City-Windom Antenna History.

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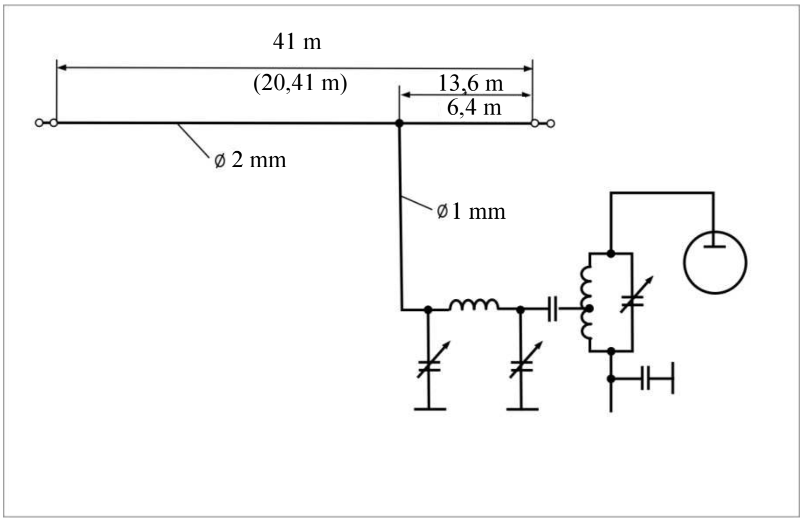
The VS1AA antenna made by an American named Windom (1936) had been the ancestor of City Windom. It was often called “Amerikanka” in the Soviet Union, and was mentioned by E.T. Krenkel, as the principal antenna to operate with soviet North Pole station SP-1.

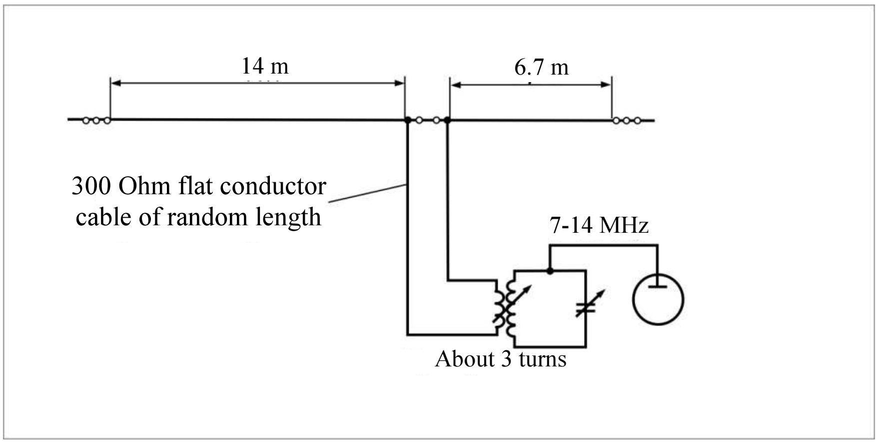
Its main idea consisted in identifying a zero-reactance point on the 41 meter long antenna wire, that was simultaneously present for several bands. To that spot a single-wire feedline was connected.

Windom multiband antenna, version VS1AA



The next modification of Windom antenna was antenna made by German radio amateur with call sign DL1BU (*Günter Schwarzbeck, editor's note*) in 1950, who fed it with a balanced feeder.

