



the RARRA RAG

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ROCHESTER AMATEUR RADIO ASSOCIATION, INC.

VOL. 55

NOVEMBER 2002

NO. 3

Annual RaRa Members Auction November 1, 2002

Marykay Vesco, KC2DPG

It's that time of year again for our annual auction; it's so exciting! As tradition has it, our auctioneers and comedy entertainment will be hosted by our very own Great Amateur Radio Experts: Ed Gabel, K2MP and Dick Goslee, K2VCZ; accompanied by Brad Allen, KB2CHY, our Expert Sound Effects and Audio Engineer. So lets dig out that surplus equipment that's just sitting in your shack or garage and watch these experts extract the highest bid for your hidden treasures. This auction is also, a great way to find that elusive and inexpensive piece or pieces of equipment you have been waiting for but just couldn't get your hands onto. It is also a nice way for your other half to approve of a purchase or sale of radio equipment.

Doors will open at 7:00 P.M., so that sellers may come early to place your equipment on the tables; and buyers may come early to preview the selections and to plan buying strategies. There will be no regular business meeting this month, so the auction will start promptly at 8:00 P.M. If you are late, you may miss some exciting opportunities.

Ok, down to business. As you all know we have some very important but simple rules to be followed to make this buying and selling auction a great and fair experience for everyone.

RARA assesses a fee of 10% on each sale (this benefits the club and is an important fundraiser for paying the bills). The seller pays the fee from the proceeds of the sale. Both the seller and the buyer must come forward to the Treasures table as soon as the item is declared SOLD by the auctioneers. This is a Members only auction; therefore, you must be a RARA

member to gain entrance to the auction. Forgot to pay your dues, don't worry membership renewals may be paid the night of the auction! Each paid member may bring ONE guest to the auction. Please respect the auction protocol, **NO PARKING LOT SALES or SALES PRIOR TO THE START OF THE AUCTION.** As stated before, this event will benefit your club and is a very important fundraiser for paying our bills. Don't forget donations to RARA are tax deductible!

So treat yourself to a fun, exciting, and entertaining Friday evening with your fellow amateur radio friends. Doors open at 7:00 P.M. and auction starts promptly at 8:00 P.M. at the Henrietta Fire Hall, 3129 E Henrietta Road. As always, refreshments will be available!

Annual RARA Auction

November 1, 2002

Henrietta Fire Hall,
3129 E. Henrietta Rd.

Auctioneers

Ed Gable, K2MP
And
Dick Goslee, K2VCZ

the RARA RAG

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RARA Life Membership is available for twenty times the annual dues.

RARA RAG 2

THE PREZ SEZ

Marykay Vesco KC2DPG

Hello folks, let me start out with a big thank you to all who attended our last Meeting. We W had a great presentation on JOTA with lots of slides. JOTA weekend is an excellent opportunity acquaint lot of youth with to expose amateur radio The to a lot of youth in just one weekend. JOTA will be over when this edition of the Rag comes out, however, there are other ways to participate. RARA has a venture program in conjunction with Kodak directed toward the same end. If you missed JOTA and have an interest in help or teaching youth about amateur radio...RaRa in conjunction with Kodak co have a venture program. If you would like to help out, be an instructor, or have any ideas to help the venture team, please contact Keith Freeberg, N2BEL (585) 254-0722. His team would be glad to have the help or input. Also And don't forget, we still have our radio coaches, they have a good group of young Children to work with this session. Just, great time to get started.

It is once again time for the ARRL Atlantic Division to elect a Director. ARRL members will be receiving a the ballot in the mail. if not already received. Bernie Fuller, N3EFN, is the current director. He has been doing an outstanding job representing the interest of all the division members. It has been very important to him to understand what is going on in all sections of the Atlantic division and what their needs are. For example He has driven from Pennsylvania on a Friday night just to attend the RaRa general meeting and hear listened to our concerns and input and to enlightened us of the upcoming discussions of possible ARRL changes. He is always willing to take a call from anybody and answer their questions or concerns.

