DL7JV

Magnetic antennas

My first commercial short waves amateur radio antenna was 1992 a "magnetic antenna" from "Käferlein", type AMA3 second-hand. These I operated on and in the most diverse QTH's. It is a small antenna with 80 cm diameters. The motor operated variable capacitor creates a frequency range from 29 to 14 MHz with 100 Watts of transmitting power.

Foto: AMA3 by Käferlein

With magnetic antennas it depends on the quality of the resonant circuit. Generally to select tries as large a pipe diameter for the circle as possible. Since the antenna must always again be co-ordinated with frequency change, most remarks are provided with a remote control for the condenser.

Since I could not work with the AMA3 on 7 and 3.5 MHz, I decided to build a magnetic antenna for these frequencies.

Another way

Building of antennas could be expensive, on a weekend and the market was closed. The problem was to build the circle. And then still the condenser with high tension strain. There the antenna in the room to be operated should did I first without the remote control.

The idea was - to use coaxial cable RG-213 for the circle and the condenser . The copper screen has a diameter of 9 mm. The cable has a capacity from 100 pF to 1000 mm of length and over 3kV tension strain. I had still enough of it. It applied to determine now the lengths.

Somewhat easy theory

Since it concerns *a tunable* oscillating circuit, exact theoretical computations of the lengths play only a subordinated role. The question about the efficiency of the antenna is many more crucial.

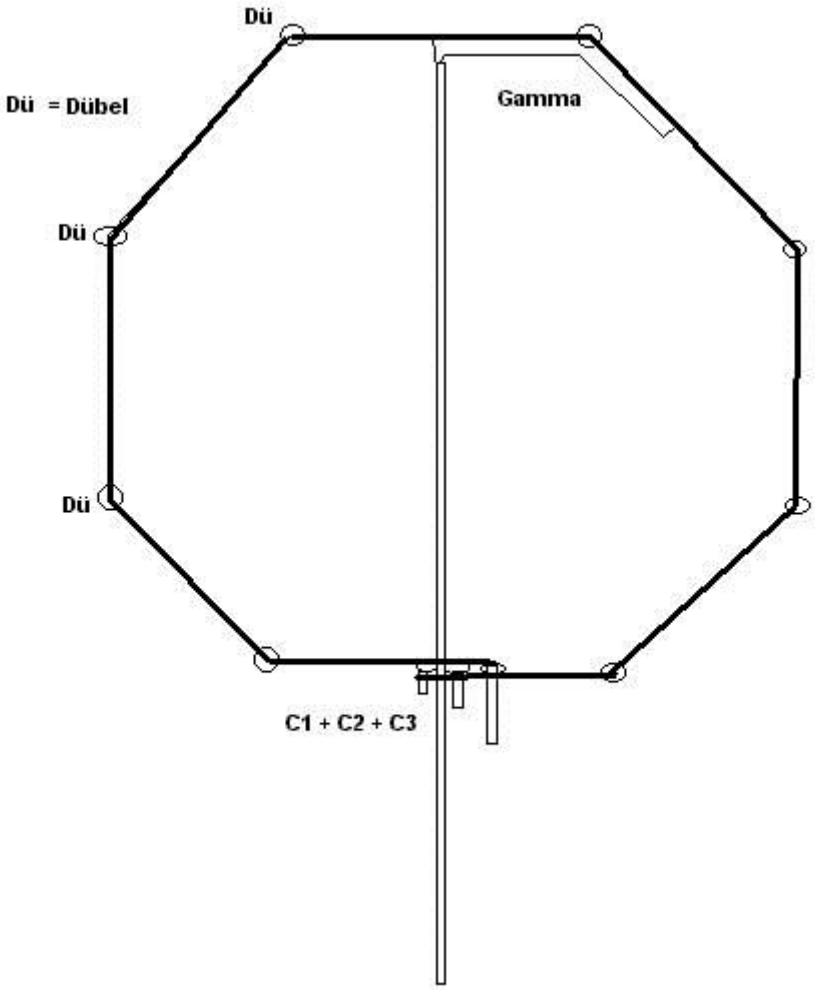
Attempts with the AMA3 resulted in that the antenna on 28 MHz obtains the best results.

