Welcome to AntennaSelect™ Volume 52 – October 2020

Welcome to Volume 52 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:

-Is A Capacitor Always A Capacitor?

The answer is no. We build RF equipment and microwave systems into the low GHz range. Components used in these systems at very high frequencies can often have much different characteristics than one would expect; (often, impedance versus capacitance). Why is this? Self resonance of the individual part. Any capacitor has three components to it: capacitance, resistance, and inductance. The use of SMD capacitors has, in many cases, reduced two of the parameters, mainly inductance, with a slight reduction in resistance. Remember the RESONANCE formula where capacitive reactance equals inductive reactance?

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When the capacitor and inductor is connected in series, the impedance at resonance is close to zero. There is still a very small resistive element present however. If we were using leaded parts such as ceramic caps, the length and diameter of the leads affect both the resonant frequency and impedance at resonance. Adding even a small amount of length to a lead will also change its resonant frequency downward as the inductive parameter of this capacitor increases because of its lead dimensions.

If we are using small capacitors to decouple circuits in mid to high frequency ranges, one solution is to use a pair of capacitors next to each other. For FM through UHF frequencies using a 1000pf and a 0.01 uF cap usually provides a good low impedance path to ground over a wide range of frequencies. As you get higher in frequency, parts often can, and do behave in strange ways. Self resonance of parts, (as discussed above), can be a major factor.

TV Over Air Reception- Part 5- A Look Back 50 Years

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More than 50 years ago the first extreme receive antennas became available. These were for CATV headends and developed by General Electric Canada. They were coined “halfbolic” antennas as they looked like half of a parabolic dish. They were used for VHF and FM reception. The antenna consisted of 10 towers with reflector wire strung between them. Each tower was 90 feet high and spaced about 35 feet apart. The towers were curved inwards to to form a parabolic arc. Roughly 16 wires were strung between the towers to form a Toroidal arc. The focus point of the arc contained receive antennas pointed at the reflector. If you have a lot of land and a lot of money we will build one for you!

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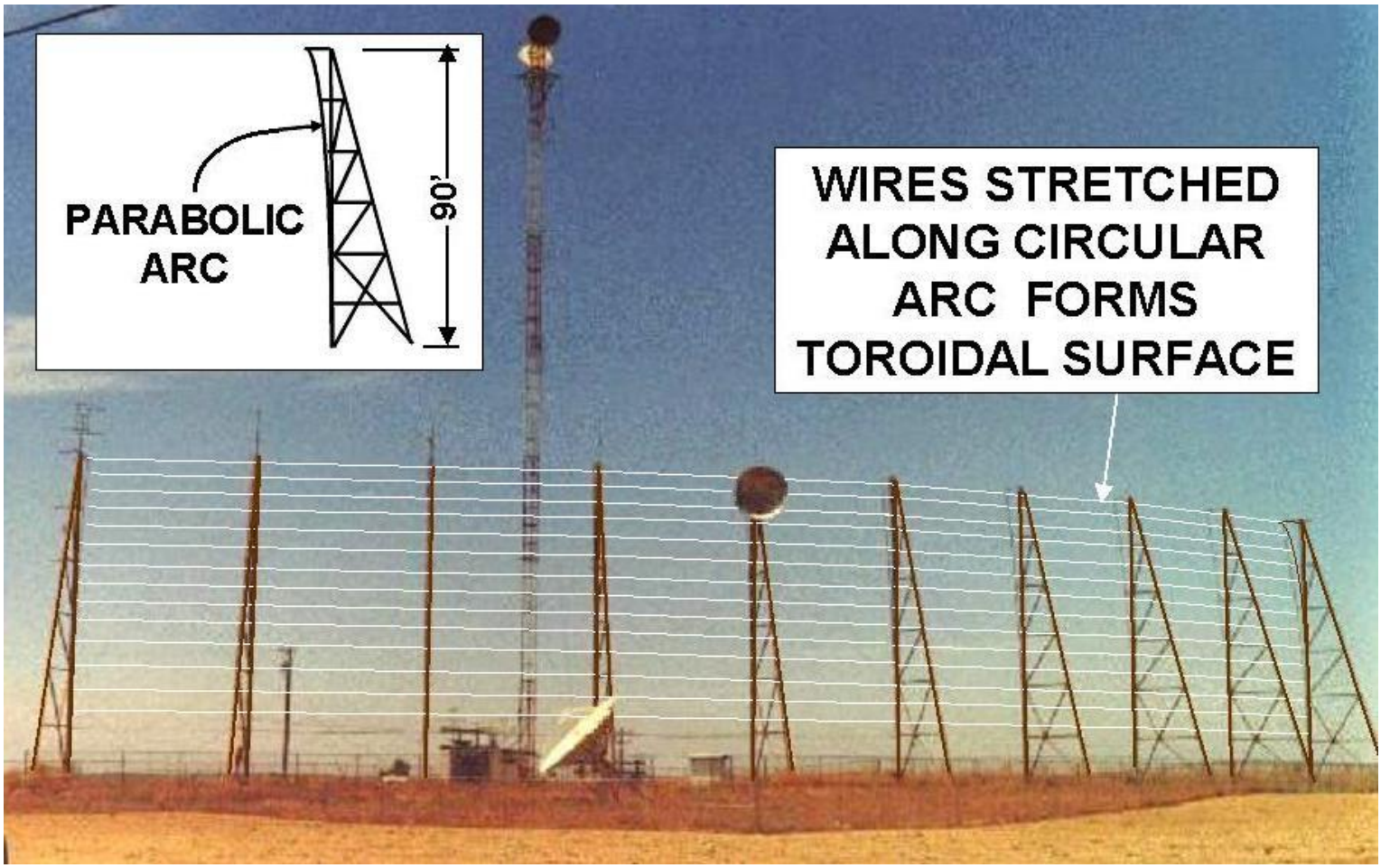