Windom multiband antenna with balanced feeder

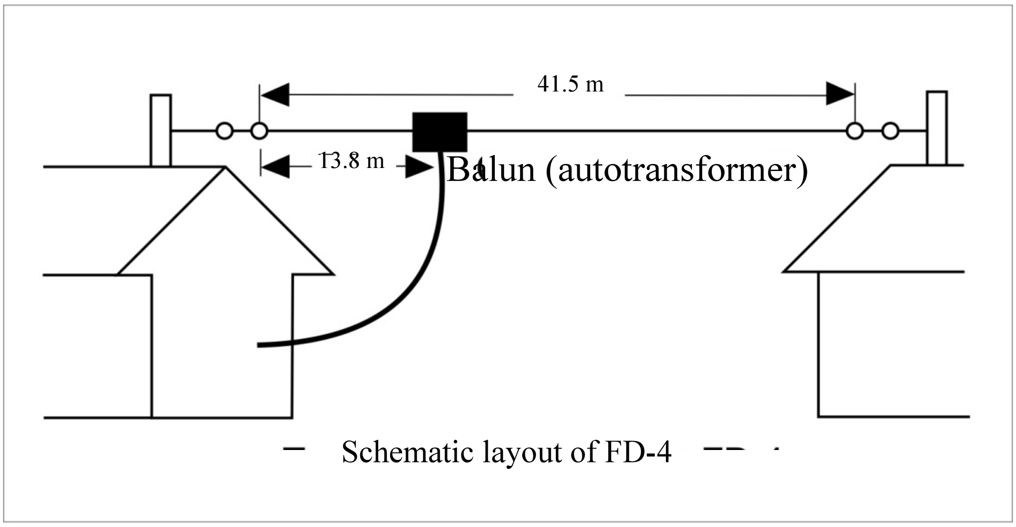


The German did find a gap in the above zero-reactance point, and connected the balanced line with characteristic impedance of 300 Ohms. That feeding system ensured greater symmetry and stability of the impedance, as opposed to a single-wire feed-line, which, in addition, produced significant radiation. A two-wire feed-line radiates significantly less, which contributes to the stability of the radiation pattern and settings.

That antenna was further upgraded by another German radio amateur - K. Fritzel (DJ2XH) in

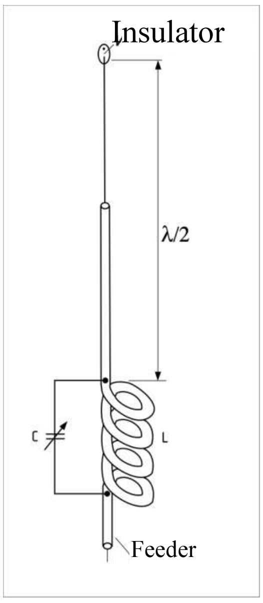
1970. He replaced the balanced line with a coaxial cable with a 1:4 transformer, and started commercial production of antennas referred to as FD4.

Coaxial fed Windom multiband antenna FD-4 fed



Seemingly, it is an excellent antenna, simple and multiband. But it has a drawback. Its installation by residents of the upper floors of urban multistoried buildings is not feasible. Thus, if one end of the antenna wire is attached to the roof, and the feeder input is located right next to the window, just in 3-4 meters, this feeder shall have to lay in parallel to the radiating part of the antenna. This means that the feeder will be interfered by stray radiation from the antenna, generating currents in the cable Shield, which, in their turn, completely spoil the desired matching.
Thinking over this issue, I recalled that I met somewhere on the Internet simple designs of half-wave dipoles fed from the end by means of a coaxial cable. Their cable shield served simultaneously as a quarter-wave radiator, and in order to prevent the currents to leak to the feeder itself, a current choke was installed at the distance of 1/4λ. K. Rothammel had described that design, which was called "Locking Circuit T2LT."

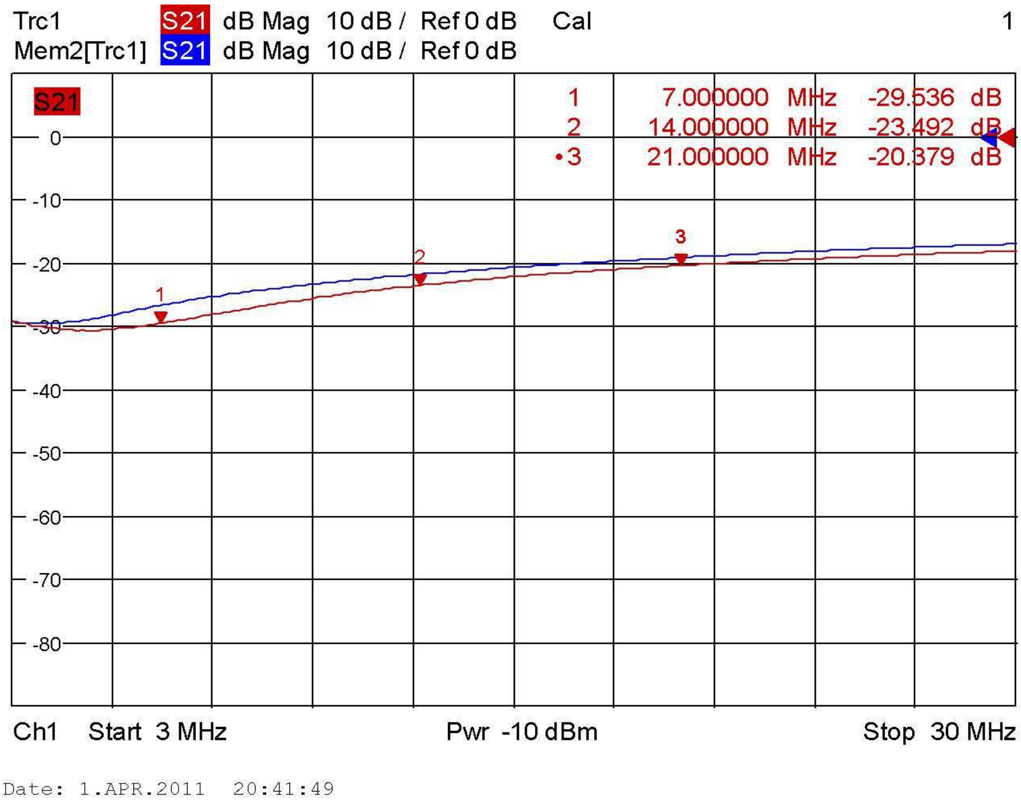
Tuned circuit (T2LT circuit)



