Vol. 12 No. 9 **www.ceitron.com/mvus/mvus.html/** Nov./Dec.1998

November-Meeting: Friday, the **27th**, at 7:30 PM at the Perkins Restaurant at SR 73 and I-75.
Have (another) piece of **Pumpkin Pie** and listen to **Tom, N8ZM** , presenting multiple short subjects related to **New RF Technologies**.

December Meeting **/ X-mas Party: Wednesday Dec 30 !**
Bring the Family and have a Good Time!

Contents

Upcoming Event

second part of **EME c**ontest Dec 5/6,
See QST Sep 98 pg 102

Happy Thanksgiving & Merry Christmas from the Officers of MVUS & the Editors of AP

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

One of the great joys

of my role as President of MVUS is that I get to hang around with a group of bright, talented, and creative people. Yes, that description fits you! You wouldn't be an MVUS member if those adjectives didn't fit. The dozen or so guys who regularly show up at the meetings are there to share their experiences and to learn from each other. Usually, we have a presentation from one of the group, such as Mike Brown's outstanding demo of the basic physics of static charges at the last meeting. But there is much more information exchanged through the one to one conversations that occur before, during, and after. I've worried from time to time that there would be some complaints that there is too much gabbing, and not enough formal meeting, but I have been pleasantly surprised.....no complaints! I think this supports my theory about the value of simply having a chance to casually chat about recent radio exploits. When I listen in on the conversations, they are almost always of a technical nature, not just gossip about car troubles or such. Certainly a major reason for the existence of MVUS is to foster the sharing of our collective knowledge, so I am quite comfortable with letting the informal part of our meetings continue. I hope you find this forum useful.

At the October meeting, we discussed a date for our holiday dinner, and settled on Wednesday, December 30 at 7:00 at the Perkins Restaurant on SR73 in Springboro. This is a family activity, so bring the whole crew along. In order to make sure we have enough room available, please call me with a headcount by the 28th so that I have time to notify the restaurant. My number is 937-667-5990.

The meeting this month is on the regular 4th Friday, which translates to the day after Thanksgiving. We will be at Perkins at 7:30. The program will be multiple short subjects related to new RF technologies that are being developed. The speaker will be that dynamic, witty, and all-around good guy, N8ZM. (Well, he IS kind to his mother.)

Happy Thanksgiving to all! **de N8ZM**.

P.S. To **Bill Tynan**, W3XO, many, MANY thanks for being the right guy in the right place at the right time in the P3D project. May all the joys and rewards for years of hard work be yours for many years to come.
To **Keith Baker**, KB1SF, new President of AMSAT-NA(and MVUS member), congratulations and best wishes for a successful tenure in your new role. You are the new right guy at the right time for AMSAT and P3D, and there are very few folks in this world who bring your level of talent, skills, and experience to the table. Good luck, my friend.

10 GHz Transverter Boards here's another source:

1)-Main PC Board partially modified, holes drilled for (copper pipe cap) filters and coaxial connectors - - $ 75 2556 LO input
2)-Main pc board Metal Mounting Plate -rough cut (required) - - - - - - - $15
3)-Synthesizer VCO controlled, uses Qualcomm 3036 PLL Chip - - - - - - - - $30
4)-Power Supply: 12 V DC in//+10V, -5V out - - - - - - - - - - - - - - - $15
(with logic switching of rcv/xmt control voltages)
5)-Complete kit (items 1, 2, 3, 4) - $100
Complete kit -(item 5), with finished/milled pc board mounting plate - - $130
6)-1 Watt Power amplifier pc board, with Mounting Metal - - - - - - - - - $55
7)-10 MHz TCXO - $40 2556 MHz output
adjuster/for 1 PPM operational - - - - - - - - - - - - - - - - +$5

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This and That 11-98

- **Microsoft.** Statistics indicate that the United States has more lawyers than any other nation on earth, with five times as many attorneys as engineers. In fact, Microsoft alone has more lawyers than most small countries. [John Haag]

- **Marconism.** Maybe Bill Gates is today's Marconi who tried to monopolize the airwaves in his time. Marconi only allowed transmissions to be received from "Marconi type" transmitters. It is reported that the Titanic did not respond to transmissions from vessels with "Telefunken type" transmitters. The Germans even had a word for this: Marconism.

