Welcome to AntennaSelect™ Volume 3 – October 2013

Welcome to Volume 3 of our newsletter AntennaSelect. Each month 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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- **Stainless steel mounting brackets are superior**
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How Omni-directional is that antenna?

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A perfect Omni-directional antenna would produce the same amount of radiation at all azimuth angles. We will take a look at some common antenna patterns and compare them.

We will start with the Omnioid pattern. This is the most simple antenna pattern to design. The Omnioid is formed by using a single column of slots in an aluminum or steel pylon. For a UHF (Band IV) antenna, the pylon diameter is about 3.5 inches (8.9 cm.) in diameter.

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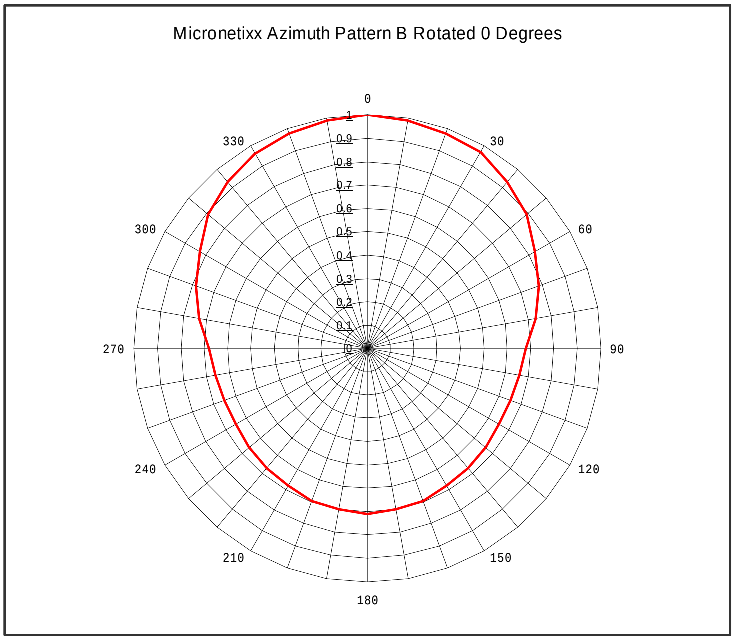
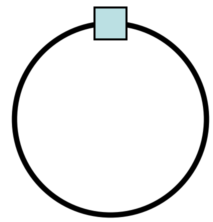
For VHF (Band III), the typical pylon diameter increases to a range of 10 to 12 inches (25.4 cm to 30.5 cm). Band I VHF antennas can be built, however the pylon diameter increases to between 3 and 5 feet (91.5 cm to 152 cm).





= Slot location

The azimuth plot above is an Omnioid antenna. To the right is a birds eye view of the antenna pylon, with the location of it's column of slots. The antenna has an average azimuth gain of 1 (0.0 dB), or if thought of as a directional antenna, the azimuth gain is 1.7 (2.30 dB). Along the back sides of the pattern, the field value falls to about 65% of peak, and is at 70% of peak field at 180 degrees opposing the slot location.

Under U.S. FCC rules, the Omnioid pattern can be filed as a Omni-directional, or directional pattern. If the majority of the population is in one direction, filing the antenna as Omni-directional and applying power as need to achieve your ERP, adds 2.3 dB more signal to the main lobe.