The opposition is Tony Gargano, N2SS. He has demonstrated that he listens to our members and participates in activities so that he can be a better representative. He is a resident of NJ section. He had sent us an email of introduction to personally reach out and solicit membership support from each of the affiliated ARRL clubs. Bill Kasperkoski, WB2SXY, our secretary, read This email at the September general membership meeting. So, don't forget to cast your vote. ..

PROBLEM-SOLVING METHODS II

Günter Wegener

(Translator's note: This article is the second of three written by Günter Wegener for the major German amateur radio magazine, Funkamateureur, 51/2, Feb. 2002, pp. 149-151. It appears by permission, translated and adapted for publication in the RAG. Any errors are the translator's, not Herr Wegener's. NB: Some pictures with obvious info have been omitted. The term "U" in pictures and the text means "voltage." Errata: The data on resistance in each instance in the October article were inadvertently noted as "W," instead of the "omega" for ohms. Also, the author's name was regrettably incorrect.)

Current Analysis

Voltage analysis traces where the voltage goes in a circuit. Analysis of current finds out where the energy potential is being used. An advantage of current measurement is that the process has hardly any influence on the voltage and current conditions in a circuit. Technicians seldom want to test current because the current's path must be broken. Doing this is not always easy with today's compact circuitry, where no current bypasses are available. Actually, you, the technician, should make a habit of connecting the electrical device to a breadboard. By measuring the overall current consumption, you can really evaluate properly and put a finger on the problem/s.

With a variator the voltage can slowly be increased to locate the whereabouts of current consumption. If the electrical device's fuse or circuit breaker opens up at full line voltage, then reduce the line voltage to the point where the fuse or breaker holds. Then you can zero in on the problem with voltage tests.

Indirect Current Measurements

It is often useful and necessary to find out about the current flow. Current can be measured indirectly, to avoid troublesome cutting into the circuit. As we know, at a simple resistance the voltage drop is determined directly by the current flowing through the circuit. Thus, the amount of current can be calculated when you measure the voltage drop across the resistance. Obviously, we have to do a little bit of calculation here. As an example, let's

measure a transistor's collector current I_C in an amplifier stage. The ohmmeter placed in parallel with the load resistor R_L shows a value of $U_L = 2.5V$ (Figure 1). According to Ohm's Law there is a collector current of: $I_C = U_L : R_L = 2.5V : 1.2K \text{ ohms} = 2.08 \text{ mA}$. If it is easier to do, the voltage drop can also be measured across the emitter resistance R_E .

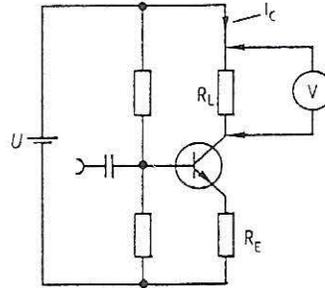


Fig 1 Voltmeter in parallel with R_L for indirect current measurement.

Measurements at the Transistor

The transistor is driven by direct current voltages, which establish the conducting point. With bipolar transistors both the voltage U_{BE} between the base and emitter and the voltage U_{CE} between the collector and emitter are the defining values. For example, if you take the transistor emitter as the measurement reference point, there will be a smaller negative voltage at the base of a PNP transistor and a larger

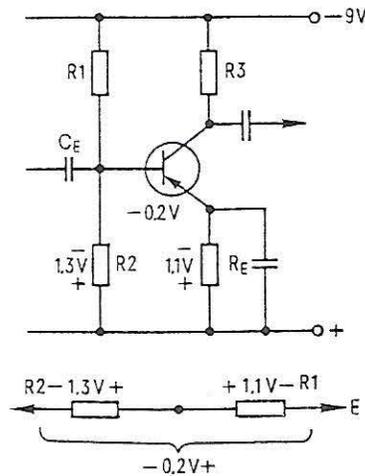


Fig 2 How base voltage is established with R_1 and R_E .

negative voltage at the collector. With an NPN

type it is the reverse. Based on their polarities, the voltages are such that the base-emitter diode conducts while the collector-emitter diode blocks current flow. If an emitter resistance R_E is present, the base-emitter voltage U_{BE} appears as the difference of the voltages across the divider resistance R_1 and the emitter resistance R_E (Figure 2).

