

# Zero Beat

Hampden County Radio Association, Inc.

Our 43rd ARRL affiliated year  
Special Service Club

Serving Greater Springfield, MA

**HCRA**  
**Amateur Radio, Computer Electronics**  
**Flea Market**

**Sunday, April 29th**  
**Agawam High School**  
**off Route 57, Agawam**

• • •

**Doors open for sellers 8:00am**  
**Doors open for buyers 9:00am**  
**VE exams 10:00am**  
**Admission \$2.00 per person**  
**Talk-in 146.700, 224.98, 449.175**

**Tables \$5.00 in advance, \$7.00 at door**  
**Contact Fred, N1DPM @ (413)786-7943**

## June Banquet

We have decided to keep the HCRA June Banquet at the church this year, and give it one more try. This has been a tough call—The board thanks everyone for their input on the matter of the June Banquet. We have obtained a new caterer this time (Touchette's Catering, of Agawam) who has a quite good reputation. At the time of this publication, the menu had not been finalized. It will be available at the May meeting, and it will be published in the next Zero Beat.

The tickets for the banquet are \$10.00. You may purchase them at the May meeting or send your check to the HCRA—P.O. Box 482, West Springfield, MA 01090-0482. If you send your check to the P.O. Box, you can pick your tickets up at the door to the banquet. **Tickets will not be sold at the door of the banquet.**

The board of directors understands the dissatisfaction of the previous caterer, and has made every attempt to improve the quality of the upcoming banquet. We'd love to see you this year, so please make it a point to attend!

**HCRA Fleamarket will be Sunday, April 29th at the Agawam High School**

**Next meeting will be Friday, May 4th, 8:00PM at the Feeding Hills Congregational Church**

**Next board meeting will be Thursday, May 10th, 7:30PM — location to be announced**

**Next VE exam will be at the HCRA Fleamarket — No VE exam in May**

**The HCRA banquet will be June 1st at the Church — Tickets are \$10.00**

### Club Officers

President—Yorke Phillips, K1BXE  
 Vice President—Stan Hilinski, KA1ZE  
 Treasurer—Greg Stoddard, N1AEH  
 Secretary/Clerk—Jeanette Platanitis, KA1MEW

### Board of Directors

Jim Sebolt, N1DUY	Ed Goldberg, WA1PLS
Larry Lemoine, N1EPE	Fred Stefanik, N1DPM
Steve Nelson, WA1EYF	Frank Potts, NC1I
Cliff Junkins, W1UWX	Bob Lafleur, NQ1C

## Message Nets Are For Everyone!

One of the initial charters of Amateur Radio was emergency preparedness. This effort is still carried through today in the form of traffic or message nets. These nets meet on a predetermined schedule for the purpose of passing messages on a practice basis for emergency preparedness. These nets also pass "real" emergency messages when the need arises.

Any Amateur Radio operator may take part in these nets, provided their license class allows them to transmit on the net frequency. You don't need any special skills to participate in these nets — it's really easy! Don't let the fancy net jargon scare you away. The nets are there to train you and to provide practice messages so that you'll be ready if an emergency comes along.

There are nets that meet on HF, and there are nets that meet on VHF. The VHF nets are a good way to get involved in message handling — they're easy to find and check into, and you don't have to deal with the QRM of the HF bands while trying to learn the procedures of net operation.

Listen, then speak. Try listening to a few nets before you check in to one. Don't let the jargon intimidate you, but try and get a feel for the procedures used on the net. Once you feel comfortable, give it a try. Just remember that while the net is in session, the net control station is the top dog. Listen carefully and follow his instructions, and all will go smoothly. Speak out of turn, and all you'll do is create chaos on the net.

Give these nets a try: Weekdays, 10:00am and 1:00pm on 146.91(1); Tuesdays, Wednesdays, and Thursdays at 4:00pm on 146.94(-); Ever day at 9:15pm on 145.11(-) and 9:30 on 146.88(-).

