Welcome to AntennaSelect™ Volume 29 – December 2016

Welcome to Volume 29 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:

VHF Standby/Temporary Antennas

In the last issue of AntennaSelect™ we introduced our newest TV antenna, the DX Series. The DX Series are 8-bay side mount slot pylon antennas. Now comes the question from one of our readers; what about something for VHF, specifically channels 7 to 13?

Amswer: Micronetixx supplies two slotted antenna models, plus a time tested batwing antenna. All three models can be either top mounted or side mounted. Our analysis concludes that most of the standby antennas will be side mounted models. So let's review a few design rules and observations when working with VHF.

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Azimuth Pattern – If you are trying to replicate an omni-directional azimuth pattern, a true onmi-directional VHF slot antenna is much more expensive than an Omnioid slot antenna. The cost is driven by two factors: 1) the omni-directional pylon is larger in diameter, (6 to 8 inches more), than the omnioid pylon; And: 2) the onmi-directional antenna has 3 times as many slots, and slot couplers, when compared to the omnioid antenna. Production and test times are also longer. With the omni-directional antenna, a full 360 degree radome is also needed versus a partial radome on the omnioid model.

If you have a top mounting position for the standby antenna, either antenna pattern will work fine. Side mounted omni antennas take a bit more care. Since there are radiating centers every 120 degrees around the pylon, about 30% of the slots are firing high levels of energy directly at the tower. Additionally, the disruption of current flow around the pylon can cause some detuning of the antenna. A minimum of 5 feet off the tower leg is advised.

For side mounts we recommend either an omnioid or broad cardioid pattern. Here, there is less current flow around the back of the pylon. Mounting these antennas 3 to 5 feet off the tower leg or face is advised.

How much coverage do you lose going from a omni-directional to omnioid antenna? Usually, with the antenna mounted at the 500 foot level an improvement of only a few miles would be realized.

Our third antenna model is a Batwing Antenna. In free space it is very broadband and can cover channels 7 to 13. This antenna works much better in top-mounted configurations. For side mounted applications, the antenna can be detuned at a number of frequencies by the tower. A side-mounted batwing should be mounted a minimum of 8 feet off the tower leg or face.

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To solve detuning on a side mounted antenna, a four port fine matcher will usually “walk” the antenna back in. Fine matchers are not expensive and can save considerable time in installing the antenna.

Elevation Patterns – Unlike UHF antennas, VHF high band antennas are roughly 3 times longer per bay. A standby VHF antenna may only be a 3, 4 or 5 bay model, as opposed to 8 to 16 bays for UHF. A 5-bay channel 13 antenna will be about 30 feet long. From a coverage point of view the broad main beam will provide a half power signal level, down to about 8 degrees below the horizon. In most applications that will cover about 99% of the viewers.

If there is extra transmitter power available, consider Elliptical polarization. Adding Elliptical polarization is the best way to ensure that your viewers in impaired areas are covered. Adding Elliptical polarization is not extraordinarily expensive and does not increase the weight or wind load significantly. At a given impaired site, Elliptical polarization can increase received signal strength by 10 to 15 dB.

Micronetixx also offers a low RFR version of our VHF pylon Antennas, the TPV-SFN. The TPV-SFN, depending on bay count, produces 15 to 20 dB less RFR at high depression angles. This allows placement of the antenna at lower positions of the tower. Another benefit of the TPV-SFN is the elevation gain efficiency per bay is 12 to 15% higher than standard-spaced antennas

Station ERP – All of our VHF pylon antennas are built using a 3-1/8” EIA input. With the larger pylon size needed for VHF, and the larger inner conductor, transitioning to the 3-1/8” input is the most cost effective way of building these antennas. With a 3-1/8” input, the maximum input power is 25 kW. So a 5-bay Omnioid antenna, with a peak gain of 8.5 (9.29 dB) can produce an ERP of over 200 kW.

Best LPFM/Translator Antenna Mounting

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We get a lot of calls, e-mails and pictures from clients seeking advice on mounting their LPFM or translator antennas. For our clients that are not technically oriented, here is how we describe what their LPFM antenna is doing. Imagine the LPFM antenna as a large spinning ball where the antenna is mounted. If everything is right the ball will rotate and appear as a perfect circle. If the ball gets moved closer to the tower it will chafe and distort form a perfect circle. The areas that chafe a smaller in size. Those areas will have less signal.

So how are our LPFM antennas tested? Single antenna bays are mounted to a 10 foot pole at our factory. They are taken outside and are tuned and tested on that pole. The typical V.S.W.R. in the middle of the channel is in the range of 1.02:1 to 1.03:1. Multi-bay antennas are tested on a longer pole, with the pole extending a minimum of 5 feet above and 5 below the end bays. A cut-to-frequency feeder cable is used in the tests. We check and tune for the lowest V.S.W.R, and measure the phase and magnitude each bay, to ensure proper elevation pattern performance. The mounting pole is part of what is needed in order for the antenna to launch a perfect C/P signal.

So here is the dream mounting for these antennas. The best mounting is on a pole above a structure like a Rohn 25 or 45 series tower. The pole would clear the top of the tower by 10 feet. A single bay antenna would be mounted 5 feet up on that pole. Multi-bay antennas would require a longer pole. The bottom bay would be mounted 5 feet up from the tower top, and the top bay mounted 5 feet below top of the pole.

For applications that call for side mounted antennas, using an outrigged pole is a must.

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A good rule of thumb is to use an outrigged pole that is a minimum of 3 feet off the tower or structure. The pole should extend 5 feet above and below the top and bottom antenna bays. If you are using a multi-bay center-fed antenna, grounding the transmission line at the input tee is recommended. That way the outer conductor of the transmission line does not support current flow that could affect tuning of the antenna array. So it is OK to think of your LPFM antenna as a spinning ball. When it is freely able to spin it is launching the maximum signal to your listeners.

When planning your LPFM or translator station, give us a call. We can help to ensure that your installation will keep that ball spinning properly!

Holiday Hours and More Articles on the Repack

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We will be closed on Monday, December 26th and Monday, January 2nd for the holidays. As we start the New Year, the Spectrum Repack will be that much closer. Depending on the timing of the Repack, and the number of unique technical applications we see, AntennaSelect™ may come out monthly rather than every two months. To all a peaceful and merry holiday season. Be on the lookout for the first issue of AntennaSelect™ next year.

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

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