Above is an image of a halfbolic antenna that had been installed in California in the late 1960's. The photo shows the back side of the antenna. The parabolic antenna near the center of the tower was most likely a microwave link back to the city.

These antennas were not common, with the bulk of them being installed in Canada to capture long distance U.S. stations. You needed a lot of space (close to 300 feet) to install one and the land in front of the antenna needed to drop off. Also, any trees would have hindered the antenna's performance. The reflector worked well at channel 2, but due to the wide spacing of the reflector wires was not as effective at channel 13. This antenna did not work well on the UHF band. A 25 dB gain was estimated on low band. With the stations here being much more crowded, and more frequent skip conditions, co-channel interference would have been a real problem. If a preamp was being used, it would have needed a wide input frequency range, but during periods of strong signals, intermodulation could occur.

FM Antenna Bandwidth Versus Interbay Spacing

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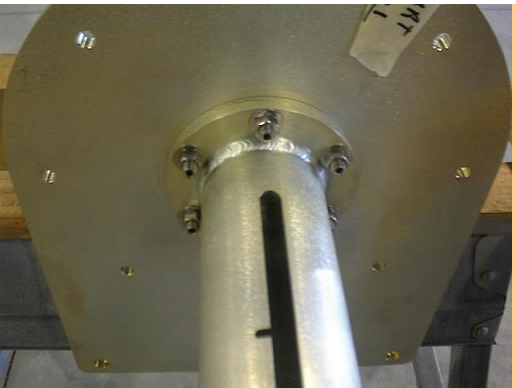
Does the spacing of FM antennas affect the array's bandwidth? Yes. Each antenna model has a "sweet spacing" for producing the best bandwidth. Almost all designs will increase bandwidth when spaced less that a wavelength apart.

In FM antennas, (and similar VHF models), the antenna bays do "talk" to each other. …Talk to each other? Yes! – it is called mutual coupling. The coupling between bays for the best array bandwidth ranges from 0.5 Wavelength to 0.875 wavelength. Our popular FMP FM antenna model exhibits its best bandwidth when spaced approximately 0.75 Wavelength; averaging at least 10 to 12 MHz of extrelemy favorable V.S.W.R. bandwidth.

Ah, but you may ask what happens to gain as the array is short-spaced under 1 Wavelength? The gain does decrease slightly, about 10 to 15 percent depending on the number of bays, however, gain-aperture efficiency increases. Additional benefits include reduced RFR, where that can be an issue for short towers or building fooftops. Typically, the RFR from the last grazing lobe is decreased by about 10 dB. And if your leasing tower space by the foot, there is increased savings each month! Got a project? – call us and we will work on a solution for you.

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



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