You can obtain a publication called the "Net Directory" from the league that describes the net system in detail, along with articles on proper net procedures, delivering messages, sending messages, and a comprehensive net listing.

Remember, if there's ever a major emergency, we're going to need as many stations as possible ready to handle messages. So brush up on your skills and check into a net!

## Field Day Is Sneaking Up On You!

Yes, it's almost Field Day time again! The HCRA will be performing it's spectacular Field Day effort once again at the Agawam High School on June 23-24. But in order for the event to be a success, we need you! Regardless of whether you'd like to operate an entire band yourself, or just for 20 minutes to give a long-haul operator a break, you can be a great benefit to the Field Day team! Even if you don't want to operate at all, we can still use you to greet visitors and explain what Field Day is all about, or to assist with food service or other errands for the operators.

There will be a Field Day planning meeting on Saturday, May 12th at 1:00pm at the Agawam High School. At this meeting, we'll determine what bands will be operated this year and with what equipment. We'll also inventory our antennas and other equipment to see what is needed before the actual event begins. If you'd like to give a hand to the organizational aspects of Field Day, please plan to attend this meeting.

We plan to have coverage by Continental Cablevision again this year, and hopefully by other media groups as well. Publicity is a big part of Field Day—Did you know that we even get bonus points for it? If you have contacts at newspapers, TV, and or radio stations, please inform them of this June 23-24 event.

Now that the warm weather is on the way, keep Field Day in the back of your mind, and we'll hope to see you there!



# A Killer 6-Meter Array "The Unfair Advantage" by Fred, N1DPM

**Background:** A pair of 7 element 20 foot boom KLM yagis at 70 feet just wasn't enough to "tame" the 6m band from the multi-op station of KA1ZE. As most of you club members know, Stan and I like to put up the "big stuff". The KLM's just didn't qualify. Our 6m op, Tom, WB1FVS, wanted to be the "king of the hill" on 6. He remembered the array that he and Stan put up in September of '83: 3 cushcraft boomers. Tom thought this array was fabulous. The antennas were stacked one over another at 85, 55, and 25 feet. They were switch selectable, either top antenna, or bottom pair. These old antennas were still available and they also fit the "big stuff" category being 6-elements on a 34-foot boom. After seeing the presentation on big 6m arrays at the Mid-Atlantic VHF conference by Dave Olean, K1WHS, my evil-scheming mind was fully engaged.

**Objective:** Make a 3-yagi 6m array with ultimate switching flexibility and performance. Switching and power division/matching should be done to provide **all** possible combinations.

First: Any single antenna for quick direction changes. Second: any pair of antennas, top and middle, middle and bottom, top and bottom, for +3dB of gain and a somewhat lower angle of radiation. The top and bottom position would have somewhat larger side-lobes vertically due to their spacing. This could be important along with the following selections because of the arriving angle and takeoff angle of signals due to different types of propagation such as E-Skip, double-hop E, F2, meteor scatter, aurora, tropo and ground-wave. Third: all 3 yagis for +4.77dB of gain and a low-clean angle of radiation. Fourth: To take care of utilizing all the array gain at a high angle add an 11 degree selectable uptilt (electrically steered) to the top or bottom pair or all three yagis and, 28 degrees for the outside pair. This sounds like a lot! It really isn't that complicated.

**Switching system:** To accomplish our intended goals would require some coaxial relays to be mounted on the tower. These relays required are 1

3-position capable of having any of the positions energized at the same time and 3 4-port coaxial transfer relays. These were all obtained at fleamarkets for less than \$50 each. Referring to figure #1, the 3-position switch (K2) is used to select each of the 3 antennas. One of the transfers (K1) is used to select (insert) a quarter wave matching transformer to provide the matching/power division to the multiple antennas.