There the diameter approx.. 800 mm is, arises an extent of 2513 mm (U = D x pi). That is somewhat smaller than quarter lambda from 28 MHz. The variable capacitor has the smallest capacity and the antenna here has the largest range without placing behind.

The size of the loop

Since the new antenna should be co-ordinated from 7 to 1.8 MHz, I selected an extent of 9 m for the loop. That is somewhat less, related to the highest working frequency of 7 MHz, than quarter lambda. The diameter of the circle is approx.. 3 m.

Since RG-213 is quite flexible, I fastened it simply circular with pegs and hooks to the wall (not with walls from reinforced concrete and in the proximity of heating elements). The cable ends were DOWN. Screen and soul were soldered with one another. Down the condenser was attached.



The supply of the antenna

With magnetic antennas is the situation of the feed always opposite the condenser. Was there my loop in 3 m height fastened to the wall, selected I as infeed ABOVE. The inlet runs in the center upward and ends there as gamma adjustment.

As gamma wire a silver wire with 1 mm². I determined the exact situation of the pick-up of the gamma adjustment with a needle at the end of the silver wire was soldered and into the coaxial cable was stung.

The capacity

The determination of the capacities took place with 2 x 500 pF radio condenser. It was amazing that on 7.000 MHz less than 10 was sufficient pF. The range with SWR under 3 was with approx.. 100 kHz - thus with a condenser, without adjust, on entire 40 meters the volume in resonance. That is because of the large extent of 9 m.

The further values were simply determined and written for the frequencies 1.822 - 1.835 - 3.515 - 3.545 - 3.600 - 3.700 - 3.750 - 3.775 - 7.050 into a table. The Drehko should be placed with completely small achievement on the best SWR. With a LCR

measuring instrument then the capacity can be read off in the developed condition. If the range of control of the condenser should not outer-rich, one knows fixed capacities parallel switching.

Range and frequency

With degradation of the transmitting frequency the range of the antenna and the capacity are reduced increase.

-Die range of the antenna on 7 MHz amounts to 100 kHz.

On 3.5 MHz the range amounts to approx.. 30 kHz.

With 1.8 MHz only 5-6 kHz.

Self-'s building condensers for high achievements

... from coaxial cable RG-213. C=100 pF with 1000 mm of length.

The necessary capacities were instrumentation determined before and registered into a table.

Thus 1 cm cable corresponds to a capacity of 1 pF.

Over for each individual frequency an individual condenser from coaxial cable ready to place to have I did not use one triple connection from 3 parallel PL sockets DOWN at the loop.

As a result of combination of different cable condensers with suitable PL plugs the points of resonance on the antenna arose for the desired frequencies. It is to be noted that the PL plugs have also a self-capacitance and with are included.

For a reproduction the concrete lengths must be determined locally, therefore I can give no data here. With me the longest cable for 1.822 MHz was about 8 m long, thus approx. 800pF.

It exists to co-ordinate also the possibility without cutting the cable ends. In addition one isolates somewhat off at the end and pushes the loose screen network back and forth.

When soldering the plan conclusions and when stripping the open ends of the coaxial cable clean function is conditioned - otherwise there are punctures those to damage the transmitter. Against the condensers high voltage rests in the transmission case - do not touch!

A table to the overview and to the faster frequency change is helpful. It applies the 9 frequencies on condensers to distributing (example values, not to the reproduction suitably!).

1,822 - 800 pF - 7900+100 mm

1,835 - 790 pF - 7900 mm

3,515 - 370 pF - 2200+1400+100 mm

3,545 - 360 pF - 2200+1400 mm

3,600 - 290 pF - 2200+400+300 mm

3,700 - 260 pF - 2200+300+100 mm

3,750 - 230 pF - 2200+100 mm

3,775 - 220 pF - 2200 mm

7,050 - 10 pF - 100 mm

6 cable condensers in different combinations make possible to cover all frequencies.

Result

In 18 months European Union QSO's could be driven on all volumes. At the best those functioned loop on 7 MHz. There could be worked also DX. Due to QRM in the house always with strong sizzling in the RX. With a more favorable situation in the attic this antenna is well suitable for the mono volume enterprise.

For 1.8 MHz the efficiency is too small. Here the circle extent would have to be substantially increased.

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