

**October-Meeting:** Friday, the **23rd**, at 7:30 PM at the Perkins Restaurant at SR 73 and I-75.  
Meeting topic: **Mike Brown, W8DJY** will present some interesting concepts and probably throw in some neat demonstrations. Ye all come!

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### Upcoming Events

#### EME

non competitive **Microwave ONLY** on Nov 7/8  
second part of contest Dec 5/6,  
See QST Sep 98 pg 102

Trip to **Greenbank, W. Va.** in Nov. We like to get a “carload” together to visit the Radio Telescope Facility. Make your interest known to Gerd, we will then discuss the details...

Brand new Federal **2 Meter Linear Amplifiers**: 2.5 Watts max input, approximately 35 watts output. Ready to be put "on the air". RF-detector circuit (mod) installed for 2 meter handy talky use. BNC Input-SO239 Output. Units also contain a robust speaker and audio amplifier. \$40 each Contact Dave Pelaez AH2AR/8  
4872 Trailside Ct Huber Heights Ohio 45424 E mail: AH2AR@webtv.net

**Drive safely, don't speed, don't follow too close!**

## **Progress is being made on many fronts,**

I am happy to report this month. The application for a license for the Society has been sent off to the FCC, and we should soon be issued a new, next in the sequence call sign. Gerd and I worked out the knotty problem of who should be trustee when he pointed out that he wasn't an Extra class, and we shouldn't settle for anything less. Which is OK with me, as he still had to sign the application as an officer of the club. Further, thanks to the charm of Bill Newill, W8LIL, Jules Wittebort's widow has agreed to sign the papers for MVUS to apply for the call W8KSE. She agreed with us that this is a fitting tribute to his memory and love for the hobby. From here, we just have to wait for the first license to arrive, then send in the paperwork for the vanity application, and of course, thirteen bucks!

Now the driving force for all of this is that we are planning, designing, and soon should be building a set of VHF/UHF/microwave beacons which will need a call sign. Since the beacons are a group effort, using one individual's call sign seemed inappropriate. Thus the effort for a club call. As for the beacons, Sam, WB8ZDF, and Bruce, KA8EDE, are plotting and scheming to get a design together. Soon, we will be in need of folks to help with the task of getting things built and installed. I don't expect these two guys to do all the work when there are many of us who can contribute in lots of ways.

For instance, once the design is complete, parts need to be acquired and assembled, modules tested, antennas obtained and installed, and everything checked out. While we have a few hundred bucks in the bank that we can use for this project, it is always more fun to do some scrounging and recycling. When Sam agreed to be the project leader, I promised him that the title did not require him to "do it all!" And if he did do it all, he would certainly be entitled to take all the credit, thus it wouldn't be an MVUS project. And the rest of us would miss out on the fun of participating (Tom said Sawyerly). So come meeting night, I expect to sign up volunteers to help out with the tasks mentioned above. A few hours each ought to be pretty easy to find, and I know you guys have the talents, skills, and capabilities needed.

Speaking of money, Gerd has taken care of our problem with the credit union's need for a federal ID number, so we once again have a checking account in the name of the MVUS. He was paying income tax on the interest earned on our money in his personal account, which really isn't fair to him. Three percent of two grand is enough to pay the postage for a month or two of newsletters.

With the December holidays fast approaching, it is not too soon to start planning our annual party. Looking at the calendar, we have a serious conflict, what with Christmas day being on the 4th Friday. Since I don't have a whole lot of leverage to persuade the masses to give up their claim on the 25th, I'm perfectly happy to capitulate and look for alternative dates for our little feast. The Perkins was a nice place to get together last year, so that seems like the thing to do again. The big question is when? So talk with your better halves and bring a management approved proposal to the meeting so we can get it settled.