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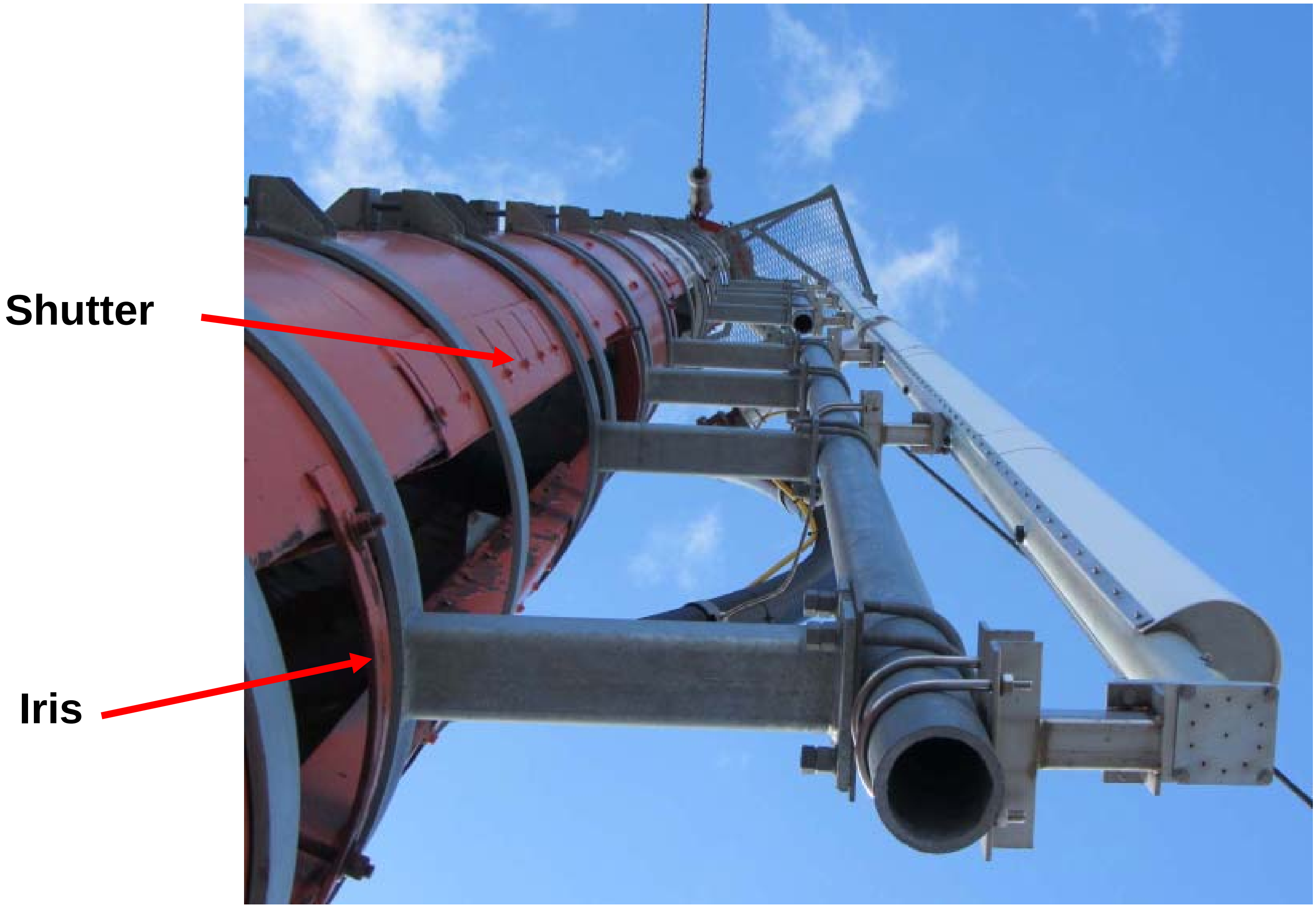

The picture above is a of a new Omnioid channel 42 antenna outrigged on an old channel 5 Omnioid slot antenna (left in orange). The channel 42 antenna pylon is 3-1/2 inches (8.9 cm), while the old channel 5 antenna is 4 feet (122 cm) in diameter.

If you take a look at the old antenna pylon, there are two tuning aids visible. One is the tuning Iris, which is located near the end of the slot. It moves along the slot and is adjusted to the proper length. It acts as a short circuit across the slot. The second tuning aid is a set of shutters on each side of the slot. They slide horizontally to control the coupling of the slot. The length of the slots on the channel 5 antenna is about 110 inches (280 cm).