So, by making voltage measurements at these transistor electrodes you can get a reasonable picture about the working condition of the circuit. Defects in the transistor or its external circuitry invariably produce larger voltage swings and finally to a defective circuit. Voltage swings in the range of 20% can be tolerated, but considerably higher differentials indicate a problem.

The voltage at U_{BE} largely determines the transistor's conducting point. Even small deviations significantly shift the conducting point and make problems, such as distortion. That is why you should begin your test of an amplifier stage by measuring U_{BE} . If this value is too low, then the transistor will be driven into the cutoff range. The collector current, which is also the same as the emitter current, falls off. When this happens, the voltage drop at the load resistance R_L becomes smaller and the voltage U_{CE} becomes greater. The latter voltage is obviously always smaller than the voltage supplied to the circuit, by the amount of the voltage drop at the load resistance. The cause for the problem could be the base voltage divider R_1/R_2 . If R_1 has become greater, then the voltage divider's ratio changes and U_{BE} sinks. The same thing happens when the emitter resistance R_E has increased. In this case, the required voltage drop is achieved simply by a smaller emitter current. But even though the voltage across the emitter resistance R_E reads correctly, you should be careful here.

Measuring with an ohmmeter with the device's power turned off can tell you about the actual conditions.

An internal transistor problem is also possible, where for example the base-emitter path is loading down the divider resistance R_2 and is reducing the voltage. A short circuit on the base-collector path makes the resistance R_1 appear to be reduced, and U_{BE} climbs. To experiment, you can unsolder the connection to the transistor base. If the proper voltage returns at the divider point, then the transistor is defective. If the voltage is too high at the base voltage divider, then the transistor will be driven further: the collector current I_C increases and the voltage at U_{CE} decreases.

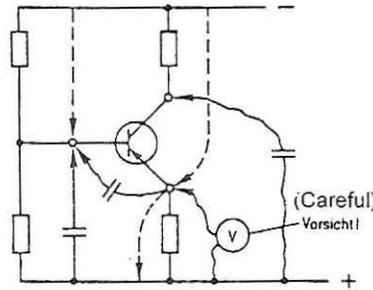


Fig 3 Be careful not to switch the meter to "current". Avoid careless attachment of test leads.

Now the divider resistor R_2 can be tested. It may have increased or the value of R_1 has become less because of other components connected in parallel with it. You should also take a look at the coupling capacitor C . It may have an isolation breakdown, which will change the base voltage. This also applies to the capacitor C_E , which relates to R_E in an AC sense. With an isolation problem present, R_E appears smaller, and the required voltage can only be attained with a higher collector current. If you

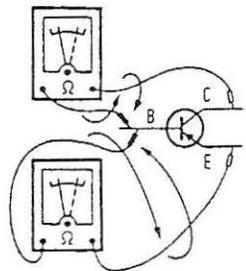


Fig 4A Testing the transistor for conductivity and blocking.

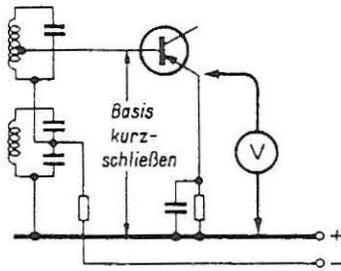


FIG 4B Testing the transistor for its response in the circuit.

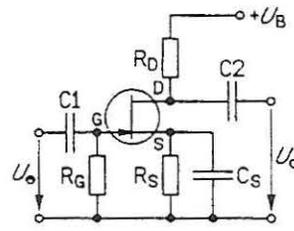


Fig 4C Amplifier stage with FET.

find the full voltage applied to the circuit at U_B and there is no voltage across R_E , then no collector current will flow. The reason for this could be an open circuit: in the transistor itself, in the electrode connections or in the base voltage divider.