However, this circuit is narrowband, and provides operation on a single band only.

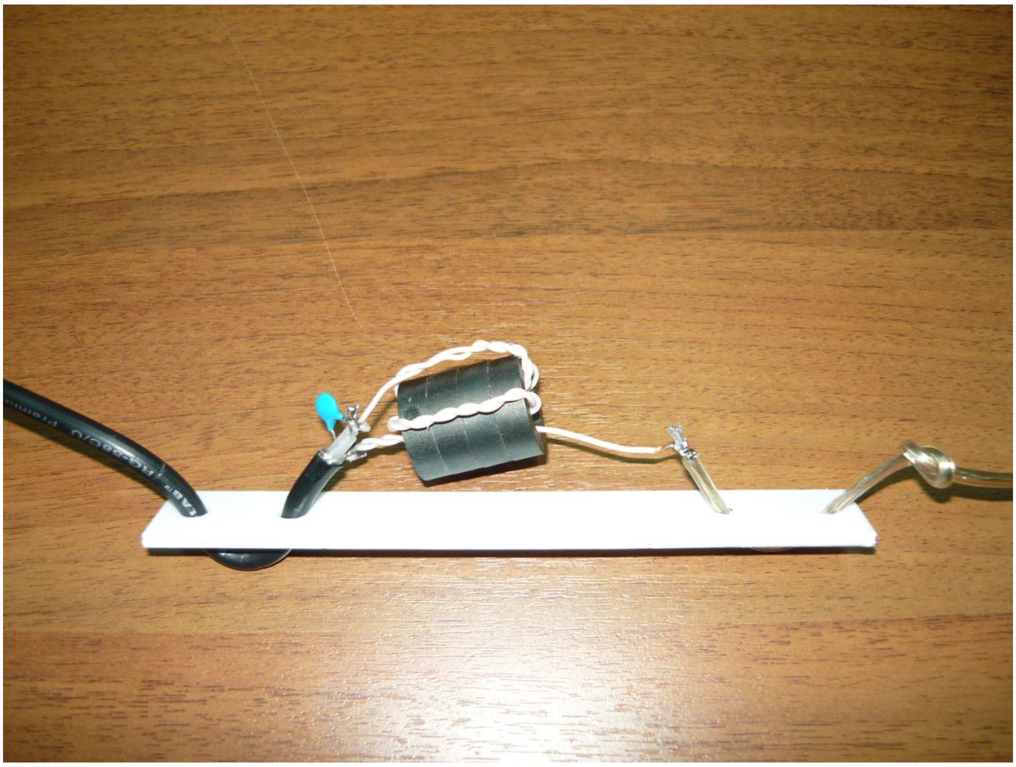
Being in possession of modern fleet of measuring instruments and sufficient number of ferrite cores, I set out as a goal to manufacture a broadband current choke with a level of isolation up to 30 dB, and operating band of 3-30 MHz. And that choke was successfully made.