**Here's a little math:** 1 antenna =  $50\Omega$ . 2 in parallel =  $25\Omega$ . And 3 in parallel =  $16.6\Omega$ . As shown in many handbooks, a transformer needs to be  $1/4$  wave long and also the mean impedance. This is found by taking the square root of the product of the input and output impedances. So, for 2 antennas, input impedance of  $50\Omega$  and output impedance of  $25\Omega = 1250$ . Take the square root =  $35.4\Omega$ . Now 3 antennas, 50 times  $16.6 = 830$ . Square root =  $28.8\Omega$ . Now just try to find 35 or 29 ohm coax! Here's the trick, it involves a slight compromise and some ingenuity. First since we can only "switch in" one transformer it needs to be halfway between the desired 35 and  $29\Omega$ , or  $32\Omega$ . This means that if the transmitter was a perfect 50 ohm source, and the antenna a perfect 50 ohm load, the transformer would be a mismatch of (SWR) 1.106 to 1 for two antennas, and 1.103 to 1 for three antennas. This means that for one kilowatt forward, the reflected power would be 2-3 watts! This is certainly acceptable. Now the ingenuity. Since the only thing frequency dependent about a coax transformer is its length, you can treat coax like resistors when you put the pieces in parallel with each other. So take out your "resistors in parallel" formula, and calculate what happens with a 50 ohm piece of line in parallel with a 75 piece of line, RG8 and RG11.  $30\Omega$ ! The mismatch will now be 1.18 to 1, for 2 antennas, and 1.04 to 1 for 3 antennas. Close enough! Some coax fittings and T connectors make up this assembly.

**Now for electrical steering:** As stated in chapter 6 of Yagi Antenna Design, by Jim Lawson, W2PV, two basic uptilt angles are obtainable. 11 degrees and 28 degrees. These are accomplished with a "delay line", a piece of coax in series with the upper antenna of a pair. The two best and easiest are 90 degrees, or  $1/4$  wavelength, for a tilt of 11 degrees, and 180 degrees, or  $1/2$  wavelength for a tilt of 28