Something else should be noted. When measuring around transistors, particularly at the emitter voltage, take great care. The multi-meter should never be switched accidentally to "current." This would result in a practical short circuit of the emitter resistance, and the transistor would be endangered by excessive collector current. Dangerous short circuits can also occur with careless use of a multi-meter probe in the close quarters of a compact circuit, particularly on SMD boards or by carelessly attaching a capacitor lead as a way to find a noisy stage (Figure 3).

Testing the Transistor

It has become clear that the transistor itself can be the cause of unacceptable voltage swings. For this reason it is useful to picture how the transistor functions.

With bipolar transistors it is easy. You are testing the diode effectiveness of the transistor paths. As in Figure 4a an ohmmeter test is made from the base to the emitter or to the collector. Depending on polarity, you will obtain resistances of 1M ohms and more, or only about 100 ohms by reversing polarity. Naturally, this procedure is a bit involved, because the transistor must be unsoldered from the circuit. (Components in parallel could falsify the measuring results.) To avoid damaging the transistor, measure the voltage with the ohmmeter set not to exceed the ranges of 1.5V and the short circuit current of 20 mA. However, it is quite clear that such a procedure can give you only a very rough impression about the condition of the transistor. Still, some conclusions can be drawn from the test.

Testing the Transistor in the Circuit

To get a more exact picture, test the transistor in the circuit, i.e., in its "regular environment," and you can see how it responds. To do this, place a voltmeter across the emitter resistance and short out the base-emitter path with a test lead or something similar (Figure 4b). This way the transistor is driven into cutoff range and the emitter current reduces to almost zero. You can also put the voltmeter on the collector, if this is easier to get to. Then the collector voltage will climb to the value of U_B .

If there is no change in the voltage, then it is pretty sure the transistor is defective. With Field Effect Transistors (Figure 4c) – there are P-types and N-types here too – the "drain" and "gate" voltage polarities are reversed. With the source connection as a point of reference, the P-type must show a small negative voltage at the gate and a greater positive voltage at the drain; with N-types this is reversed.

Transistors, like other components, often indicate a problem by unusual changes in temperature. Intermittent problems or other defects occurring from time to time can often be caught just by a condition that is too warm or too cold. Simply use a small heater fan or a cold spray, the latter to be sprayed directly onto the suspicious component, using a thin plastic tube. If voltages change, then the part should be replaced. With transistors and other semiconductors one should be aware that they are generally temperature dependent. Noisy transistors can also be easily tracked down with a cold spray. Another method to find noisy transistors is to put a capacitor across the load resistance (approx. 10 microfarads for lower frequencies or approx. 1 picofarad for higher frequencies). If the noise is reduced, the transistor should be changed.

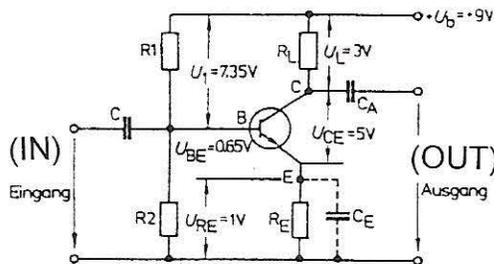


FIG 5 Voltage relationships of a transistor amplifier stage.

Measurements of Amplifier Stages

Measuring or testing amplifier stages that have transistors (a few have already been briefly discussed in this article) require great thought and care. This begins with proper polarity identification of each transistor, as shown above. Both transistor types could be present in the circuit. This fact should force us to rethink each individual situation. If voltage values are given on the schematic, be sure to find the right reference point. Both the nega-

tive pole as well as the positive pole of the voltage source can be related to the ground potential. Sometimes the information given on a schematic concerning the voltage path of a device refers to the voltages across the resistances. Therefore, be careful to obtain the right values (Figure 5).

In the process of searching for a problem, the DC voltages you want to measure are often combined with AC voltages. Take care here. There are simple multi-meters in which the rectifier in the DC voltage ranges, necessary for AC, is not turned off. The AC or impulse part is therefore rectified and adds itself to the DC voltage value. This results in measurement errors, and a considerably higher voltage will be registered.

