

Alliance Amateur Radio Club

Affiliated with the "American Radio Relay League"



ZERO BEAT

September 1990

AARC BYLAWS TO BE AMMENDED !

The following ammendment was proposed to the AARC Bylaws and will be discussed and voted on at the September.

Article I. Meetings of membership
A. The annual meeting of this club shall be held in the month of November for election of officers and trustees immediately following the regular meeting in May.

Proposed by KC3CL, David R. Buckwalter

ATTENTION

SPECIAL ANNOUNCEMENT TO FOLLOW

FROM: The Alliance Amateur Radio Club

TO: All Amateurs and Non Amateurs

Subject: Novice License Classes

Licensing clasases will be starting in September at the Alliance Community Hospital.

WHEN - September 5th (Weekly 7:00-9:30)

WHERE - Conferance Room B at the Alliance Community Hospital

COST - FREE ! Except for a fee of \$19.00 for book, code tape and handouts.

For more information contact John Myers WX8G at 821-5513 or 821-6545.

The next meeting of the Alliance Amateur Radio Club will be held on Thursday 6 September 1990. Meetings are held monthly at the Alliance Community Hospital at 7:30 PM in the cafeteria on the first floor. Visitors are always welcome.

Zero Beat is published monthly by the Alliance Amateur Radio Club. All correspondence related to the Zero Beat should be addressed to:

*Alliance Amateur Radio Club Inc.
Att: Editor Zero Beat
P.O. Box 3344
Alliance Ohio 44601*

Articles for publication can be submitted to the editor by mail, in person, or electronic transfer. Electronic transfer can be made by telephone modem, radio teletype or an IBM PC formatted disk. Disks should be 5 1/4" 360Kb or 3 1/2" 720Kb. Disks will be returned. Files should be in ASCII format or if in an IBM PC wordprocessor format, the wordprocessor used must be specified to permit conversion. For radio or teletype transfer contact the editor to make arrangements.

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The activities of the Alliance Amateur radio Club are coordinated by an elected board of officers. The current officers and the respective positions are:

*President - Jim Wilson - KB8GHZ
Vice President - John Myers - WX2G
Secretary - Gladys Wilson - KB8GIA
Treasurer - Patti Hillier - KE8KH
Trustee - Jim Ferguson - N8DZA
Trustee - Dave Buckwalter - KC3CL
Trustee - Lary Ashburn - KE8VE*

CALLS The latest calls as of August 1, 1990, are as follows:

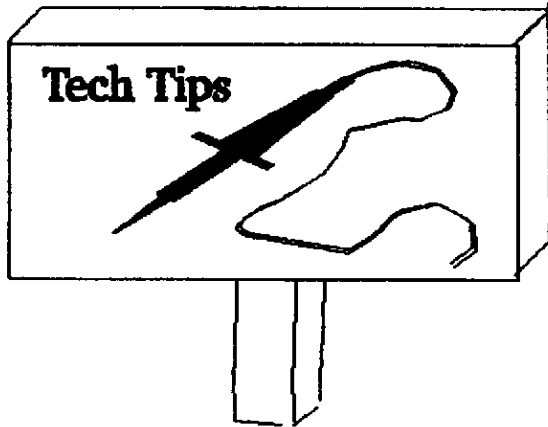
- EXTRA - AA8BX (+7)
- ADVANCED - KF8IO (+18)
- TECH/GENERAL - N8MUC (+133)
- NOVICE - KB8KOJ (+148)

Congratulations to Al Orwick, and his new call, KB8KPA.

SEPTEMBER EVENT CALENDAR

SEPTEMBER

- 6 AARC Club meeting at the Alliance Community Hospital
- 13 Eastern Stark County News and Information Net - 9 PM on 146.37
- 20 Eastern Stark County News and Information Net - 9 PM on 146.37
- 23 Cleveland Hamfest
- 27 Eastern Stark County News and Information Net - 9 PM on 146.37



This is the third in a series presenting the WJLR technical presentation on antennas and propagation. The final will be printed in the October issue of Zero Beat.

Part 3 - Upper HF Frequencies: This is probably the frequency region where most amateurs are really concerned about their antennas and probably where the most \$\$\$ are spent. Here the rotary antenna is very popular and being competitive in the pileups is very important.

Other than the usual ground planes, dipoles and long wires, the most often used antennas in the 10 to 30 meter frequency range are the Yagi and the cubical quad. First my thoughts on the quad. It may be a fine antenna for some amateurs. It is surely an inexpensive antenna but is difficult to keep in the air. It really has high Q in that its front to back ratio detunes rapidly versus frequency. I strongly doubt that it has greater than 1 dB gain over a properly designed Yagi (more on this later). The usual way a quad is tuned is to maximize the front to back ratio. This does not necessarily mean maximum gain. I personally feel the quad is popular because its construction is simple and low cost. A quad using aluminum tubing would probably do much better but would obviously be unwieldy. One big plus for the quad, and I may add its original invention was for this reason, is its lower static reception level during rain and snow storms. This is unquestionably true. I've gone the quad route twice. Despite 2 years of work on a 3 element quad, it never could compare with a well designed 3 element Yagi and hence was finally scrapped in favor of the Yagi. Tests at VHF and UHF on scaled quads

have never successfully shown the gains claimed except on the loop Yagi which I will discuss later in this teleconference.