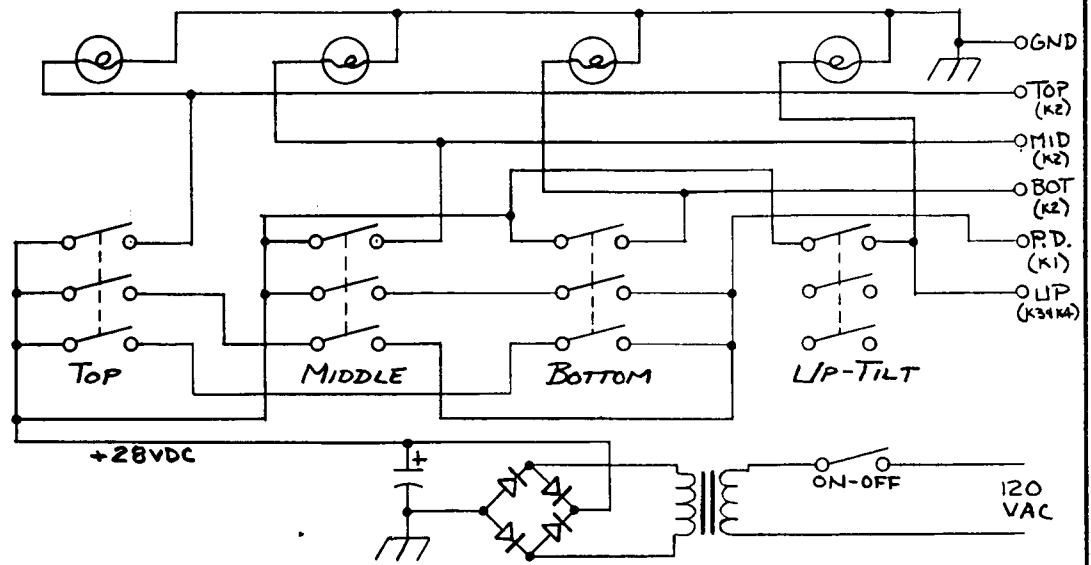
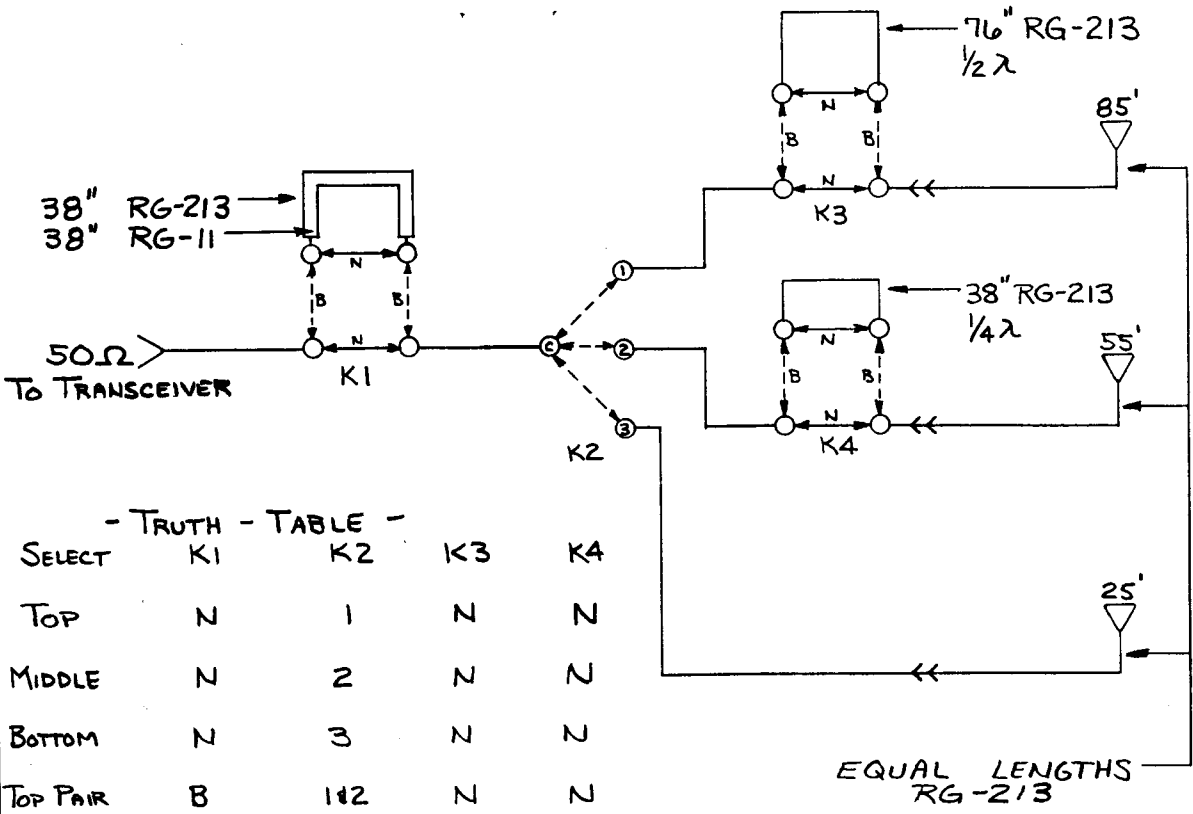


FIGURE 2



- TRUTH - TABLE -

SELECT	K1	K2	K3	K4
TOP	N	1	N	N
MIDDLE	N	2	N	N
BOTTOM	N	3	N	N
TOP PAIR	B	1+2	N	N
BOTTOM PAIR	B	2+3	N	N
ALL THREE	B	1+2+3	N	N
LIP-TILT ON ANY PAIR OR ALL THREE	B	CHOOSE PAIRS OR ALL THREE AS ABOVE	B	B