Its measured shield isolation was as follows:

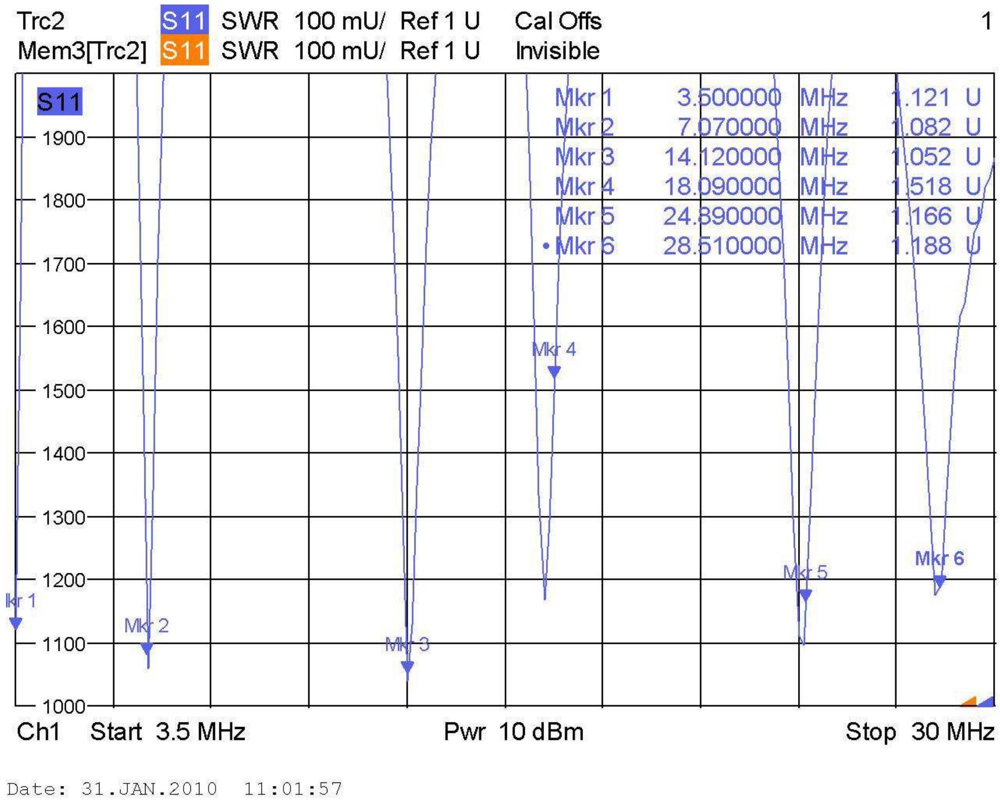


Here are two graphics. The blue line shows the isolation on the ferrite of brand 3000NN, and the red one shows the same on 1500NN brand.

As the following step, I constructed a Windom antenna with a 1:6 autotransformer,



in which the short section (13.5 m) was made from a coaxial cable. Following it, the abovementioned choke was installed. All measurements were performed on the choke output connector. Predictably, we managed to separate the radiator from the feeder, and I began to observe on the instrument the clear resonances of all 6 bands 80-40-20-17-12 and 10 meters.

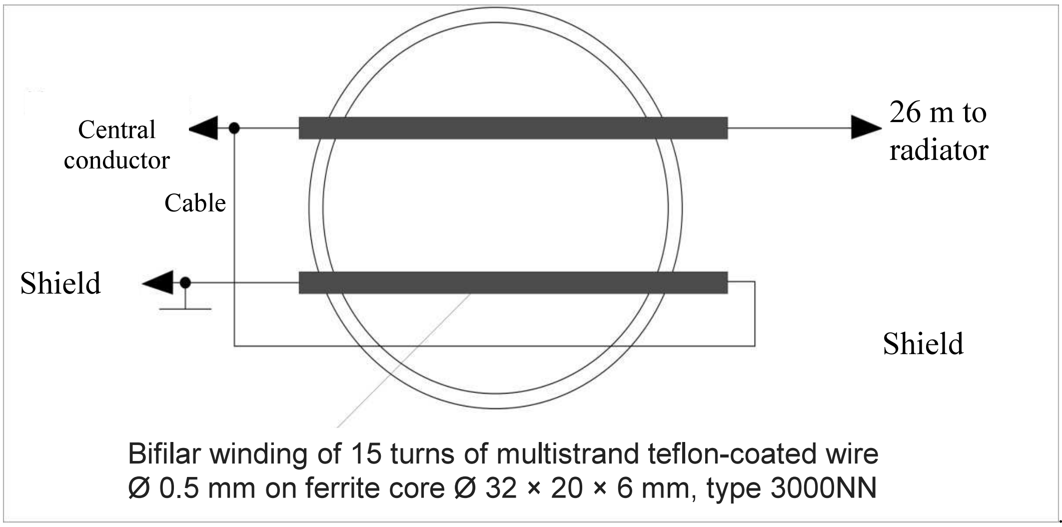


The operation of several City-Windom antennas with the autotransformer showed that in a few minutes of transmission the ferrite core got extremely hot.

