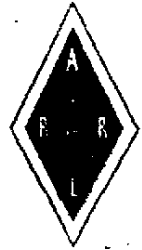


# Alliance Amateur Radio Club

Affiliated with the "American Radio Relay League"



## ZERO BEAT

July 1990

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### EDITOR GOES ON VACATION NEWSLETTER NEGLECTED

Well not exactly neglected, but this issue does not include all of the inputs received this month. I will get them in next months issue. Please keep those articles coming in. In this issue under the Tech Tips column I have included the first part of a four part series on antennas. I would appreciate any comments on how the membership feels about this type of article. If it is acceptable, then I will continue to run similar articles. Have fun at the July meeting, and get someone to pick up the doughnuts before the meeting. See you next month.

73's Dave KC3CL

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### Net Gets New Name !

Yes, the "Eastern Stark County ARES Net" has a new name, the "Eastern Stark County News and Information Net". Along with the new name the net has a new manager and a new format. Dick Bontrager KA8LKQ has turned the ranks of net manager and net

operation over to Pam Myers, N8IAK. Dick did an excellent job with the net over the past few years and we all need to thank him for his dedication. As for the new name and such on the net, Pam is planning bigger and better things for it in the coming months. If you forget to check-in, you might miss a lot. Net time and day will remain the same, Thursday at 9:00 PM. The net will also still be held on the N8DZA repeater (145.37). Turn on and tune in to the Eastern Stark County News and Information Net. (Information provided by Pam N8IAK)

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The next meeting of the Alliance Amateur Radio Club will be held on Thursday 5 July 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*

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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.

*Zero Beat Editor:*

*KC3CL*

*Dave Buckwalter*

*12435 Beula St.*

*Alliance Oh 44601*

*(216)-821-4409*

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 - KB9GHZ*

*Vice President - John Myers - WX8G*

*Secretary - Gladys Wilson - KB9GIA*

*Treasurer - Patti Hillier - KE8KH*

*Trustee - Jim Ferguson - N8DZA*

*Trustee - Dave Buckwalter - KC3CL*

*Trustee - Larry Ashburn - KE8VE*

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

- EXTRA - AASBO (+ 14)
- ADVANCED -- KF8HD (+ 27)
- TECH/GENERAL - N8MLH (+ 166)
- NOVICE - KB8KGG (+ 327)

The total number of Novice calls issued this year has been 1932. Who says Amateur Radio is dying? The AARC Novice classes are due to start in September, but if you know someone who needs help in the way of elmering, tapes, etc., contact John or Pam, and we will be glad to help, or match them up with someone who can. Our number is 821-5513. 73's, WX8G

## JULY EVENT CALENDAR

- 1 Canada Day Contest
- 4 Independence Day
- 5 AARC Club meeting at the Alliance Community Hospital
- 8 Fox Hunt 2:30 at the Stark County Sheriff Station
- Bowling Green Hamfest - Wood City Park Grounds
- Pittsburgh Hamfest - Northland Public Library
- 12 Eastern Stark County News and Information Net - 9 PM on 145.37
- 14/15 CQ Worldwide VHF WPX Contest
- 15 ARCI QRP Summer Home-brew Sprint, CW
- 19 Eastern Stark County News and Information Net - 9 PM on 145.37
- 26 Eastern Stark County News and Information Net - 9 PM on 145.37
- 28 Goodyear VE Exams - Contact Tony Mortimer, KA8ICF at 836-8869
- Aug 5 Portage Hamfair - Portage County Fair Grounds
- Aug 19 Warren Hamfest - Trumbull Campus of KSU.

## CQ-CQ-CQ

Well it's time to chase this ole pencil around the page again and see what develops. First--what is going on in the club? The June meeting was attended by 21 members and 3 guests. Jim-N8DZA said there is now more girls than boys at the "Y" classes. Three students now have passed the novice exams--KB8GKE-STEVE, KB8GKF-MIKE, AND RACHAEL--waiting for her ticket to come in the mail. To Bill-N8GKF who started the "Y" Program with Jim-N8DZA, CONGRATULATIONS on your upgrade!!

Dave-KC3CL, stated he would like to have some input on the Newsletter. So give him a call or drop him a line in care of the club.

Pam-N8IAK, is now the net manager on the 145.37 machine. A big thank you goes out to KA8LKQ for doing a good job this past year and a half. Pam also won the 50/50 drawing.

By the way, if you have anything that belongs to the club (coax, equipment, paper work, pictures, etc.) please contact Alan-WI8T. He is trying to compile a list so that we will know what we have and where it's at.

The club picnic will be on August 24th at 6:00 p.m. in the Rustic Shelter near the amphitheater at Silver Park. More on this next month. The Canton club will be having a Fox Hunt on July 8th at 2:30 p.m., meeting at the Stark County Jail on Rt. 62.