N1DPM-KA1ZE-WB1FVS  
6 METER YAGI ARRAY 10-12-88

FIGURE 1

degrees. Well, being that we have three antennas, not two, in order to make the transition smoothly we will, via K3 and K4 transfer relays, insert a 1/2 wave into the top line, and 1/4 wave into the middle. The book also shows the array gain only suffers less than 1dB for the 28 degree tilt. With this combination, by selecting all three, top and middle, or middle and bottom, we can steer the array up 11 degrees. And by selecting top and bottom, we can steer the array up 28 degrees. The power supply and switching in the shack is accomplished with four push-on, push-off buttons and is connected to the relays on the tower with standard 6-conductor rotor cable. The schematic for this box is shown in figure 2. With the switches wired in this fashion, it logically unravels the truth table in figure 1 and provides the operator with an easy means of antenna selection.

**Results:** In one short word, **WOW!** All 3 antennas are rotatable, the top 360 degrees, middle and bottom 300 degrees on sidearms. For long-haul tropo, all 3 are the best by about 5dB (4.77 to be exact). K8III is consistently S5 to S7 from Ohio. The other types of propagation take some experimenting. The uptilt works really well at nulling ground noise. Typically for double-hop E, or F2, all 3 are the best. For meteor scatter, single hop E, and aurora, either a low antenna or a combination with uptilt works good but the conditions are *never* the same so constant experimenting is called for. Sometimes this antenna gives you the "unfair advantage". The best example is during some E-skip last summer, a station 1,000 miles away with any single antenna was S5. With top or bottom pair, was S4, with all 3 was S3. The 11 degree uptilt added about two S units to these multiple antenna combinations. The last remaining combinations, top and bottom, proved to be very interesting. Top and bottom performed somewhere between S3 and S4, about what you would expect. Now, add our magic ingredient, the "unfair advantage", 28 degree uptilt, and with this combination, for these conditions, the signal is now S9+20 to +30dB! This is absolutely amazing, but it sure makes it easier to break those pileups! This has been the most drastic difference seen with this array although typically it has a dynamic range of about 10dB. So, with the correct combination, 10dB is a major unfair advantage.

## What! No ACSSB? From Westlink Newslines

United Parcel Service may be on the verge of dropping ACSSB and going to FM in the recently purchased 220-222 Mhz band. A regular listener of the Amateur Radio Newslines who is also a two-way radio serviceman called "our" radio news service with a story that the land mobile industry is buzzing with a rumor that II-Morrow, the UPS subsidiary which is supposed to build the ACSSB gear, is having trouble making it work properly. The problem appears to be with the pilot tone that locks the system. It reportedly will not accept a 200 cycle drift. The rumor continues that II-Morrow will soon announce that the radios to be supplied will be FM and designed for 2.5 KHz channel spacing. One of the primary reasons given by the FCC for re-allocating the 220-222 Mhz band was for it's use in the development of new narrow-band technologies. If this story holds, it would seem that the FCC has been duped by UPS and their radio boys. Seems that the whole procedure should be re-examined by Congress.

*Thanks to the Pack Rats' "Cheese Bits" for this tidbit of information.*

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## Rescue! by Jeff, K1BE

"Clouds, clouds, and more clouds!", Stu lamented, "How could I have been so dumb!". Circling the Cherokee slowly higher, no clear patch offered escape to the ground. "Well, time to go IFR," Stu said to his wife, Mary. Nervous already, she wanted to know exactly what Stu was up to. "You're the one who had to visit your sister in Holyoke, now we're stuck stuck above the clouds. I haven't made an instrument approach in over a year." Tuning his radio to Bradley Field, he barked into the mike: "Bradley approach, this is 7394 Juliet, listening on 125.8." Nothing. Once and then twice again Stu called, and began

trying other channels. "The thing is on the fritz! Stop crying, Mary, that won't fix it". Stu's clammy hands tightened on the wheel. He knew the remaining fuel would soon be gone. A blind descent through the clouds could end up smashing into a mountain. Flying two minute legs on a triangle, he waited for Flight Service to send up a shepard to guide him in. The transponder was set to 7700. "Hope that's working", thought Stu, "My guts are wrenching themselves inside out". The fuel guage creeped down, and Stu knew he'd have to try a descent soon. What to do next?