Current Measurements of Amplifier Stages

Particular care should also be taken when measuring current. If there are no available test bridges at particular measurement points, as is usually the case for neutralizing final stages, then the current path must be broken for inserting the ammeter. The measurement device is then best connected at a point free of high frequency or low frequency components as a way to avoid measurement errors, due to AC voltage mixing. In this case, couple the voltmeter with a capacitor (Figure 6). Direct currents are best viewed outward from the transistor from behind the blocking capacitors. In principle, you can insert the ammeter at any of the three desired transistor electrodes, as long as the electrical conditions are not disturbed.

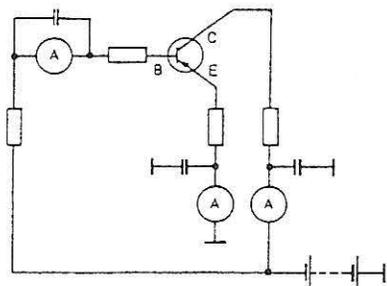


FIG 6 Measuring current at a transistor.

The least inner resistance R_i possible should be present in a measurement instrument for accurate readings. This is especially true for a transistor's emitter circuit, where the resistance of the instrument can often contribute

to a change in the conducting point and produce completely incorrect current and voltage conditions. Often, it is better to measure the current indirectly.

Measurements of Final Stages

Complete symmetry is the first condition for problem-free operation of low frequency push-pull final power amplifiers. This requires an exact setting of the idling current for most final stages using transistors. A too low idling current results in distortions. One that is too high endangers the transistor finals. The procedure for setting the idling current is always described in the service manual, and the measurement points for this are usually easy to reach. Set your ammeter according to the manufacturer's directions (Figure 7). Otherwise, apply the information already given in the section "Current Measurements."

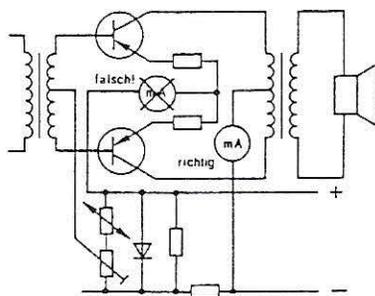


FIG 7 Current measurement of a push pull amplifier circuit.

There's More . . .

We have already learned about many procedures for localizing and correcting breakdowns in circuits. In the next part of our modest excursion into the methodology of problem location in electronic circuits we will deal with direct coupled stages, with testing of IC's and with the use of the oscilloscope [forthcoming in the RARA Rag.]

RaRa HOTLINE
(585) 442-0587
24 HOURS A DAY

Awards

Greg Michels, KC2GXV

Congratulations to the winners of the awards drawing at the October 4, 2002 club meeting!

Irv Goodman, AF2K Atomic Clock
Bill Kraft, WB2IHM Scanner Headphones
Dave Holman, KE3HF MFJ™ 2m ¼ Wave
Groundplane Vertical Antenna

With only about twenty people entering the drawing, odds at winning were good for everyone who purchased tickets. With the auction in November and the joint meeting with the Kodak club in December, the next regular meeting in January will be the next awards drawing. Until then I will be looking for more great prizes. Hope to see you there!

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RaRa Amateur Radio

License Testing

All Elements Needed
To Complete a License Class

SATURDAY

NOVEMBER, 16, 2002

Registration-8:30 AM
Testing Begins-9:00 AM

LOCATION

**MONROE COMMUNITY HOSPITAL
SOUTH (MAIN) ENTRANCE
435 E.HENRIETTA RD
(park in lot across the street)**

Inquires 585-334-4488
Aa2fo@localnet.com

IS THIS YOUR LAST ISSUE OF THE RAG?

Dick Goslee K2VCZ

The membership period for RARA starts the first of September each year and continues through the end of August the following year. The final membership expiration each year is October 31, which includes a 2 month grace period for payment of your dues. Check the address label on your current issue of the RAG for your expiration date. If it shows OCT. 2002, your dues have not yet been received for the year 2002-2003, and this will be your last issue of the RAG. You must be a current member of RARA to participate in the auction at the November meeting so now is a good time to send your check.

