
## Welcome to AntennaSelect™ Volume 50 – June 2020

Welcome to Volume 50 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:**



### Wow! -50th Volume of AntennaSelect™…

Welcome to the 50th Volume of AntennaSelect™. Over 8 years ago we started this great little newsletter on antennas and RF Technology. In part thanks to the great feedback we have received from you, a lot of great technical knowledge has been covered. We try to place emphasis on how things work, without using a lot of math or technical jargon to explain things. Our website www.micronetixxantennas.com also contains some great technical guides on both practical FM and TV oriented Antenna Technology. Our DTV Repack Guide is one great example, containing 87 pages of tips and practical knowledge.

# DTV Over-The-Air Reception- Part 3 UHF Yagi/Reflectors

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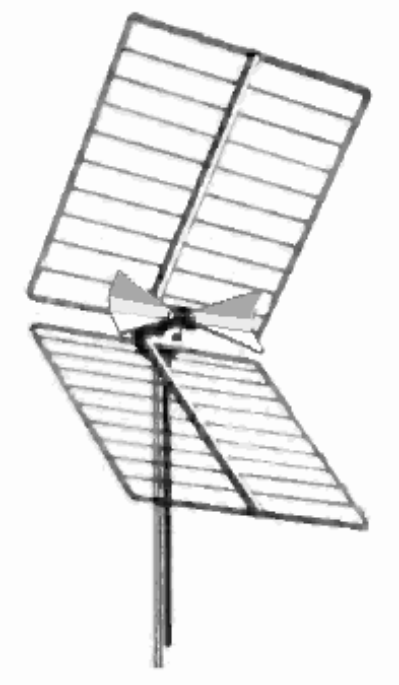

In part 3 of our Antenna Series, we will look at a very common design found on millions of antennas. On the left is a picture of the UHF corner reflector we discussed in the April issue of AntennaSelect™. Now, what would happen if we placed a few director elements in front of the driven bow tie element? The corner reflector antenna is very broadband, so the first question is what is the upper frequency we want the antenna to work at. In the old days of UHF that was Channel 69, which is at 800 MHz. The director elements would need to be no more than 6-1/2 inches long. Placing them 3 or 4 inches out from each other would work spacing-wise.

Using 3 director elements cut for 800 MHz as an example would increase the gain of the antenna at about 800 MHz by a dB or two, and make the main lobe of the antenna slightly narrower. If we go down to the bottom of the UHF band at 470 MHz, there would be no difference in gain or width of the main beam. The short elements, (6-1/2 inches), are less than 50% of the length needed for channel 14. So what if we substituted the proper director elements for channel 14 (about 12 inches)? The antenna would work great at channel 14 and quickly lose gain at higher frequencies. The main beam would also split with a number of side lobs at higher frequencies. …This would make a horrible channel 69 antenna!

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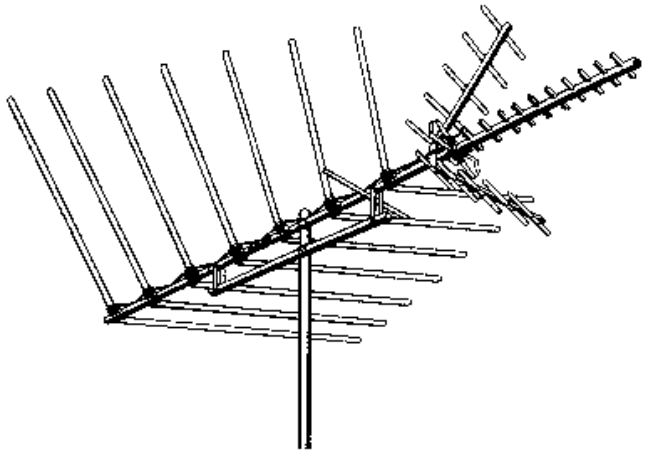

Pictured to the left is a picture of a Radio Shack VU-120 VHF/UHF Antenna. It consists of 7 VHF 3/2 Lambda elements, and a corner reflector UHF antenna. The UHF section has 10 director elements.