"The handi-talkie!", Stu shouted, "dig it out of my jacket, Mary". Turning to .105/.705, Stu heard the crisp cw ID: KA1JJM/RPT followed by station W1HGJ chatting, and passing it on. Breaking in, Stu fought his rising panic and called: "MAYDAY, MAYDAY, MAYDAY, this is K8SJ, trapped above the clouds with all radios out. My fuel is running low and I require an immediate instrument approach to the nearest airport. Can someone contact flight service?" Through the garbled doubled and tripled replies, one call was understood. "K8SJ this is K1YQQ, calling them now." Chet got Bradley FSS on the landline and advised them of the problem. "K8SJ this is K1YQQ, they've got you on radar, your transponder is out. They want to know your altitude and remaining fuel?"...KERCHUNK..."7,000 and 45 minutes— request immediate vector to nearest airport, I repeat"...Chet relayed this and replied: "Turn left to 230 degrees, begin slow descent, approach control at Westover is being notified"...KERCHUNK... Stu began his descent and tried to calm himself as clouds wrapped his plane in mists. "K8SJ, K1YQQ turn right 330 degrees, Westover has

you on its' scope"...Roger, K8SJ". Chet wondered how this pilot felt, bringing his plane in by instructions slowly passed by unknown friends.

"K8SJ, this is K1YQQ, a corridor has been cleared for your Westover approach. Ceiling of 800 feet, visibility two miles in rain. You're doing fine, just keep taking it nice and slow"... Misty hands seemed to be grabbing at Stu outside the windshield, and winds buffeted him from side to side... "Turn to 320 degrees, descend to 1200 feet" ...KERCHUNK... "K8SJ K1YQQ, I say again, turn to 320 degrees, descend to 1200 feet" ... "THE PLANE'S DIVING TO THE RIGHT, NO THE LEFT, I CAN'T KEEP IT LEVEL!" ...Trust your instruments, Stu, trust the instruments, you're disoriented—K8SJ, K1YQQ, come in please".....Where had he gone????

"Chet, we've lost him on the radar about three miles out," Flight Service quietly said. Chet wanted to know it he'd crashed. "Most likely", they replied, "we're sending the teams out now". Chet hung up the phone and cleared the repeater. He just didn't want to talk to anyone.

*Note from K1BE:* Since this story was written in 1980, Stu has gotten a divorce and is now living in Sandusky, Ohio. I hear from him every year and you can meet him at the Dayton Hamfest every April. Chet, K1YQQ, is now a silent key and is missed by everyone who ever met him. He had a genuine spirit and enthusiasm for amateur radio.

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***Remember:  
No VE exams in May.  
See you at the Flea Market!***

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## Chasing (And Catching) DX by Mike Ludkiewicz, W1DGJ

My serious interest in amateur radio started during the fall of 1954 with a small group in the East Control Lab at Monsanto. We thought it would be great if we could construct power line transmitters and be able to communicate with each other. After some investigation we discovered the limitations of the power line transmitters and realized that it would not be possible to transmit our voices beyond the nearest pole transformer. Our interest was not dampened since one individual obtained information about a Novice Class amateur radio license that required only the basic knowledge of the code and electronics. We all started studying the code and the ARRL license manual and within two months time we all passed the novice test. I received my Novice license in December 1954 (WN1DGJ) and when my license arrived I had my station ready to go on the air. The receiver was a Hallicrafters S-38 and a home-made transmitter consisting of a single 6v6 oscillator/output, with maybe a couple of watts input. The antenna was an end-fed piece of wire about 50 feet long, and since SWR wasn't even in my vocabulary, I didn't worry about it!