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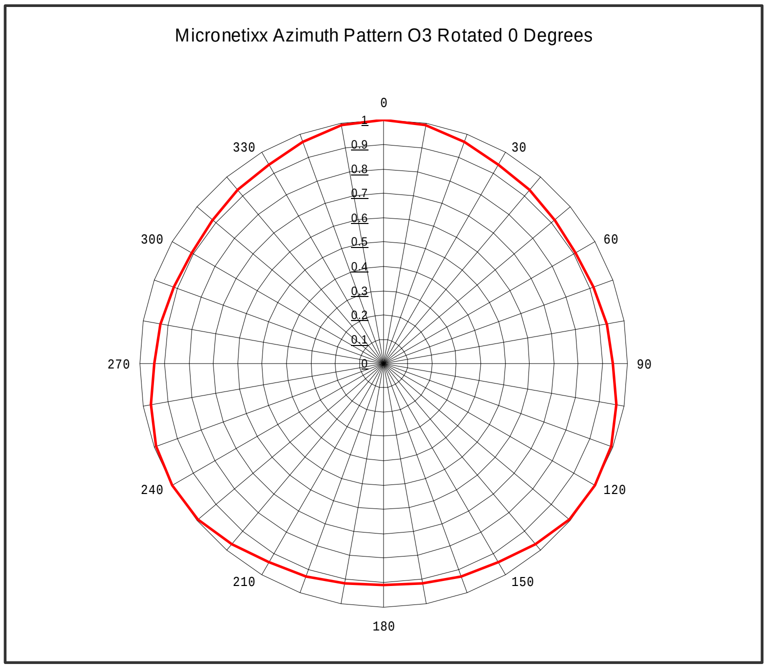
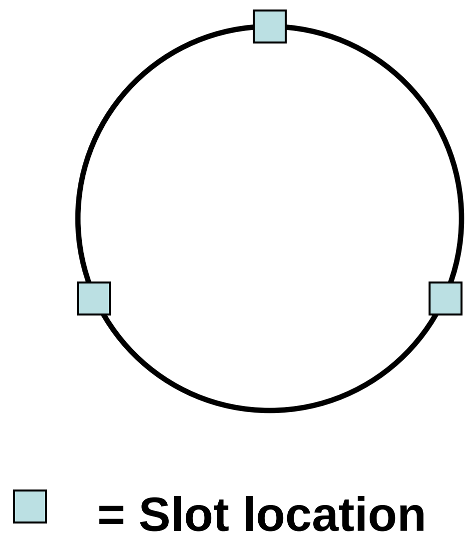
Next we will look at a true Omni-directional antenna. A good Omni-directional antenna will have minimas of no less that 80% of peak field. The three slot pattern below has minimas at 91% of peak field





The Omni-directional antenna pattern needs a bigger pylon diameter to get the proper current flow around the pylon. For a UHF slot antenna, the minimum diameter is 6 inches (15 cm) and can vary to 16 inches (40 cm.) for large top mounted pylons. When larger top mounted antennas come into play the slot count can be increased to 4 or 6 slots per bay. As the slot count per bay goes up on a top mounted antenna, the thickness of the pylon needs to go up to keep the pylon rigid.

An Omni-directional antenna also can produce an excellent Circular or Elliptically polarized signal with a great azimuth pattern. Our design for Elliptically polarized antennas produce a true Quadrature relationship between the horizontal and vertical signals. We will explore Circular Polarization in a future issue of AntennaSelect.

Stainless steel mounting brackets are superior

We have been using stainless steel mounting brackets on our side mounted antennas for years. Stainless steel will stand up to the elements for a very long time. The top of the Chrysler building is decked out in very ornate stainless steel and still looks great after 83 years.

All of the steps of fabricating stainless steel brackets are done in house. The brackets are fabricated from just two components: Heavy wall square tubing and steel angle stock. The material is cut as needed and welded together. After the brackets are welded, the welds are brushed clean with stainless steel wire brushes. The picture below shows a typical side mount antenna bracket we make..

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As antenna patterns and frequency of operation varies, so does the optional distance from the tower change. With our modular approach to bracket construction, we can tailor the bracket length for best antenna performance. On heavier antennas, we use triangulated brackets. The brackets can be designed for either a leg mount, or across a tower face.

Since we fabricate in house, the turn around time for brackets is quick. Galvanized brackets require that the brackets are sent out of house to a galvanizing plant for coating, adding cost and time in their fabrication. We do not cold galvanize, as the rust free service life is limited with this process

AntennaSelect antenna design and database tool

We have a powerful antenna design program available on-line, called AntennaSelect. The program functions as a catalog of antenna designs, and system calculation tools. When AntennaSelect was created, we decided to make it an on-line tool, versus sending it out on a CD. By putting it online we can upload new data on the fly and relieve the users of hunting for the latest version of the program. AntennaSelect can be found at www.antennaselect.com It is free to use. You set up a user name and self selected password. You can save your work, or get a full report on a PDF file. Antenna elevation and azimuth data can be quickly exported in Excel spreadsheets. The program has a number of neat features. We will take a look at a few on them on the next few pages.