This month we will be entertained by Mike Brown, W8DJY, who always has some interesting concepts and demonstrations to share. **73, Tom, N8ZM**

## **10 GHz PA, LNA, PS Board set -Qualcomm PC Boards retuned for 10.368 GHZ complete with cases and full documentation**

\*PA -approximately =30 dBm (1 watt) Output for -5 dBm input

Merle Rummel, W9LCE

\*LNA - >25 dB gain; 2.5-3.5 dB NF (<1.9 dB possible)

provided this information

\*PS - +12V input = 10V & -5V output sequenced

Each set of boards -provided with full documentation and performance specs. Boards will be available late in 1998  
price: \$225 plus shipping -orders taken -deposit required, quantity limited

Mixers @ \$35 (your choice -1 for switching, or 2 for duplexing), wave guide filter kits @ \$15  
(2 required -one for Xmt, one for Rcv), splitters @\$20 - 1 required for dish antenna

Over 40 sets have been built and installed in the Northeast, and all work well building powerful stations with 1 watt and 25-35 db gain dish antennas. This may be the last time, due to availability

The system requires a 2m radio, also you provide the 10 GHz LO, approaches used:

1) surplus microwave PLL unit      2) LO chain      3) synthesizer-multiplier-mixer-splitter

**Bruce D Wood, N2LIV 3 Maple Glen Ln Nesconset, NY 11767 (516)265-1015**

## This and That 10 - 98

**No Escape Possible.** Magellan Corp. has come out with the world's first hand held satellite transceiver that permits you to do your e-mail from anywhere on earth. This system combines Orbcomm, a ring of low earth orbit data communications satellites, with the Global Positioning System. The inability to get away from it all does not come cheap, however. The set alone costs \$ 1000.-

**QRM?** Recently a high percentage (several hundred) of homing pigeons didn't make it back to their home coop. This happened along the highly populated East Coast of the US. A lot of pigeons were later located and they seemed to be very confused. Several theories have been offered: disturbances in the earth's magnetic field, relatively inexperienced young pigeons, and what is the most interesting theory: signals from the numerous cell towers along the way. Seems like the size of a pigeon is about ½ wavelength at those cellular frequencies.

**The Hustler.** Inventor and founder of NCR Corp. John H. Patterson took inventing serious. He turned all his ideas over to a three man Bulletin Room staff to develop the thoughts into prose to be used in executive meetings and in The Hustler, a publication for the inspiration and instruction of salesmen. The Hustler, with editions for bartenders, hotel men, druggists and retail clerks in all manner of stores, often had a circulation of 1.5 million a month. (Roz Young)

**A Paradox.** I define a paradox as a claim that is self-contradictory, even though based on valid deduction. I would assume that one or more of the premises are incorrect, even though it may not be evident at first. In short, I believe that a lot of apparent nonsense is **actually** nonsense. (Marilyn vos Savant)

**Fifty Licks.** A commercial maker of ice cream saw fit to find out how many licks it takes to polish off a one scoop cone - about 50. (L.M. Boyd)

**Three Hundred .** Just to keep your balance while standing still, you need to work about 300 muscles. (L.M. Boyd)

**Radio.** In 1919 it was illegal in the United States for a private person to play a radio. Eleven years later, about 40% of all U.S. homes had radios. So you can see, can you not, how the law controls the future. (L.M. Boyd)

**Queer.** The universe is not only queerer than we suppose, it is queerer than we **can** suppose. (J.B.S. Haldane)

### **The History of the Computer.**

- “Computers in the future may weigh no more than 1.5 tons”. (Popular Mechanics, 1949)
- “I think there is a world market for maybe five computers”. Thomas Watson, Chairman of IBM, 1943.
- “I have traveled the length and breadth of this country and talked with the best people, and I can assure you that data processing is a fad that won't last out the year”. Business book editor for Prentice Hall, 1957.
- “But what .... is it good for?” -- Engineer at IBM Advanced Computing Systems commenting on the microchip, 1968.
- “There is no reason anyone would want a computer in their home”. Ken Olson, president, chairman and founder of Digital Equipment Corporation, 1977

**Holiday Inn.** The automobile. Man on the moon. Electronic locks at Holiday Inn. Has this been an awesome century or what? (Ad for the motel chain))

**Shooting.** “You shoot , you loose, you bury that dog.”

(Earl Scripture, Champion trapshooter)

## 22<sup>nd</sup> Annual Mid-Atlantic VHF Conference

This conference, also known as the Pack Rats Meeting, took place on **Oct.3** at the Hampton Inn in Willow Grove just **north of Philadelphia**. Between 50 to 60 people were in attendance. The six presentations gave interesting glimpses on propagation, antennas, mm-waves, commercially available MMICs and more. Some handouts helped in reading up later, but the lack of “proceedings” is clearly a disadvantage. The admission price of \$ 24.-, as it turned out, went largely towards securing the meeting room at the motel...At these rates one should look for other opportunities such as schools, colleges, or even a church. Then for the overnight stay any motel without convention facilities would suffice; and those are per se a lot cheaper. The weather turned cold as the conference began and there was rain on and off which didn't help to bring out the crowds for the flea market on Sunday. Also, there were a lot fewer sellers than in previous years at the flea market.