The Goodyear Hamfest was a lot of fun for me. I got to meet a lot of friends. I didn't have much of a chance at the bargains--Dan-N8LVO came prepared with a long list fastened to a clipboard and an oversized knapsack. Hi-Hi!! I supposed I've chased this pencil long enough and you are getting bored of reading so I'll close with this thought: Why is it? A wrong number on a telephone is never busy when you dial it?

\*73's\* JIM-KB8GHZ

## From KB8GIA'S KITCHEN

I hope that everyone is enjoying the great weather we are having. It is the time of year for eating salads and things that are light and refreshing. So-I thought maybe you would enjoy trying this quick and easy recipe.

### CHICKEN SALAD SUPREME

*This will serve 6-8*

*4 cups cubed cooked chicken*

*1 cup seedless white grapes*

*3/4 cup chopped celery*

*1 (11 ounces) can mandarin orange segments, drained*

*1 (8 ounce) can pineapple chunks, drained*

*1/2 cup slivered almonds*

In a large bowl combine all the ingredients & mix well. Dressing recipe as follows:

### HONEYED ORANGE DRESSING

*This will make 1- 1/4 cups*

*1/2 cup vegetable oil*

*1/3 cup unsweetened orange juice*

*1/4 cup Real Lime-Lime juice from concentrate*

*3 Tablespoons Honey*

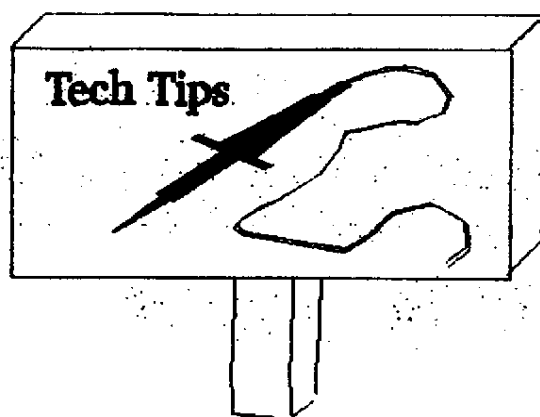
*1 teaspoon garlic salt*

*1/4 teaspoon celery seed*

Mix or shake ingredients, in a cruet or jar with a lid. Serve the salad on a bed of lettuce with fresh dressing.

I hope all or you enjoy this salad as much as I do. Now, I have a tip for you. When removing the corn silk from an ear of corn, try this: dampen a paper towel or terry cloth and brush downward on the cob of corn. Every strand should come right off. Until next month.....

\*73\* Gladys- KB8GIA



Through the courtesy of the many computer BBS's that support Ham Radio I've managed to get a transcript of a Teleconference by Joe Reisert, W1JR. Joe spoke on the subject "Antennas and Antenna Systems, Where is the State of the Art Going?" The transcript is in four parts. I will be printing this as the subject of the Tech Tips section of the Zero Beat over the next four months.

Joe's talk did an excellent job of covering the whole spectrum of antennas - from HF through UHF - and made heavy use of references in the amateur and professional literature.

#### **PART I - Overall Summary and Definitions**

Good evening, my fellow amateurs. It is a great pleasure to be here tonight. I feel honored to be selected to speak at this very large and possibly largest ever teleconference. Many thanks go to the Honeywell Amateur Radio Clubs and, in particular, Dave Meldrum, KA1MI, and Rick Whiting, W0TN, for the confidence they have placed in me and also for their helpful hints and suggestions to make this presentation a success.

Tonight my talk will be about "Antennas and Antenna Systems, Where is the State of the Art Going?" I will divide the talk into four separate segments. The first part will deal with general terms and definitions which will set the stage for the rest of the talk. The other three segments will be the "low HF" (40 through 160 meters), the "middle HF" (10 through 30 meters) and finally VHF/UHF and EME antennas. In most cases I will be talking about the top of the line, state of the art or future antennas and antenna systems.

There is probably no other amateur radio topic that inspires such a vigorous line of conversation as the subject of antennas. Virtually every amateur has some interesting story to tell about his or her favorite antenna or antenna system or one yet to be fully tested. In reality there is no better place to spend you time improving the performance of your station since if the same antenna is used for transmitting and receiving, every dB of improvement in gain yields a two dB overall station improvement, one dB on transmit and one dB on receive. The old saw still stands... "If you can't hear them you can't work them."