You may pay your dues at the November Auction or any RARA meeting or send them along with your completed membership application to RARA, P.O. Box 93333, Rochester. NY 14692-8333.

Silent Keys for November

A. PROSE WALKER W4BW 8/ 8/ 2002

THERON F. LILLIE WA2UIG 9/20/2002

ORVILLE F. POTTER ex-WB2FPT
9/23/2002

NANCY C. WALTER N2POI 10/3/2002

RaRa's New Domain Name

Please bookmark our new internet address:

www.rochesterham.org

Are you a Rochester ham? Bug our website monthly to checkout on the most current events. The old URL still works, but, no guarantee in the future. Note rochesterham is one word. Capitalization may work with most web browsers.

RARA RAG 7

Monroe community Hospital

Bill Kasperkoski WB2SXY

Access to 111 Westfall Road has changed. The use of meeting rooms and other facilities for "Club" purposes is no longer allowed. Facilities at the Monroe Community Hospital are expected to fill the void. To obtain facilities for such purposes a request must be mailed to:

Mr. Edwin Holdsworth
518 Parrish Road
Honeoye Falls, NY 14472-9772

All classes, meetings, and testing are included. Club officers please note that access to The Monroe Community Hospital meeting rooms must be coordinated. Through Mr. Holdsworth.

In your request, please send the organization name, exact dates, approximate attendance and times extending into the future as far as possible. It is not satisfactory to send in schedules in the form "the 1st and last Tuesday & Thursday of every month"; you need a calendar dates. To coordinate rooms for 2003 send a second request.

The Radio Amateur Callbook is calling it quits.

Margaret Ratajczak

The Radio Amateur Callbook, confirmed that the last issue of the CD-ROM Callbook, the Winter 2003 issue, is due to hit the CD racks in November.

"Due to accessibility to the FCC database via the Internet, sales have declined to levels that make it unprofitable to publish future editions,"

The Callbook's publisher Bob Hughes announced in a recent news release. In 1997, citing "rising costs and increasing demand for electronic publishing" the company phased out its telephone-book-size paper North American and international editions in favor of its CD-ROM product. The 1997 Callbook--the 75th edition was the last hard-copy version available. The Callbook began publishing in 1920.

SUPPORT OUR ADVERTISERS

RARA RAG 8

RaRa License Test Schedule, 2002-2003

George Platteter, AA2FO

GET LICENSED, UPGRADE - The fall season is fast approaching, and it's the advent of the 2002-03 testing sessions.

These sessions are held in the September through May. The sessions are held on the third Saturday of the month with the exception of September when it is held on the 4th Saturday of the month and at the Hamfest, whose date varies.

- THE PLACE September through May; Monroe Community Hospital 435 E. Henrietta Rd. Rochester NY (Enter via the south entrance ask at the information desk at the top of the stairs)
- REGISTRATION 8:30 AM, Exams 9:00 AM
- HAMFEST Hamfest location, refer to Hamfest schedule.
- SCHEDULE September 28, 2002
October 19, 2002
November 16, 2002
December 21, 2002
January 18, 2003
February 15, 2003
March 15, 2003
April 19, 2003
May 17, 2003

Applicants need to bring the following in addition to pen and pencil: Two forms of identification, one being picture ID (Drivers License), original FCC License (if you already have one) and a copy, Certificate of Completion and a copy if credit is to be claimed for elements passed at another test session.

We welcome handicapped applicants. Please phone in advance, (585) 334-4488.

RaRa LICENSE CLASS

1st SEMESTER MONDAY NIGHTS 19:00 - 21:00 9/9/2002 THRU 12/9/2002 WITH A VE TESTING SESSION ON 12/9/2002
MONROE COMMUNITY HOSPITAL
435 East Henrietta, Road