Dave Olean, K1WHS, was intrigued by his son's science project which was building and demonstrating a jam jar **magnetometer**. This is basically a magnetic compass needle with a mirror attached and suspended on a string in a “jam jar”. A light beam gets deflected by the mirror and at some distance generates an easily visible deflection of a magnetic field. Just the thing to sense passing vehicles at some distance or catch disturbances in the earth's magnetic field. This latter is, of course, what caught Dave's attention. Catching a strong disturbance would be an indication of an **Aurora**. The jam jar, working w/o any electronics did not appeal to Dave so he searched the web for a better solution. He found a company that offers a very reasonably priced fluxgate kit costing between \$45 and \$85 depending on whether you need all the parts or whether you can supplement parts from your junk box. He did not delve into the workings of the fluxgate, the most often used technique to measure slowly varying magnetic fields. Dave buried his sensor some distance away from the house and did some checking comparing notes with WWV. Of course, in every instance he knew of a magnetic disturbance hours before WWV was updating the k index readings. He also could see when the wife was leaving the house, and he could detect other cars passing by. Some cars gave a rather small deflection presumably the ones with an aluminum block. Kits, application notes etc available from: Fat Quarters Software, 24774 Shoshonee Dr., Murrieta CA, 92362 Tel (909)698-7950 Fax 698-7913 e-mail ekern@dconn.com

Chris Fagas, WB2VVV, next talked about **patch antennas**. These antennas are used on aircraft, satellites and sometimes on cars. He also showed a 28 GHz array which had a gain of 30 dBi. This type of “flat plate” antenna may be used by hanging it in a window for direct TV. The phase 3 d satellite has 6 round circular polarized patch antennas for 70 CM and more for GPS. Chris concentrated on square patches using mainly 62 mil double sided pc board (5880, e=2.2). The material should be low loss and as could be expected air insulation is best. Dimensions Chris gave for the sides of the patches are 432 MHz...9”.903 MHz ...4.35”, 1296 MHz ... 3.03”, 2304 MHz ... 1.704”, 3456 MHz ... 1.136”, 5760 MHz ... .682”, and 10 GHz ....379”. The gain you can expect from one element is around 6.5 dBi. Chris managed to put 5 microwave band patches on a single large circuit board, a nice compact arrangement for field trips. Feeding of the patches is off center from the back plane to get 50 Ohms, and since the patch is square a second feed can be added to obtain circular polarization. Naturally, Chris also experimented with array configurations in order to increase the gain. More can be found on his Website: WB2VVV.com

Mike Gaffney showed us how the big boys build **mm-wave amplifiers**. There is a great need to replace the good old traveling wave tube with solid state. This is similar in importance to replacing Braun's Picture tube with an LCD screen for computers etc. The present approach is, of course, to combine lower power devices to get to the high power. Mike talked about how they designed a ten watt output 28 GHz amplifier. Efficiency of a 4 W module is only 20, maybe 22%, so cooling is important. All power supply parts are kept away from the amplifier so that their heat does not contribute.. Matching, particularly for phase is important. The amplifying devices are initially substituted with 50 Ohm strip leads. Matching then is done from input to output entirely “passive”, then the devices are inserted. The “devices” are very wide band and some 1W modules are good between 23 and 27

GHz. Hams might get their hands on parts that are not quite making it for the desired higher frequencies. The finished amplifier was a piece of beauty, unfortunately not what you could duplicate in your garage.