If there is one big complaint that can be leveled against the amateur community it is that they almost never use true gain standards when evaluating antenna performance below 30 MHz. Typical performance is measured in dBs above my last antenna or above a long wire in the trees of how many guys I beat out in the pile up on XZ2XX. Seldom regarded are changes in radio propagation, power of the competition, or operator savvy not to mention good luck in being at the right frequency or timing of the call. Another problem is the sheep following the wrong leader copying an antenna that Joe Blow uses because he works more DX than I do without regard for his physical setup, power or operating ability. The trouble with this kind of approach is that you never really know what you have. You even may have built a real good antenna and replaced it with a poorer one. The situation I've described is not hopeless or beyond even the novice doing antenna tests if you understand your limitations and make a few basic tests.

Typical amateurs can only measure a few antenna parameters such as VSWR and in the case of a rotary beam, front to back ratio. Therefore, the commercial manufacturers make sure that these parameters are good.

Let me be more specific about these parameters and first look at VSWR. All kinds of myths have evolved such as the one that says a 1:1 VSWR is necessary for an antenna to be working properly. This is entirely false. More recently, there has been an upsurge in the belief since many of the modern solid

state rigs will only put out power if the VSWR is below 1.5:1. The lowly antenna tuner is now enjoying a big comeback. We have gone to solid state rigs that don't require tuning but now we have to add an antenna tuner that takes more time to adjust than the old pi-networks we all used to use that would literally load into any VSWR.

To further muddy the water, the typical VSWR measuring gear used by amateurs is patterned after the monimatch, a breakthrough in its time but an instrument that is sadly lacking in accuracy when compared to a good directional coupler like the Bird Model 43 thru-line wattmeter and its equivalent toroid directional hybrid VSWR meter. Whenever I hear someone tell me their dipole covers the full 80 meter band with a 3:1 VSWR I just laugh to myself and wonder if they have a lossy feedline, a dummy load or just another incorrect reading VSWR bridge.

Probably the most important antenna parameter is gain. Gain is an antenna property dealing with its ability to radiate power in a desired direction or conversely to receive energy preferably from a desired direction. It is a relative quantity, not measured in watts or ohms, etc. Hence gain must be referenced to something such as a dipole or an isotropic radiator, a theoretical antenna that radiates power equally well in every direction. HF'ers rarely measure this very important parameter and usually blindly accept the manufacturers claims especially if the front to back looks good. Many persons wrongly feel that if an antenna has good front to back it has good gain. This is not always true and will be discussed later in this teleconference. In many cases the antenna manufacturer can't even measure gain or compares his antenna to the competition and inflates his gain figures by adding a single finagle factor to the competition's claims. Now don't misinterpret my remarks as a slap at the manufacturers. I have noticed a significant improvement in this area in recent years but we still have a long way to go and I hope to give some guidance on this subject later in this teleconference.

VHF'ers realized this problem years ago when they organized an antenna measuring parties. Some of the setups have gotten very exotic but the accuracy can be quite good. The main things that must be taken into consideration are an accurate gain reference antenna, a well illuminated source antenna, accurate measuring instrumentation and a reality as to what to expect. Two excellent articles on the subject are "Antenna Performance Measurements" by Dick Turrin, W2IMU in November '74 QST pgs 35 thru 41 and "UHF Antenna Ratiometry" by Dick Knadle, K2RIW in February '76 QST pgs 22 thru 25.

The National Bureau of Standards in Boulder, Colorado has done a lot of work in gain measurements and NBS Report 5539 entitled "Methods of Accurate Measurement of Antenna Gain" by H. V. Cottony is well worth reading. NBS developed an antenna gain standard which consists of 2 full wave dipoles mounted 1/4 wavelength in front of a 1.6 by 2 wavelength reflector that yields an accurate gain of 9.31 dB over a dipole. This standard was later redesigned for the EIA (Electronic Industries Association) by Richard Yang, a consultant to the Andrew Corporation to a simpler and smaller reference which consists of 2 half wave dipoles spaced 1/4 wavelength in front of a 1 by 1 wavelength reflector and yields 7.7 dB gain over a dipole. The EIA adopted this smaller reference and incorporated it into EIA Standard 329 entitled "Minimum Standards for Land Mobile Communications Antennas, Part 1, Base and Fixed Station Antennas." This reference antenna standard is the one most commonly used by amateurs and is often referred to incorrectly as the NBS Standard when it is actually the EIA Standard.

While on this subject, the EIA has issued another standard, RS-409 entitled "Minimum Standards for Amateur Radio Antennas, Part 1, Base and Fixed Station Antennas." It uses a half wave dipole for reference and is more apropos to HF antennas. This standard is very specific about the range itself including the reference antenna height, the source antenna height, the minimum distance between antennas and

the minimum gain of the antenna under test. It should be noted that the the formula for minimum separation distance between the source and reference antennas is often quoted in the popular literature as  $2 D^2 / \lambda$  where D is the largest aperture dimension of the antenna under test. This minimum can introduce an error of up to 1 dB. A better antenna separation standard and the one used by the EIA is  $10 D^2 / \lambda$  which is accurate to 0.2 dB.