RaRa Rag 20 Years Ago, November 1982

Ed Gable K2MP

Then, as now, the program was the annual RaRa auction held at the Police and Fire academy on Scottsville Road. K2JD Trustee Ed Holdsworth, N2EH, called for a special work party to remove the tower from the old Iola site and move it to 111 Westfall Road. Reported was the loss of the long standing computer service, which maintained RaRa membership data. Looking into a long-term solution was Doug Wilson, KA8IGS. At this time the Rag Editor was Ron Jakubowski, K2RJ, with Dwight Hill, K2KWK, as Associate Editor. Membership chairman Irv Goodman, AF2K, reported membership at 927, including 60 new members this year. Writing for the RRRRA was Ed Neubauer, N2BXA, reporting that their meeting would feature Nelson Nail, WA2ZPE, talking on RTTY operations. Continuing on FM news was Craig Stolze, WB2AQQ, announcing that his repeater is vacating 78/18 and is now operating on 11/51 with many features such as auto-dial phone patch, TT test and more. Dick Goslee, K2VCZ, reported a new computer bulleting board, with emphasis on ham radio, was then available for use and sponsored by the Heathkit Electronic Center. Rick Berg, KS2F, reporting for the RDXA, tells all that the Meeting was to be a slide presentation on the VS500 DX-pedition to Brunei. Similarly, Tom Richmond, WB2IEY, told of the Rochester VHF Group's meeting of Show 'N Tell for home brew enthusiasts. Remaining a long time advertiser was Harvey's Ham (KB2LB) of Caledonia, NY. From the Want Ads you could buy a HQ-170 and DX-60/VFO for \$160.00 from Tom Calvette, KA2OMQ.

THINK HAM RADIO

LIFE, ACCIDENT & HEALTH AGENT

MARYKAY VESCO
KC2DPG

310 Commercial Street
East Rochester, NY 14445
716 381-7773 Fax/Phone



P&C BROKER NOTARY PUBLIC

AMATEUR RADIO BULLETINS

Dwight Hill K2KWK

Amateur radio voice bulletins are available to local hams on the VHF-FM and UHF-FM bands twice a week. Anyone with a FM ham set or a scanner can receive them. Hams can keep up-to-date. Those wishing to become hams can find out when classes and exam session are held. A schedule of Hamfests is included for those wishing to socialize and browse

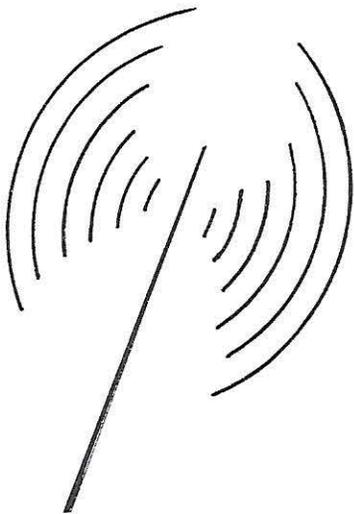
On Sunday nights, bulletins and the Monroe County FM Net are held to keep the local gang informed and to test equipment. Bulletins begin around 8:20pm with the "Newsline 2002/2003" brought by Ray, WA2MYG. They continue with the "Hilltop Bulletin" from Dwight, K2KWK at 8:45pm. These weekly features alternate from Sunday to Sunday on local repeaters. When they appear on the 146.88 system of the RRRRA, they are also linked to the mega-repeaters of Bob, N2HJD on nine amateur bands. On the alternate Sundays they use the K2SA repeater of The Genesee Repeater Association on 146.79.

Tuesday bulletin sessions begin at 8:00pm with the same features from WA2MYG and K2KWK. They appear on the Bristol Mtn. repeater, WR2AHL, 145.110 (pl tone 110.9 required) of Mike, W2HYP. That is linked up full time to the repeater of Greg, KE2VW, operating on 146.67 (pl tone 107.2 required) from a very high location south of the communities of Dunkirk and Fredonia. These two systems enable hams from Syracuse to Erie, PA to hear bulletins that include selected stories from the ARRL Letter and ARRL web site.

News items of interest to radio amateurs are welcome and can be sent to K2KWK at <k2kwk@arrl.net>. ARRL Bulletin Stations in Western New York include John, WA2U in the Syracuse area who also sends out voice bulletins in his Central NY Bulletin Service Sundays and Tuesdays. Listeners can reach him by email at <WA2U@arrl.net>

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