Steve Kostro, N2CEI, from Down East Microwaves gave an interesting talk on:

**“Amateur Use of New PCS Solid State Components”** The “Personal Communication Service” PCS in the US is at 1.9 GHz. (in JA it’s PHS and in EU it’s DECT). This service uses wide band widths for high speed data communication and some devices might be usable in Amateur bands. Steve went through a number of promising data sheets, explained the fine print and related a lot of practical experience. He often gets “reasonably priced” samples to play with. Some devices are not even close to what you would expect from looking at the advertising. Others are promising and the whole field is new and in rapid development. As Steve put it: We should expect to see many more new components and improvements concerning amateur radio available in the near future.

Tom Whitted, WA8WZG, educated us on the capability, availability and proper use of **“Andrews” hard-line**. He once more recommended to avoid “air lines” unless you are prepared to put them under pressure to positively keep the water out, an aquarium pump might be adequate. For jumper cables, the ones that loop around the rotator, LDF4-50, ½” foam is good to 10 GHz (nominally 8.8) and has a turning radius of 5”. Superflex is even better with a turning radius of 1 ¼’. If you have a specific question Tom would be my first choice to ask for advice. Websites: Andrew.com  
Tom: wa8wzg.com Tel: (419)732-2944

Tom Williams gave the last presentation of the day with **mm wave imaging**. The use of mm waves to obtain an image promises yet another view of our surroundings adding to the visible (of course), x-ray and ultrasound. Metallic or ceramic guns hidden under clothing are clearly discernible. Dry walls can be penetrated and persons hiding identified. Technology in this frequency range of 60 to 70 GHz is still evolving. Oscillator stability is a problem. Tom played a recording of a 47 GHz experiment where the oscillator can be heard shifting and whimpering in frequency as it was on lower frequencies in the old days before x-tal control and PLL.

This concluded the presentations. A few door prizes were drawn, then the crowd dispersed to come back later for happy hour and the banquet. Speakers at the banquet were Maarten Broess, W1FIG and Steve Harrison, KOOU, and their theme: **“High Speed Meteor Scatter”**. Unfortunately we could not stick around for those activities. A very informative conference had come to an end. We hope to be back next year. Gerd, WB8IFM.

### Calculating WB2VVV’s Patch Antennas

Dimensions are for 1/16<sup>th</sup> “ Rogers Duroid 5880 support, field test adjusted formula:

Where L = Patch Side Length  
f = Frequency in GHz  
= Relative Permeability of 2.2  
c = 11.65 for L in Inches

# Sept Rover Exploits of AB4CR and W8ULC

By Jack Nyiri, AB4CR

We had a wild ride with Murphy and his family. Most folks probably would have been happy with our rover score, but we had higher expectations...what a mistake. We ended up with a score of 175,050. What a year!! The flu in January, tornadoes, bad weather and Red's wife sick in June, and Murphy in September!! Come on 1999! Here is the rest of the story.....

Since last September, we had planned, visited sites, modified equipment, bought "new stuff," spent weekends visiting ham friends to test "stuff," and agonized over the best routes for maximum QSO's and Grids to work. We publicized the route. We were ready!!

The first four corner grid that we drove around took longer than expected, but the results were great!! We were exceeding our expectations. Only thing left to do was head for the next stop, the shores of Lake Erie to try and work many microwave paths across the Lake. Spirits high, we started up the interstate highway..... In 10 minutes we hear a thump-thump-thump. The fan belt was coming apart. It is 5 PM when we stop pull off the interstate and start making phone calls. (We also RENT a van for this contest, so we have a new vehicle that will be free of mechanical problems for only \$250 for the weekend.) The nationally known rental company is of no help. We are on our own to find a mechanic at now 6 PM on Saturday....right.

After several good tries, we limp into Toledo for the night and find a garage who has a mechanic that comes in at 10 AM. What a long night... cannot operate the contest, so we try to get some sleep. Sunday morning we are at the garage at 10 AM. It takes half an hour for the mechanic to get down a cup of coffee and 15 minutes to put on a new fan belt. By now we have rearranged our route, and off we go to EN-91. We make several good QSO's and spirits are up, again. Who knows, we have defeated Murphy and still might do well, even after losing 18 hours.