That occurred due to the fact that transformation was based on passing of the magnetic field through the core. And there were great losses inside of it.

Therefore, the autotransformer was replaced with a long line transformer (LLT), which used a different principle to operate.

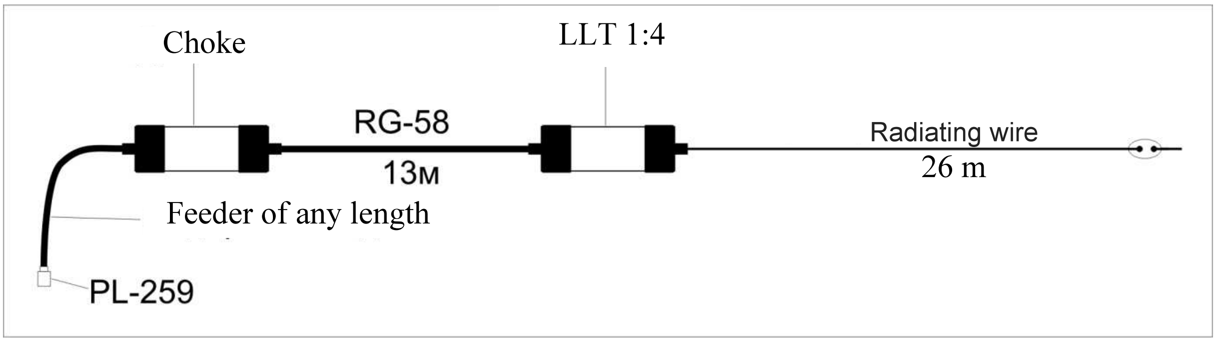
LLT Diagram



Here the energy is transferred over a two-wire feed-line. The magnetic field transfers solely the asymmetrical currents.

The application of 1:4 LLT enabled me to fix the problem with the transformer getting hot, and to substantially increase the load capacity of the antenna. The final diagram of the commercial version of CW80100 antenna - (City Windom from 80 meters with power handling capacity of 100 watts) is shown in Diagram of CW80100.

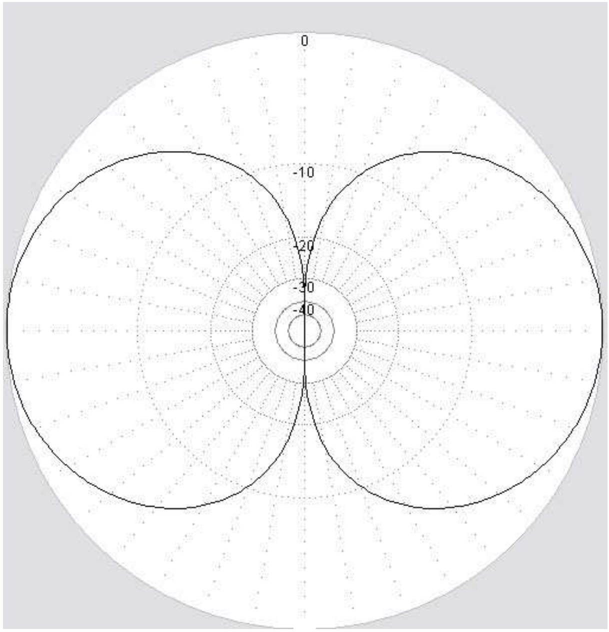
Diagram of CW80100



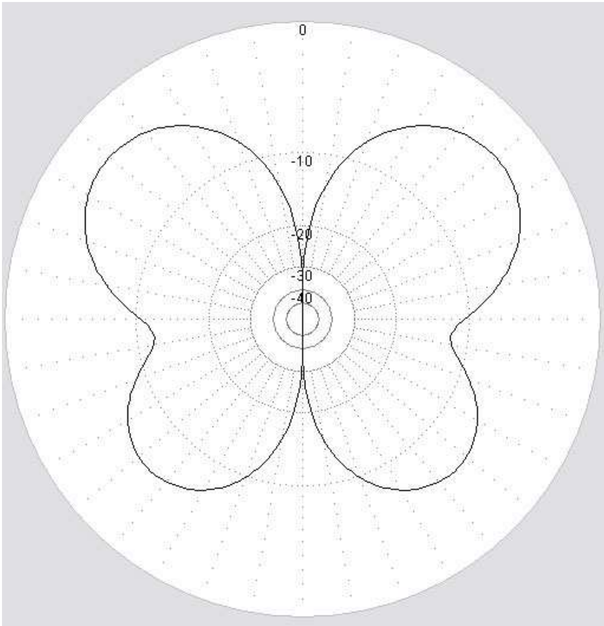
Thus, unlike all previous versions of the Windom antenna, a new antenna called City Windom has a new advantage, it's a feed-line at the same time as being a radiator. This makes it possible to get along with only two attachment points instead of three, which significantly improves user performance and usability of the antenna in modern urban environment.