There is a crude but informative method of gain measurement that can be done on rotary beams using simple amateur techniques. It relies on the fact that gain results by redirecting the power radiated in many directions into a single direction or directions. If the half power bandwidth of the radiated signal can be measured, the gain can be calculated using the formula  $41253$  divided by the product of the beamwidth in the horizontal and the beamwidth in the vertical plane. Using a locally generated low power signal (such as a local amateur), you first measure the half power bandwidth of your antenna (the points where the signal is down 3 dB from the direct heading). The vertical beamwidth can be estimated to be 5 to 15 percent greater than the horizontal beamwidth. To give a numerical answer, a typical well designed 3 element Yagi has a 60 to 65 degree beamwidth in the horizontal or "E" plane and 70 to 75 degrees in the vertical of "H" plane. Dividing 41253 first by 65 and then by 75 yields a gain of 8.5 or approximately 9.25 dB. This is isotropic gain which is approximately 2.15 dB above the gain of a dipole. Therefore the gain of a typical 3 element Yagi is roughly 7.1 dB over a dipole. By measuring your beamwidth over the frequency bands of interest you can estimate the gain. The wider the beamwidth, the lower the gain and vice versa. The only restriction to this formula is that all side lobes and rear lobes should be at least 15 dB below the main lobe. If not, the gain may be lower than calculated. For further information on this subject, I refer you to "Antennas" by John Kraus.

Always be aware of the beamwidths quoted for a specific antenna. This parameter

can usually be accurately measured and tells you if the gain is true gain or specmanship. Also, some manufacturers list half beamwidth. To convert, just multiply by 2 and proceed. Check the gain reference carefully. Some sources quote isotropic gain which is 2.15 dB above the gain of a dipole.

#### Transmission Lines and Baluns:

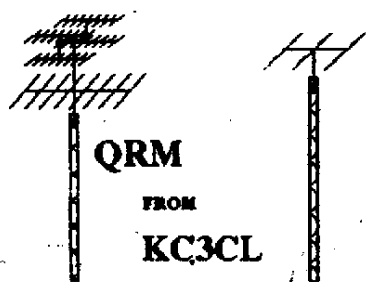
No antenna talk would be complete without at least a few words on transmission lines and baluns. Time does not permit a long segment on this subject. A few general rules apply. Use good low loss non-contaminating types of coax cable such as RG 213. Most RG-8 is poorly shielded, contaminating and deteriorates rapidly meaning your feed line becomes a big attenuator after a few years. The CATV foam coax is low loss, inexpensive and 75 ohms. It will require special connectors and matching transformers (such as synchronous transformers) if you want to go between 50 ohm sources. Make sure no water gets inside as some of the older types of this line will draw water through like a sponge and then cause discontinuities. I prefer Andrew Corp. Helix or its equivalent at VHF and UHF. It costs more but has long life and is very low loss making it less costly in the long run. Open wire lines are great and low loss but require special handling techniques and are particularly vulnerable when humidity or rain is present.

Baluns are a subject that invokes strong arguments. Suffice it is to say that a balun probably doesn't help much on wire antennas and dipoles. On directional antennas it can prevent re-radiation which will reduce front to back ratio. I prefer the balun types that do not require extra wires or windings that interrupt the feedline. My article in September 1978 Ham Radio and the one by Walt Maxwell, W2DU in March 1983 QST discuss this balun type in detail.

#### Part 1 Summary:

To summarize this portion of the teleconference, we need some accurate antenna gain references. EIA Standard RS 409 may be a step in the right direction. A good directional coupler type of VSWR indicator is a must for the serious amateur. As a side benefit, it may be used to measure output

power if the FCC changes the amateur regulations to PEP output power as discussed in the recent Notice of Proposed Rulemaking. Amateurs can determine gain if they make the effort to measure or study the beamwidths and antenna patterns on their antennas and calculate gain as I have described. Hopefully in the not to distant future there will be general agreement on amateur antenna standards so we can objectively compare antennas.



I made it! Another newsletter completed and out in time for the mailing. This months issue is a little sparcer than I had planned, but with Field Day and my upcoming vacation there wasn't much time to do a better one. The news of Field Day will be reported in next months Zero Beat, with all of the soggy details.

73s Dave KC3CL

## Fox Hunt

The Canton ARC will be sponsering a Fox Hunt on July 8th, at 2:30 PM. This hunt will be open to all, and hunters should be at the visitors parking lot at the Stark COUNTY Sheriffs station no later than 2:15. This will be an easy hunt, with no surprises. If you are interested in fox hunting, this will be a perfevct hunt to get started with. For more information, contact John, WX8G, at 821-5513 or on the repeater (145.37 or 146.865).