I was able to make contact easily on 80 meters and soon found that my signals were reaching further and further West. I was doing quite well until one evening when I called CQ and got an answer from a station whose fist was so strange that I could not understand the call letters. It took many QRZs and QRSS before I determined that the ham was a VE1 in Canada and not the usual W or K prefix that I was accustomed to copying. That was the start of my interest in DX.

By spring I was tempted to try for the General Class license so that I could use voice. My first trip to Boston was a disappointment, since I was not fully prepared with the code and had to make a repeat trip a month later. In the meantime I got a lot of vocal advice on "how to pass the FCC exam". One suggestion was to visit a nearby bar for a couple of stiff ones to calm the nerves, another suggested not to copy the three Vs at the beginning of the test since the advisor did just that and then froze completely with only the three Vs on his page!

When I received my General Class license I was very interested in operating ten meters since I was told that it was a band that allowed world wide communications with low powered transmitters. I built a transmitter with a 6146 final that band switched 80 to 10 meters and bought a used Hallicrafter's S-20R receiver that had a band spread on 10 meters. I could hear the skip stations everyone talked about. one Saturday I was visiting W1NY in Wilbraham and he turned his receiver on 10 meters and the W6s and W7s were stronger than most locals I was

used to listening to. I couldn't wait to get home and turn my receiver on to see if it was capable of hearing the skip and to my amazement the stations were loud and clear. I found that 10 meters provided many types of propagation conditions and it was possible to contact any area of the world if you had the patience to wait for the proper conditions. In 1957 I moved up to a Heathkit DX-100 and a National NC-300 receiver. I was able to contact over 100 countries on 10 meters with a 3 element beam and got my DXCC certificate in 1959.

I've always felt that my biggest interest was in talking with DX stations. I continued to try and work every new country that I heard. Working DX was most enjoyable between 150 and 250 countries since at that level you are experienced enough to know what its all about and by going on the air most of the time when the band is open you could expect to hear a new country on. Beyond the 250 level you have to start "stalking" the needed countries by obtaining their operating habits from one source or another.

After qualifying for a number of certificates such as: DXCC, WAS, WAC, WAZ, etc. I started collecting awards from different countries and ended up with over 100. About this time I passed the First Class Commercial license test and felt that now was the time to try for the Extra Class amateur license. It didn't provide any incentive then but a short time later the incentive licensing program did allow special privileges for this license class.

I finally worked up to the "top shelf" equipment and purchased a Collins S-line, 30L-1 amplifier and a good mono-band beam for twenty meters, inverted Vs on 40 and 80 with the DXCC honor roll as my goal. Now I had my finger on the DX with only a very few contries that I had to contact. I tried SSTV and the biggest kick was to see my own pictures that I had transmitted to Hawaii on the long path over Africa retransmitted back to me, a trip of 40,000 miles! I made DXCC on SSTV by exchanging pictures with over 100 different countries.

Working DX and having a "DX capable" station provided many interesting contacts that remain with me: Running a phone patch from the hospital ship "Repose" off the coast of Vietnam to a Chicopee family who had just received a telegram telling of their son being wounded and hearing their relief when they could talk directly with him and hear that he was OK!; daily schedules with anthropologist Thor Hyerdahl's expeditions on reed rafts across the Atlantic and in the Persian Gulf area; Emergency messages from earthquake victims in Italy; and hurricane victims in Haiti. I've made many friends, some I correspond with including a Russian ambassador to Mongolia, the ex King of Sikkim, and the King of Jordan.

In 1979 I finally contacted a station operating from Bouvet Island in the South Atlantic to complete my DXCC. It took me 25 years to work 344 countries, but I enjoyed the challenge. Now I can say that I have contacted every country in the world!