CW80100 antenna radiation pattern in horizontal plane

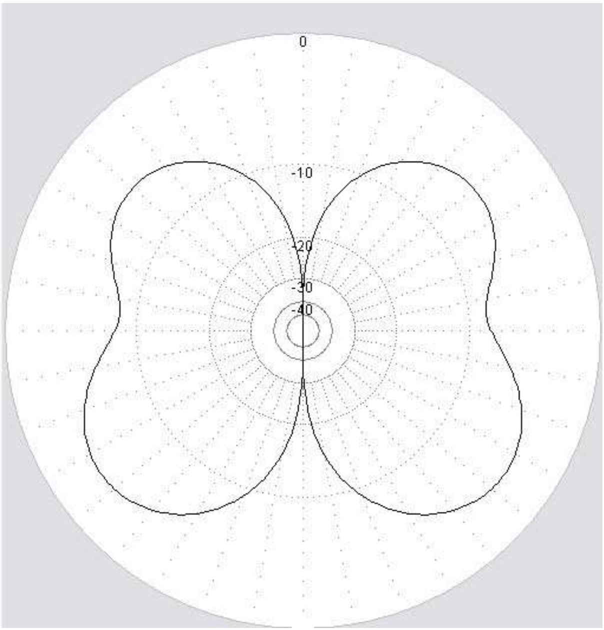
80 m



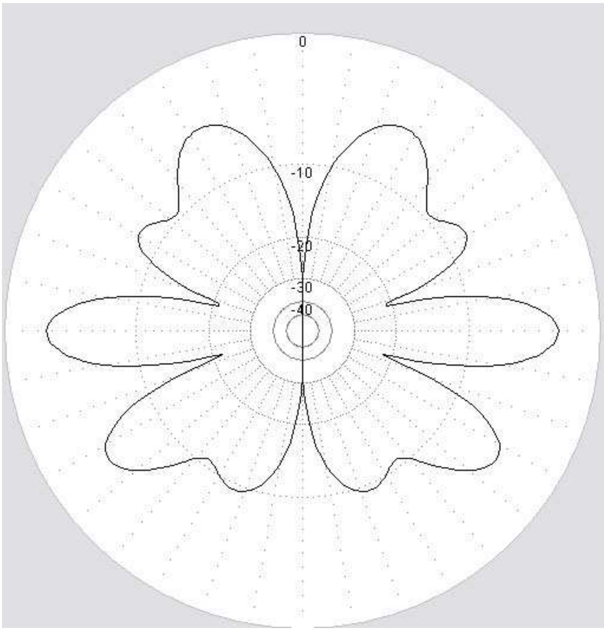
40 m



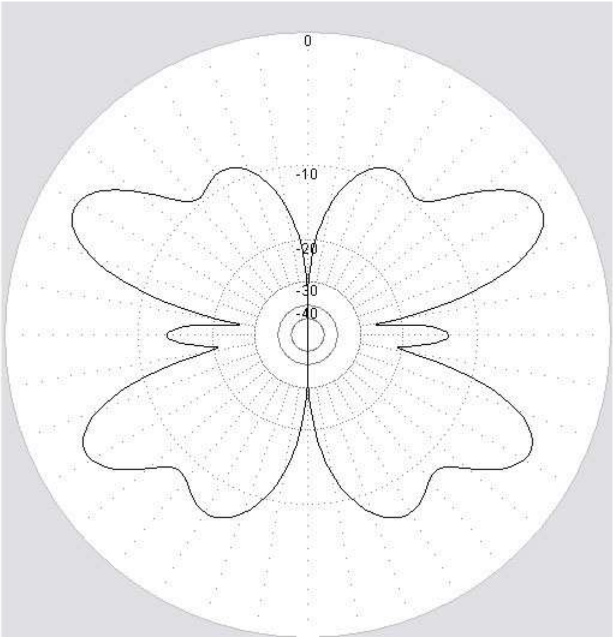
20 m



17 m



12 m



10 m