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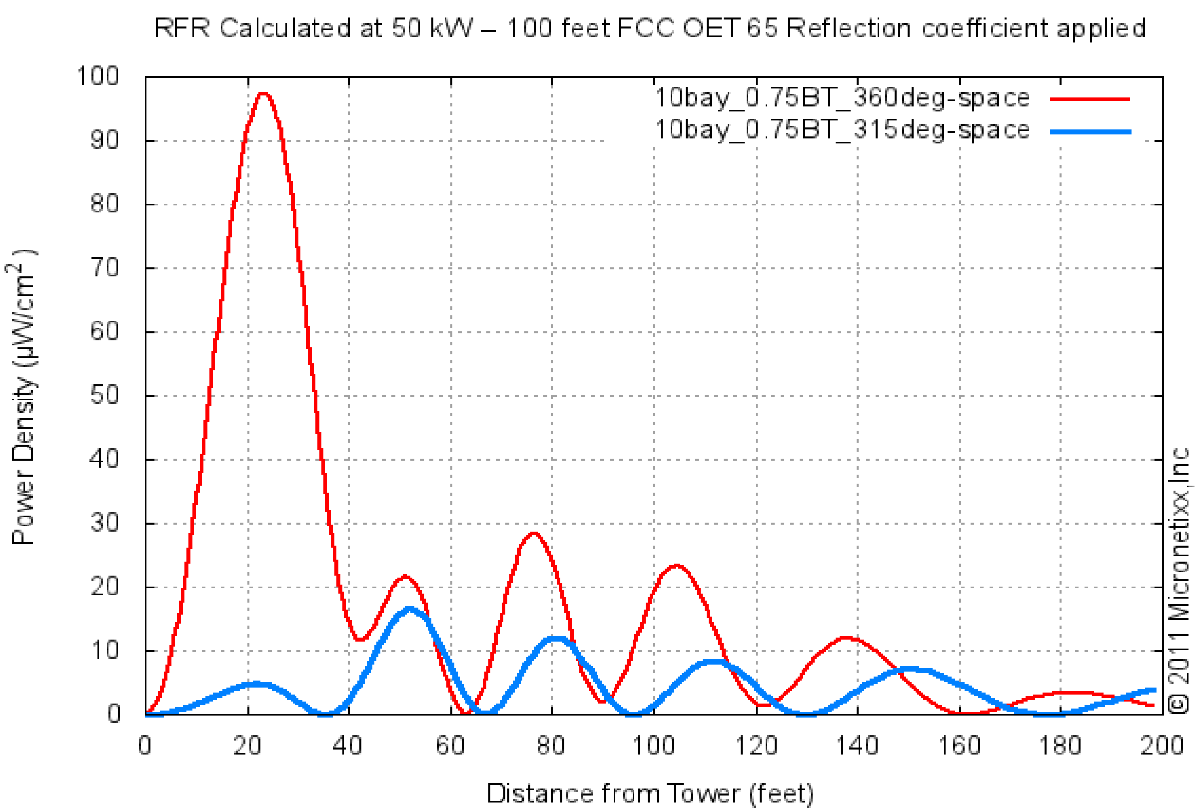
The first feature of AntennaSelect we will look at is the RFR calculation part of the program. You can select one or two elevation patterns from the database and plot the RF power density and percentage of RF exposure. After selecting, the antenna elevation pattern, the program will ask you to put in an ERP, center of radiation above ground (or rooftop), and select a reflection coefficient.

The plot below shows the power density from two 10 Bay antennas, with an ERP of 50 kW – 100 feet up on the tower One antenna has a 315 degree spacing, the other a 360 degree spacing. A reflection coefficient of 1.6 has been selected.