We reach our spot, just south of Cleveland, start to set-up and operate. After about 20 minutes, the power goes off...the NEW generator has stopped. (forgot to mention that the FT-736's microprocessor keeps dropping out - doesn't like this vans electrical system - BUT we do have a new generator that keeps them happy.) Are we out of gas? Well, in short time, it is apparent that the generator is down and out. Several days later, the repair shop tell me that the low oil sensor and the spark plug coil are gone. Red and I both realize we are riding with not only Murphy, but his whole family. We decided to head home, trying to work who ever we can. The microprocessor problems get worse.

We struggle and make a few more QSO's, have a good Sunday night dinner. Neither one of us wants to think about the score. The question is not "how did we do?" It is "who did us?" Finally we agree to send in the score, but we aren't in a rush. We also agree to think about going through all of this again in January.

Our score turns out to be 175,050 - 488 QSO's, 140 grids. Not bad, but did not meet our expectations. Now for January....see you then - AB4CR and W8ULC

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System is centered on 2m exciter 10 GHz frequency source: (you provide) -Approaches used:

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**Bruce D Wood, N2LIV 3 Maple Glen Ln Nesconset, NY 11767 (516)265-1015**



## GI7b Triode Testing at 23 CM

by John Berker, WA9OUU

I built a  $\frac{3}{4}$  wave anode coaxial cavity with a  $\frac{5}{4}$  wave input line. The anode line is 3" ID and the grid line is 1 $\frac{1}{4}$ " OD with a machined step collet to the tube. These sizes are mode clean.

Testing was done with a 1 to 2 Ghz generator amplified by a 20W TWT. Anode voltage could be varied from 0 to 1800 Volts and bias from -40 to 0 Volts.

The cavity tuning was normal and the same results were achieved with either capacitive or inductive output coupling. Several tubes were tried and showed large variations in tuning, i.e. grid and anode capacity. Also the gain varied quite a bit.

Gain was high and very regenerative, i.e. the grid current peaked noticeably with anode resonance. With idle current and the input tuned some tubes would start oscillating.

Tests were done at 50 to 200 W output and all factors adjusted for minimum input. The efficiency obtained was typically 30+%. The best one measured was 40%.

Thermal drift was very high. Water cooling direct on the anode using o-rings had little effect. Blowing extra air on the grid area did nothing either.

Output readings were obtained by picking a start frequency that in a second or two would drift into resonance and just past. This peak observation became the test method at all the higher powers and under varying bias and plate voltage conditions. These powers, however, were not near the tube's power limit. At 150 W out I could vary the frequency and chase around the output. The drift was very fast as power was increased. I observed an abnormal relationship in the drifting between grid current, anode current and output power.

I got curious and cut a tube open by careful cutting with a lathe at the grid band double flange. It separated (luckily) without damage to the internal structure. A grid disc of spherical shape like the bottom of an oil can was revealed with a mesh in the center.

More surprising were three holes at the periphery of the grid that permitted three probes attached to the cathode to penetrate into the anode cavity. This would facilitate an internal feedback at a designated frequency which would raise the gain, even help self oscillation. The tube was used as an oscillator/pulsar at 1650 MHz. The unusually large grid ring diameter was probably for this dedicated purpose.

For the time being, I have suspended my efforts with this tube. My cavity and two typical tubes can be borrowed by anyone wanting to run more experiments. The tube works fine at lower frequencies as reported by others.

One last comment: the tube specs shows the cathode ring's maximum temperature to be only 100C. The reason, there is a low temperature solder connection that will melt with the heater on without heat sinking.

## **Antenna Gain versus Frequency**

Daun Yeagly, N8ASB and Gerd Schrick, WB8IFM

Here is a sampling of antenna gain curves versus frequency taken at the annual MVUS antenna measurements in August. Daun recorded these curves with the HP 8753E network analyzer. Bear in mind looking at these curves that both the source and the reference antennas have their own response which plays a role in the recording. Those antennas are usually somewhat broader than antennas developed for maximum performance. But in any case, they are only calibrated for a nominally “mid band” frequency. However, with a grain of salt, the curves below are quite instructive. E.g. K8EDE’s 57 element antenna peaks nicely in the band whereas the 25 element antenna seems to be off frequency and about 3 dB low in gain. Shown are curves for 23cm in the range from 1200 MHz to 1350 MHz. The source antenna was a loop with reflector and the reference antenna a dual coffee can with a measured gain of 9.7 dBi at 1296 MHz.