In this frequency range, the Yagi is King especially among the DXCC Honor Roll members. This antenna has been around the amateur community since the late 1930's. Many people have used Yagi antennas but few have really paid any attention to proper element lengths. Recent work on scaling and especially on element tapering have been thoroughly discussed by the late Jim Lawson, W2PV, in a series of articles in Ham Radio from August 1979 thru December 1980. These articles show that on 20 meters the elements may have to be lengthened as much as 12 inches and more to equal the free space length of an equivalent untapered element. The results of not performing this extension are lower gain and poorer pattern than expected!

This same series of articles is probably the best collection of references on Yagi design to date. W2PV meticulously explored all details. Of greatest interest are his charts and patterns showing what can be done and how to do it. This is must reading for the serious HF'er.

W2PV also shows how to use computer aided optimization, a technique that is presently beyond those without access to a large computer, but surely something that will be within the realm of home computers in the not too distant future. The principle advantage to computer-aided Yagi design is the ability to optimize gain, front-to-back ratio or side lobes. One big problem is bandwidth, typically 250 to 300 KHz. maximum at 20 meters. This is true because of the feed systems we amateurs use and the cutoff of the first director causing the pattern to break up at the top of the band. As a word to the wise, design your Yagi antenna on the high side of your favorite operating frequency since this type of antenna cuts off rapidly above the design center but drops performance slowly as the frequency is decreased.

All things being equal and optimum, the boom length, not the number of elements, is the important parameter when determining the gain of a Yagi antenna. A larger number of elements than required insures a good

pattern over a wider bandwidth but more elements can also be a negative since there are more things to go wrong both electrically and mechanically! Maximum gain on a one wavelength boom is about 10 dBd! Compare this with the high gains you hear amateurs bragging about on the HF bands.

Another interesting phenomenon on Yagi's is the improved pattern at certain boom lengths. This was first discovered by Peter Viezbicke and reported in NBS Technical Note #688 and later confirmed by W2PV. The NBS data showed slightly higher gain at certain boom lengths which is probably due to some pattern cleanup. Suffice it to say that for best pattern and gain, the boom length of a Yagi antenna should be an odd number of quarter wavelengths (eg .25, .75, 1.25, etc.) long. (The only known exception is the famous W2PV 0.575 wavelength boom published in the Yankee Clipper Contest Club Bulletin. However, this design is asymmetrical about the axis and uses very close reflector spacings and is believed to be a special case). We will discuss the NBS Technical Note in depth in the VHF/UHF portion of this talk because the antennas in that report are mostly longer than the typical designs used on HF.

Boom resonances can be a problem especially at HF and where mono-band Yagi's are often stacked Christmas tree fashion for multiband operation. Again, computer optimization has shown that these effects are real. Gain and front-to-back ratio can be significantly decreased when one Yagi is placed close to another one even though they are on different frequency bands. Computer techniques have been used to reduce these effects by re-tweaking the element lengths to offset the detuning effect but even then the results show bandwidth may be decreased by up to 50% of the original design. Some amateurs have used insulated boom mounting clamps in an attempt to offset this effect. Another technique but an ungainly one is to rotate the offending antennas at right angles to the lower antenna. If you place one antenna in close proximity (1 to 2 meters at HF) to another, check the VSWR carefully before and after the change. If the pattern or the VSWR shifts or changes, it is a possible

sign of an interaction problem. Let's not forget the log periodic array! "The Log-Periodic Dipole Array" by Peter Rhodes, K4EWG, QST, Nov. '73, "The Log-Yagi Array" by K4EWG and J. Painter, W4BPP, QST, Dec. '76 and "The Log-Periodic V Array" by K4EWG, QST, Oct. '79 articles are must reading. The addition of the new WARC bands in the future will make log-periodic antennas much more practical. Their main advantage is good gain, VSWR and pattern over a very wide frequency range rather than the usual narrow bandwidth of the conventional Yagi antenna. One amateur antenna manufacturer presently employs a log-periodic feed system to some of their antennas to increase bandwidth. The log-periodic structure forces current and therefore pattern by its unique feed system and I think we will see more antennas of this design in the not to distant future.

Summary: We've come a long way in the HF region. There will be a swing towards wider bandwidth and perhaps LPA's will find their way into the amateurs bag of tricks as more spectrum and bands become available (eg 18 and 24 MHz). We are getting more discriminating and will demand good patterns and gain at the same time! In the future I see the use of computer aided design to improve patterns and gain as well as bandwidth. Wider bandwidth feed systems are needed. The LPA is one example, the use of the open sleeve dipole is another. Amateurs have notoriously ignored the feed systems and consistently used narrow band feed systems. We must develop wider feed systems and consistently used narrow band feed systems. We must develop wider bandwidth feed systems in the future.

(End of Part 3)

FLASH ! FLASH!

Special elections will be held at the September meeting. Resignation of current officers has left key offices vacant. Come out to the next meeting and vote for your choice for President, Vice President and Secretary.

Fund Raiser Raffle Drawing to Be Held

The September meeting will be when we draw the winning tickets for this years fund raiser. Please bring all of your ticket stubs and turn in any monies to KE8KH.

Eastern Stark County News and Information Net. Net Schedule September 1990

- 6 No Net Club Meeting Night
- 13 N8DZA Jim Ferguson
- 20 KB8GHZ Jim Wilson
- 27 KB8GAB Gary Grimes

Remember, if you cannot be net control on the night you are scheduled please let Pam N8LAK know. She can be reached at 821-5513(e) or 821-6545(d)

Pam is also looking for volunteers for Net Control. Give Pam a call and help support your net.

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