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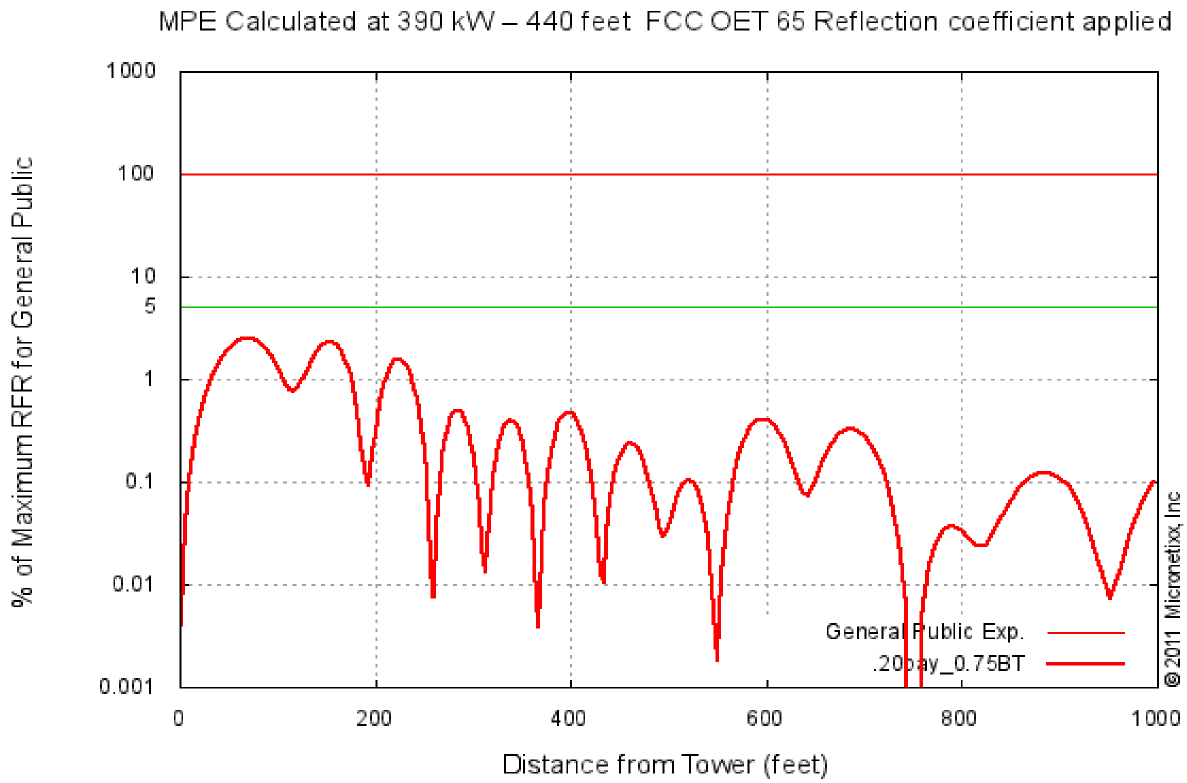
The plot below shows the percentage of maximum public exposure from a 20 bay antenna producing an ERP of 390 kW. The antenna is mounted 440 feet above the ground. A reflection coefficient of 1.6 has been added.



The next feature of AntennaSelect we will look at is the "Quick Calc" section. The Quick Calc" is a generic RF systems planner or "what if" calculator. You enter in a channel of operation, the azimuth and elevation values of the antenna you are modeling. Then add in the type and length of planned transmission line, plus additional losses from a mask filter or combiner. Select calculate from either ERP or transmitter output power. You can change any of the variables. If the transmission line is overloaded, the program will tell you that too.

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A sample printed “Quick Calc” report. With “Quick Calc” you can run a analysis of any TV antenna in just minutes. Try AntennaSelect today !

Micronetixx Antenna and System Summary

AntennaSelect
DTV Broadcast Antenna Design

Consultant:	Joe Smith			**Date:**	
Project ID:	07737				
Customer:	Mount Sizemore				
Description:	channel 18 antenna replacement				
Channel:	18				
Azimuth Gain:	1.7				
Elevation Gain:	12.55				
Line Type:	Foam Core Flexible 1-5/8" AVA7-50			**Line Length:**	200
		Line Loss (dB):	-0.93	**Line Efficiency %:**	80.76
Filter 1:	Mask Filter	**Loss (dB):**	-0.22	**Efficiency %:**	95
Filter 2:		**Loss (dB):**		**Efficiency %:**	
		Total (dB):	-1.15	**Total System Efficiency %:**	76.72

Transmitter Power Output:	0.9162	**(dBk):**	-0.38
Antenna Input Power (kW):	0.7029	**(dBk):**	-1.53
Antenna Gain:	21.34	**(dB):**	13.29
Station ERP (kW):	15	**(dB):**	11.76

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

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