- **Do Something Immediately**. A rich client had a mansion built by famous architect Frank Lloyd Wright. Getting ready for an elaborate Thanksgiving dinner it started to rain and a leak in the roof let drops fall, you guessed it, on the dinner table. The irate owner called the architect and demanded "immediate action". "Move the table." recommended Wright.

- **Life after Death.** 300 adults from the Dayton / Springfield area were asked: Do you believe in life after death? 74% said yes, 19% no and 7% said they didn't know. Numbers should be within +/- 5.7%. [Dayton Daily News]

- **Not only Bigger Houses**. Compared to the 36 cuft of space John Glenn's Mercury Capsule had, the Shuttle is a true "Space Ship" with 2,325 cuft, featuring, aside from the living/sleeping accommodations, nine workstations/positions and a gymnasium! [Time]

- **Alkalines.** A recent TV show investigated quality and price for alkaline batteries. What they found is that there is no significant difference in performance. So you should shop for the best price. and forget the brand names and the hype. A good deal was pointed out: "K" mart offers a package for $ 10.- (9.99, of course) with 36 AA cells. That comes to 27 cents per cell. Since alkalines last a long time, even if you are not using very many, that IS a good deal.

- **Swiss Army Knife Programs**. You all know about software. If you start with version 1.0 pretty soon there is the new, improved version 2.0. There maybe some improvement, but more likely there are features added, that you may or may not ever use. In any case, the program begins to look like the proverbial Swiss Army Knife. This knife has so many tools, but are they any good? Sure, in an emergency they will help. But if you have a choice, you rather use a real screwdriver. Such is the case with many software programs. The software people should obey the old German motto: "Schuster bleib bei deinem Leisten!" (cobbler stick to your last)

- **First EME.** John, W9OUU, had been getting ready for this moment for some time. He had his first contact on 1296 with K5JL on the first of November. John is a meticulous guy, for EME you almost have to be. He noticed that sometimes the signals of others were stronger than his echo, at other times it was the opposite. What was wrong? Finally it hit him; his tube amplifier, when not keyed, was generating diode noise, it raised the noise floor and actually even moved the S-meter a bit.

- **Human Suffering**. Can you stand another one? A recent caller to the local papers "Speak Up" column listed the major causes of human suffering: No.3, the Internal Revenue Service. No.2, the pain of childbirth. No.1, Microsoft.

Solar Spectrum Calculations

By Gerd Schrick, WB8IFM (P3d Team)

The Solar spectrum looks somewhat like the output curve of a transmitter plotted versus wavelength. However, there is a difference; our transmitter curve shows the output power we get tuned to any particular wavelength, while the solar spectrum indicates power provided at the indicated wavelengths simultaneously. In fact the labeling of the abscissa in watts per wavelength points to that. In Optics it is customary to use wavelength rather than frequency, of course, both are interchangeable. (see fig.1)

Anybody familiar with physics will recognize the shape of the spectrum as very close to a "black body" curve. The sun indeed can essentially be described as a **black body radiator at 6000 K**. In fact the graph (fig.1) includes the blackbody curve for 5900 K. At a recent presentation about radio astronomy, Ed, K2VEE related that one aspect of black body curves is, that they do not overlap and that the temperature completely describes the curve. We are extremely lucky to have the sun as a black body and not some other type of radiator. At 6000 K the main output of the sun is in the "visible" part of the electromagnetic spectrum. Indeed; one could say: what you see is what you get. This leaves the "radio spectrum", which is much lower in frequency, with only a small fraction of solar power. However, even this small part is enough to blot out our microwave signals, if the antennas are aimed at the sun. If you haven't tried yet, even on 10 m you can pick up sun noise; point your beam west into the sunset and listen.

Nature has designed our eyes (rx) to peak in the same range as the sun. So the sun provides, besides the heat that warms up the earth to a comfortable temperature, also the perfect illumination during the day. Even the reflection of the moon is enough so that 100 years ago, when night illumination just started and was expensive, one week per month around the full moon the street lights were turned off.