This is a very common design and was used by several manufacturers. The UHF section is form of a corner reflector. Since the reflector elements are so far apart the reflecting action works better at the bottom part of the band.. At higher channels, (higher than channel 69), the reflector did not have much effect. The reflector elements serve a second purpose however. In this case they were cut to be 24 inches long, which lets them function as directors for the VHF section of the antenna. If we did not care about adding a little VHF high band gain, the reflector elements only need to be about 14 to 15 inches long.

The UHF director elements are about 6 inches long, cut for less than a half wavelength at channel 69. At channel 14 the directors have only a small influence on antenna gain and horizontal beamwidth. As you go up in frequency, these directors have more influence, hence the antenna has higher gain. With an estimated gain of 8 dB or so on channel 14, the gain would rise to about 1 dB or so at channel 69.

Since we now use channel 36 as our higher channel, a 2020 version of the antenna would use director elements about 9 inches long. We would see about 10 dB gain at channel 14 and 13 dB at channel 36.

Since the antenna works so well around channel 40, low band UHF cell services are picked up well, and can cause the television set to lose desired weaker DTV channels due to intermodulation products forming. Actually, using an old UHF preamp might well make DTV reception worse.

# TV and FM Antenna Heater/De-Icer Systems:

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Heaters in FM antennas are often used when the station wants to prevent the buildup of ice on the antenna elements. The heaters provide enough warmth to the antenna elements to keep ice from building up. Depending on the design, a heating system will add only a few pounds to each antenna bay. A temperature controller located in the transmitter building turns the heaters on when the outside temperature drops to 37 to 40 degrees Fahrenheit. When the temperature rises above about 40 degrees, the heaters are switched off.

Heaters are not designed to remove accumulated ice buildups. Turning on a heater after ice has formed will help the ice to thin and fall off, but the time needed may be several hours.

The heater system in the antenna bay is quite simple. Nichrome wire forms the heating element. Nichrome wire is available in a number of grades and sizes from 10 gauge down to 40 gauge. The design constraints of the heater are: 1) It must fit inside the antenna elements; 2) provide the proper resistance to produce the right level of heat, and; 3) be mechanically stable from both an operational and installation standpoint.

A straight section of small Nichrome wire (26 gauge) has a resistance of about 2.5 Ohms per foot. The Nichrome wire is not insulated, so a common method to building is to wind it into a continuous coil. At Micronetixx we wind the heater wire into a coil using specially-designed tooling and adding proper insulation, as shown on the following page.

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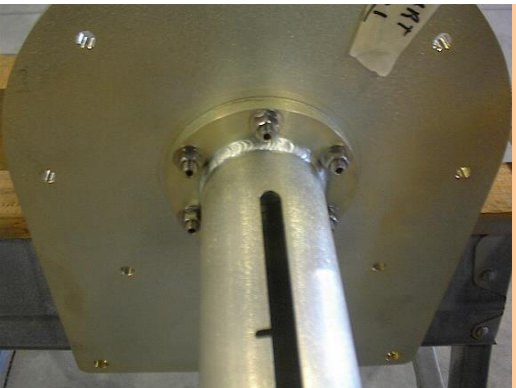
Pictured above is a completed, coiled heater wire. The wire is cut to the right length and then the ends are silver brazed to special high temperature lead wires. A braided fiberglass flexible sleeve is slipped over the heater wire for insulation from the antenna elements. The braided insulator is rated for 1400 degrees Fahrenheit. The heater assembly is then inserted into the antenna element. A small junction box on the antenna bay is used to connect the wiring from the individual heater elements. Depending the application, and antenna design type, the heaters will vary in power usage. 50 to 200 Watts per element is a common range.

The heaters can be designed for either 110 or 220 Volt installations. The 220 volts are much more popular as the AC feed line often can be a smaller gauge. When we design these systems we look at the available AC feeder to determine the power available for each antenna bay.

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



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