## VE Exams

Exams are sponsored by the HCRA on the first Wednesday of each month at 7:00PM *sharp* at the Agawam High School. VE's are also needed. If you are interested in taking an exam or helping give exams, please contact Jeanette WC1O at 786-1463.

There will be no VE exam in May due to the Flea Market.

## HCRA Meetings

First Friday of each month at Feeding Hills Congregational Church  
Center of Feeding Hills  
Intersection of routes 57 & 187  
Doors open at 7:30 PM  
Meeting starts promptly at 8:00 PM

## Next Meeting:

**Paul Aubuchon, K1YOU**  
**will give a presentation**  
**on radio-controlled**  
**aircraft.**

**Friday, May 4th**  
**8:00pm**

## Local Nets

HCRA 10 Meter Net	Thursday 9:00 PM 28.650
Nutmeg VHF Traffic Net	Daily 9:30 PM 146.28/88
80 Meter Ragchew Net	Tuesday 8:00 PM 3.709 Mhz
WMPN	Daily 6:00 PM 3.937
WMSN	Tuesday & Thursday 7:30 PM 3.713
WMN	Daily 7:00 PM 3.562
WMTN	Monday-Friday 1:00 PM 146.31/91
CPN	Monday-Saturday 6:00 PM 3.965
	Sunday 10:00 AM 3.965
Mt. Tom Information Net	Wednesday 7:30 PM 146.34/94
Mt. Tom Swap Net	Follows Mt. Tom Information Net
Mt. Tom Emergency Net	Sunday 8:45 AM 146.34/94
WMA Tfc Net Cycle 3	Tue, Wed, Thu 4:00 PM 146.34/94
RASON	Daily 9:00 PM 146.13/73
WESCON	Daily 8:30 PM 147.78/18
CN	Daily 7:00 & 10:00 PM 3.640
CSN	Monday-Friday 7:30 PM 3.720
BEARS Traffic Net	Daily 9:15 PM 145.11(-)

**Hampden County Radio Association, Inc.**  
**P O Box 482**  
**West Springfield MA 01090-0482**  
**Editor: Bob Lafleur, NQ1C**

Forwarding & Address  
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# First Class

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# Hampden County Radio Association Annual Banquet

≈ ≈ ≈

June 1st, 7:00pm  
Feeding Hills Congregational Church

Catering by Touchette Catering of Agawam

≈ MENU ≈

Chicken Cacciatore  
Italian Meatballs  
Macaroni with Meat Sauce  
Cold Roast Beef  
Sliced Turkey with Cranberry Sauce

Garden Green Salad with Dressing  
Potato Salad  
Deviled Eggs  
Relishes – Olives – Pickles  
Potato Chips

Apple Squares  
Brownies

Rolls – Rye Bread – Butter

Assorted Beverages

*Several door prizes will be awarded, totaling more than \$75.00 in value!  
See reverse side for more information.*

**Doors open at 6:30pm**  
**Dinner served at 7:00pm**  
**Business meeting at 8:00pm**

(you need not attend the banquet to attend the business meeting)

## Banquet Information

Banquet tickets are \$10.00 per person. Make your check payable to H.C.R.A. and send it to the club address listed below.

Checks must be received by Monday, May 21st. No tickets will be sold at the door — NO EXCEPTIONS.

If you pay by check, your ticket will be waiting at the door for you.

Officer and board of director elections will be held at the banquet. Ballots will be in the forthcoming Zero Beat, and available at the meeting. You may fill out your ballot at the meeting, or mail it to the club address. Ballots must be received by June 1.

## VE Exams

Exams are sponsored by the HCRA on the first Wednesday of each month at 7:00PM *sharp* at the Agawam High School. VE's are also needed. If you are interested in taking an exam or helping give exams, please contact Jeanette WC1O at 786-1463.

The next VE exam will be June 6th at 7:00pm

## HCRA Meetings

First Friday of each month at  
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WMSN	Tuesday & Thursday 7:30 PM 3.713
WMN	Daily 7:00 PM 3.562
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