Fig.1 shows two solar spectra; one valid at sea level and the other as seen in space. The sea level spectrum shows power drops at a number of selected wavelengths. This is caused by the atmosphere the sun rays have to traverse and gets severe when the sun is close to the horizon. Beautiful, mostly red colored sun sets are the result. Only with a lot of attenuation, such as at sunset through a thin cloud layer, can you actually look at the sun. Last summer we watched a sunset like this at Lake Erie and I observed two things; a huge sunspot in the upper left corner and two small ones towards the center, and I could distinctly make out the sun as a sphere, rather than a disk, as it normally appears. The atmospheric influence makes it difficult to obtain good readings of the solar output on the ground. Looking straight at the sun around noontime in Orlando we measured 1.5 mA with one of our silicone photocells (Hamamatsu SK1226 BK) in early March and only 1 mA in early July. The drop in the reading caused most likely by the more humid air and possibly smoke from the Florida fires.

Let's calculate the total power density of the sun as received in space. Taking data from a table at .1μ intervals we come up with column2 in table 1. As an example: at .5 μ wavelength the power density reads .28 mW/cm^2 x.1μ. We choose a range of wavelengths from .4μ to 1 μ, which includes part of the near Infra red. In Order to get the total power density we have to add these power chunks, performing what is mathematically known as an integration. This simple calculation gives us 131.3 mW/cm^2. This value compares favorably to the recorded medium **solar constant of 1390 W/m^2** (=139mW/cm^2)*, which is slightly larger as it contains data beyond our selected range. This gives us confidence to proceed with our calculation to check the response of our solar sensors.. *

This power density obtained is for a receiver (photo cell) with a flat pass band. It is what we are accustomed to in our radios. However, our photocell sensors that do the sun tracking, have a changing sensitivity with frequency (fig.2), which we take into account in column 4 of our table. Column 3 figures the power impinging on the 5.5mm^2 of the photocell. The final (5^{th}) column gives us the resulting current which adds up to 1.94 mA of photo current in space. This compares to the 1.5 resp. 1 mA we measured in March and July at the P3d lab in Orlando

Once we account for all this, we can with confidence set the sensitivity of all 16 of the various sun sensors. To make sure we do not saturate any of them, we stay 10% below the maximum reading at full illumination. So you see, there is more to the sun than meets the eye.

* Using this constant we can get an estimate of the power received at the solar panels of P3d. There are 4 panels of 105.3 cm x 62.8 cm and 2 panels of 105.3 cm x 56.5 cm for a combined area of **3.3 m (35.5 sq ft)**. So we receive 4.6 kW of solar power. Converting 12% of this into electricity we have **550 Watts** available from the sun, with perfect alignment , of course.

From DC to Light or Faraday's Ice Bucket

by Gerd, WB8IFM

When 11years ago the Midwest VHF/UHF Society was formed there was some discussion about the range of frequencies we should be interested in. It was agreed upon to start with VHF but with preference for the micro waves. DC was set to 144 MHz. That led to some protests by the 6m crowd. We have since dropped the borders but generally kept our interest focused on VHF/UHF and the micro waves.

Occasionally, we go way up in frequency to infrared and light, and then we drop sometimes to the "low bands". However, at the last meeting (Oct 23) the Society reached a new "low". At that meeting Mike Brown, W8DJY gave us a marvelous demonstration on static electricity. He got everybody involved doing a number of simple but very instructive experiments using such items as a piece of plastic pipe, some scotch tape, a piece of string, and a paper clip. For rubbing the plastic we used the type of rough brown paper you find in public bathrooms. You keep rubbing until the pipe feels warm, you have then a static source for the experiments. The charge easily last 5 to 10 minutes, enough to perform neat experiments.

I was reminded of my college days long ago; the professor would walk around holding a charged glass rod and demanded to know what this meant. The answer, of course: "it's a current". Kind of surprising, because we all think first about a closed circuit with a voltage source...On another occasion, the professor would create currents over a large 4'by 4' copperplate by connecting feed points at the diagonal corners. He would then show us with two probes the voltage between different points on the surface

Mike made us feel like being back in school. He also built a real neat electrostatic sensor; an electrometer consisting of a Faraday ice bucket and a high input impedance op-amp. As indicator he used a center based micro-ammeter. (See article the next page).

Just a few weeks ago I had listened to Dave Olean, K1WHS, who, inspired by his son's science project, proceeded to build a magnetometer (see Oct. 98 newsletter). This, in essence, does the same thing with magnetism that Mike does with his electrometer and static electricity. I guess, I have to put this instrument on my "to build" list as well.

Where is static electricity important? With his simple set up Mike was able to draw small sparks which would indicate hundreds, if not thousands, of volts present. Static electricity can be a real (silent)killer for todays high density chips with very tiny distances between traces.

