THE RIVER CITY RADIO RAG

Published by
Iowa City Amateur Radio Club and
Univ. of Iowa Amateur Radio Club.
Editor -- Bill Bonney
Asst. Editor -- John Kirby

Iowa City Amateur Radio Club Officers:
President -- George Carsner WØPPF
Vice President -- Jerry Cooper WBØPLZ
Secy-Treasurer -- Lou Facto WAØQDM
Activities Chmn -- Luke Van Orden WBØQFQ

DO-IT-YOURSELF ANTENNAS

DE-Tim Daniels
PART 1 OF 2

If spring comes, an amateur radio operator's thoughts will undoubtedly turn to...antennas. "An antenna a day keeps the blues away..." and "Look for the silver Yagi." Considering the necessity of a radiator to radio communications, this attitude on the part of hams is understandable. With this in mind, I proceed with a discussion of the only type of antenna with which I have had some practical experience -- the vertical antenna for HF.

The verticals which I have used have been commercially-made electrically quarter-wave trap verticals: the Hygain 14AVS and 18AVT/WB. A trap vertical employs one or more parallel-resonant circuits, called traps, installed along the radiating element which is vertical and fed at the bottom. Each of these traps, by having a very high Z for a particular band of frequencies, delimits electrically for that band of frequencies a section of the radiator between the feed point and that particular trap. For the lower bands, the electrical wavelength of the trap vertical radiator will be effected by the inductive reactance presented by the higer-frequency traps included in that longer section of the radiator. For example, the 18AVT/WB antenna has, going up from the feed point, first a ten-meter trpa, then a fifteen-meter trap, then a twenty-meter trap. For use on twenty meters, you rely on the twenty-meter trap to delimit the section of the antenna between the feed point at the bottom and the twenty-meter trap at the "top" of the radiator. The ten and fifteen-meter traps present an inductive reactance to 14 MHz signals, which adds to the electrical length of the physical section of the antenna. This is in reference to a quarter-wave trap vertical.

When using any type vertical as an antenna, whether or not it is a trap vertical, as long as the electrical length is near a quarter-wavelength or a half-wavelength the antennas impedance is fairly near a pure resistance. Assuming that there is little else to effect the situation, one should be able to feed the antenna with a transmission line whose impedance is close to that of the antenna and encounter little problems with SWR. The new ARRL antenna book on page 187 points out that a quarter-wave vertical will have around 30 ohmes impedance (theoretically) since effectively one-half of a dipole is used, and the ground takes the place of the connection to the other half of the dipole. The impedance of a half-wave vertical is much higher. A vertical antenna can be changed in its impedance by a method called multiple-tuning, explained and diagramed on pages 190 and 191 of the new ARRL Antenna Book. That method is similar to using multiple conductors in a folded dipole. From the top of the initial radiating element are dropped several downleads , with a loading coil at the bottom of each.

The lower end of each loading coil is attached to a ground stake at a distance not very far from the base of the main antenna, with respect to one wavelength. There should be a loading coil at the base of the first radiating element, and the inductance of that coil and each of the other loading coils should

be equal. The radiation resistance of this whole system will be increased by N^2, where N is the number of downleads in the system also counting the initial radiatin element as a downlead. The authors of the antenna book say that this matching method is used a lot in VHF, but not too much for HF verticles. It might be interesting to try that.

Since there are losses to the ground which significantly reduce the radiation efficiency of a verticle antenna system, being able to raise the radiation resistance is very nice because then one may increase the efficiency of the antenna system as a whole. If I remember correctly, antenna efficiency equals radiation resistance ÷ (radiation resistance+ system loss). If for a ½-wave verticle the radiation resistance were 30 ohms, then the antenna efficiency might well be only 50% since with a poor ground system and lousy soil conductivity, as we have around here, the ground system impedance could go as high as 30 ohms, and 30÷(30+30)=.50 or 50%. The ability to increase the radiation resistance by multiple-tuning is one means to defeat the ground resistance problems.

But there are easier (?) ways. Again, refering to the new Antenna Book on page 190, a verticle does suffer from the dissapation of RF energy through the ground around it. Their figure,7.1, shows a capacitive reactance labeled C_w, existing between the antenna and the antenna radials, if any, putting the radiator C_w and the radial network all in series across the feed line from the transmitter. then they show a capacitive reactance C_e between the radiator and ground, and that in series with the earth ground resistance labeled R_e. This creates another circuit where the radiator, C_e, R_e, are all in seriesacross the transmission line. They explain that, up to a point, the more radials there are, the greater is C_w (and the lesser is the resistance of the radial system I would think). This causes more of the RF to be dissapated through the series circuit which does not include the ground's resistance. This ,according to the book , is especialy useful for verticals which are short compared to one wavelength. This will remove some of the system resistance from the antenna system, thus increasing the efficiency of the antenna.

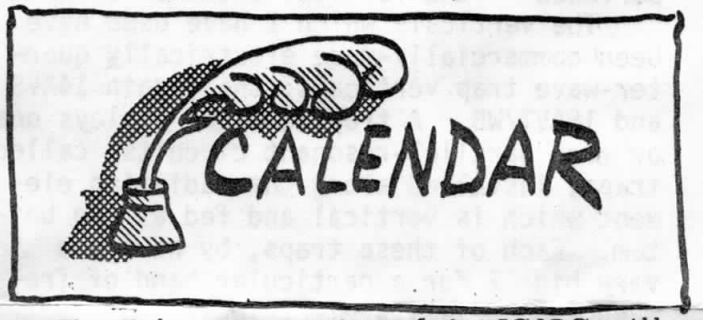
End of part I. Part II will appear in the next issue.-ED

SPACE NEWS

For OSCAR fans, an article "Computerized Satellite Tracking" appears in the February 1977 issue of 73 Magazine.

OSCAR 6's telemetry indicates a shorted battery, and there is fear that other cells may be close to failure after more than 3 years in space. With rumors going around that LANDSAT (and OSCAR 8) won't be launched until the year's end, OSCAR users must be especialy careful with both the ailing birds.

HR-REPORT



The February meeting of the ICARC will be held at the KIIN transmitter site. Meet in the First National Bank Towncrest parking lot at 7:30 pm on Wednesday, February 9th. From there we will proceed as a group to the transmitter site in West Branch.

The annual Davenport Radio Amateur Club Hamfest will be held Sunday, February 27th, 1977 at the Masonic Temple in Davenport. Admission is $1.50 in advance -- or $2.00 at the door. Talk-in on 28/88 and 52. Refreshments and tables are available. For info and tickets send SASE to Dick Lane, WAØGXC, 116 Park Avenue, South Elridge, Iowa 52748.