8** comes in horizontal and vertical, rear mount configurations and a horizontal center-mount configuration.

Power Input Ratings of up to 1.5 kW are available. Multiple antenna arrays are fed via a power divider. Common configurations such a forming different azimuth patterns, and increasing gain can be accomplished. A single **LPF8** antenna has a gain of 5.1 (7.00 dB) across the band.

The **LPF8** is shipped in a heavy-wall cardboard container. The elements are bolted to the boom in the field. No tuning is required. 50 Ohm versions are available with DIN and N connectors, the 75 Ohm version is available with an N connector.

Elliptical Polarization – Some Calculations

For quite a few engineers, choosing an antenna for the Re-Pack is a new task. One of the most common questions we get is about Elliptical Polarization. So let's go through a few considerations:

Why is Elliptical Polarization Good?

A horizontally-polarized signal may reach a location in a different elevation plane. This could be at any angle or even vertically-polarized. The change of received polarization is know as **Faraday Rotation** due to signals bouncing off structures and topography. If a horizontally-polarized signal was rotated and received as vertically-polarized at a given location, signal values up to 20 dB may be lost. Properly designed Elliptically-Polarized transmitting antennas launch a signal that has energy at all angles, so the lost signal level from **Faraday Rotation** is minimized.

How Much Vertical Component do I Need and What are the Ranges?

Elliptical-Polarization can start at as little as 10% and go up to the point where horizontal and vertical levels are equal. At that point you have Circular Polarization. Many studies have concluded that a 70/30 power split, (42.8% vertical component), is the best trade-off in cost and performance. With a 70/30 power split there will be at least 42% of received peak signal at any angle. So with a 100 kW ERP in H-Polarization, the Effective Radiated Power would be a minimum of 42 kW at any angle. Going with an 80/20 power split would produce the minimum ERP of 25 kW. Even a 90/10 power split would ensure that there is signal at all polarization angles. Elliptical Polarization benefits both UHF and VHF transmissions.

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How Do I Calculate Elliptically-Polarized Antenna Gains ?

Let's use a 16-bay antenna as a model. A 16-bay UHF slot antenna with horizontal polarization has an elevation gain of about 16.5 (12.17 dB). If we configure that same antenna with elliptical polarization, the elevation gain will decrease. Using the 70/30 power split, we multiply the elevation gain (16.5) times 0.7. The answer is an elevation gain of 11.55 (10.62 dB).

For the total power gain of the antenna, multiply 11.55 times any azimuth gain that the antenna has.

How Much Weight Does Elliptical-Polarization Add to the Antenna ?

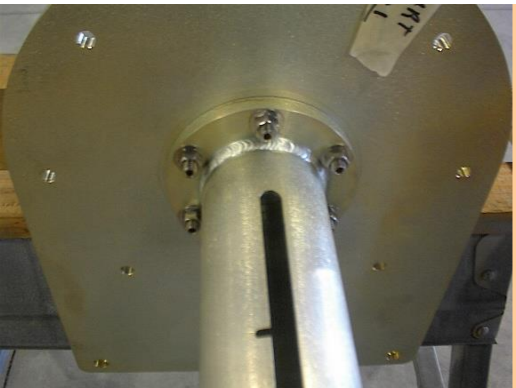
Using the 16-bay antenna again, and a 12.5 kW Input UHF side mount, single slot per bay antenna, The increase is about 35 lbs.

How Much Does Elliptical Polarization Cost ?

Using the same 16-bay antenna as a model are about $4,400 more. Higher power UHF antennas, and VHF antennas are more expensive.

If you are exploring Elliptical or Circular polarization for your new antenna, give us a call. We will quickly engineer you a solution that will provide excellent reception of your DTV station.

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



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