An Electrostatic Meter by Mike Brown,W8DJY

How the Charge Meter Works

A Faraday Pail, consisting of two concentric cylinders formed of sheet metal, is used in measuring charge of an object placed deep inside the pail. With all of the electric field lines from this charged object terminating on opposite charges induced on the inner surface of the inner cylinder, this induced charge is equal in magnitude to the charge being measured.

Charge Meter

A shielded wire connects the inner cylinder to the charge meter, which is designed around a very high input impedance (10E14 Ω) op-amp, Analog Devices type AN 795 KN, used as a charge sensitive amplifier in a current integrator

Fig. 2.

While a charged object is being inserted into the inner cylinder, like charge flows from the inner cylinder to the charge meter. Negative feedback in the op-amp constantly maintains zero potential difference between the non-inverting and inverting inputs; thus point x is maintained as a "virtual ground." It follows that there is no potential difference and no field between the inner and outer cylinders of the Faraday pail, and hence that the charge q(in) which has flowed to the charge meter is equal to the charge inserted deep into the inner cylinder. (Because of the gain of the amplifier, as well as the small size of stray capacitance (70 pF) and capacitance between the cylinders (38 pF) relative to C =.01μF, only a truly insignificant amount of charge is diverted from the charge meter.)

The voltage across the capacitor, which becomes the output voltage, *is* proportional to the charge Q that has accumulated on the capacitor Cf. The feedback operation of the op-amp ensures that Q *is* proportional to q(in). The zero centered microammeter should be connected in reverse to allow for the correct polarity to be displayed: a positive charge *in* gives a positive reading out. The integrator op-amp uses a supply voltage of $\pm$ 12 volts to allow for the measurement of either positive or negative charges.

If the charged object is removed from within the inner cylinder, the inner cylinder regains its electrical neutrality as charge returns to it from Cf, and the charge meter reading falls to zero. However if a charge is applied by conduction to the inner cylinder, it is transferred to Cf and it cannot be removed until Cf is shorted out via a 470 Ω resistor in parallel with it.

The charge meter is calibrated by using a 9 volt battery to charge a capacitor of 1 nf $\pm$ 1%, and then discharging the capacitor into the input of the charge meter. As Q = CV, the meters calibration adjustment can be set to read a charge of 9 nC. (C here stands for Coulomb, representing 6.281x10E18 electrons. The knob in Fig.1. is used to set this calibration.)

With no charge inside the Faraday Pail, the meter reading should be zero. This can be achieved by adjusting a 100 K potentiometer which is connected between the +- 12V power source, with its center tap in series with a 1 megohm resistor to the op-amp's non-inverting input.

One of the better attributes of this op-amp is its stability. With normal humidity conditions of 40 to 60%, little meter drift is seen with this circuit design. Nevertheless, after some 7 to 8 minutes the zero centering may appear offset because a small amount of charge accumulates on the inner cylinder of the Faraday pail, which puts a small charge on capacitor Cf of Fig.2. Again the meter is zeroed by discharging the capacitor.

Schematic Diagram of Charge Meter

The integrator was built into a “Bud box" 2 1/8 x 3 x 5 1/4 inches. S1a/Slb is a 2-pole 12-position rotary ceramic switch. The input was connected to a chassis-mounted BNC connector. A small 1 1/2 x 1 inch PC board was used to mount the 8 pin IC socket. Two ground lugs were mounted inside the box for ground returns and as points to which the PC board could be soldered for support. Two female banana plugs, one red and one black, were used to make the external meter connections. Three input wire leads, white, red, and black, were fed through a rubber grommet to supply the -12V, +12V, and ground from a power supply. The total current used (1.5 mA) is so small that batteries could be used in place of a power supply. The zero centering potentiometer is 100k, and the calibration potentiometer is 5k. The values of the 1 Meg and 5k resistors are important adaptations for this particular op-amp.

Faraday Pail

The Faraday Pail is constructed out of galvanized stove pipe. The outer cylinder is 8" in diameter and 9" high. The inner cylinder is 6" in diameter and 5 1/4″ high. Aluminum is used for the bottom enclosure of each cylinder; disks were cut respectively to diameters about 8 3/4" and 5 3/4". Around the circumference of each aluminum disk, small triangles were cut for tabs that could be bent upward to make a tight fit as each bottom is pressed into the corresponding cylinder. The inner cylinder is mounted so its top is level with the top of the outer cylinder. (A design improvement would be to make the top of the outer cylinder extend above the top of the inner cylinder, because the outer cylinder serves as an electrostatic shield to exclude E fields from charged objects nearby) The inner cylinder is supported by 6 each 1 1/2 x 1/2 x 1/4" Teflon blocks, drilled and tapped for 6-32 plastic flat heat bolts, between the inner and outer cylinders. Three of these blocks were mounted 120 degrees apart near the top, and three more near the bottom of the two cylinders. The outer cylinder bottom was secured with small wood screws to a 3/4" x 11" x 11" plywood base plate. A chassis-mount BNC connector near the front at the bottom facilitates the outer ground connection and feed through for the connection to the inner pail. -End-

Fat Dipole

by Gerd, WB8IFM

I don't know how we did it in the old days. I just had to repair a 2m dipole that I had mounted on the side of my tower at the 70' level. It had been up there for many years but recently the center insulator broke. This vertical dipole was to cover mostly the area in one direction (south) but also other directions to a lesser degree. Therefore I chose a distance to the tower which acted as a reflector of a little less than ¼ wavelength. To cover the entire 2m band I made the dipole a "fat"one. Usually you select an element diameter for 2 m in the order of ¼ to ½ ", here I used the same 1 ¼" diameter I was using for the boom, making this a "fat" dipole. This large diameter reqires shortening of the dipole. At the time I chose 19" for the dipole halves and 18" for the distance to the tower. The antenna worked quite well and I could access close to 50 repeaters with it. This time, however, I was reading the books and used a MFJSWR analyser for measurements.

Not much can be found as far as dimensions go. Rothammel's Antenna Book recommends to make the transition at the feedpoint conical and since the bandwidth is so enormous just cut it to approximately to 73% of the regular (thin) dipole. This would reduce the regular 20" to 14.6". In my experiments I came up with 16 5/8 ".

50 Ohms

Rothammel, 8th ed. pg. 77

Frequency

+

Range for a 1.5 SWR

19"	18"	17"	**16 5/8 "**	**½ dipole (l)**
122.4 ... 135.7	128.6 ... 142.2	136.2 ... 149.7	**139.0 ... 152.0**	**MHz**

The ’98 Leonides

We had an excellent Leonid meteor shower last night (16 Nov.) here in southern Arizona. Members of our local astronomy group (Tucson Amateur Astronomy Association) went to a dark sky site about 40 miles SE of Tucson last night. We were treated to probably around a total of 1000 to 1500 meteors (my estimate as we did not keep a good count) between about 1 AM and 6 AM (local). We probably saw about 30 to 40 Taurids both before and during the Leonid shower. The Leonids came in all sizes, mostly emitting a green glow. Many left visible ionization trails with the bigger trails being optically visible for about 30 minutes. For several hours the average was probably about 1 every 8 to 10 seconds with numerous occasions where up to 4 or 5 would be visible simultaneously. It was a great show and well worth loosing a night of sleep staying out in 34 degree F temperatures. Several of the bigger meteors would have been visible during the daylight and I talked to one individual that did spot one after sunrise.

Due to timing considerations, I did not have a radio so I cannot report on any successful meteor shower contacts, but conditions here looked very promising.

Larry, NW7N

Although visual sightings were for most of us **disappointing** to nonexistent, there was quite some activity on Meteor Scatter. Many stations were active on 6m, but most on 2m. Even small stations with power under 100W and single Yagis were successful. The peak of the shower, by the way, came about 17 hours earlier than predicted. Below, you find a report from some 2m MS! (ED)

Leonids APRS Packet Results

By Bob Bruninga <bruninga@nadn.navy.mil> Wed, 18 Nov 1998

I built an APRS MAP backup file of all of the MS packets detected and it can be loaded into APRSdos to see the results. But for those of you without APRS, here is a text summary of the Leonids MS event:

To summarixe the map, there were 2 north south reports between CA and WASH, None across the continental divide but WD0E in Denver and N5TAM in Texas saw packets from Alabama. All the rest of the calls were scattered east of the mississippi and from Florida to Canada for a total of at least 35 reports and at least double that many total packets.

N2NRD /170622z <= seen by WA4HEI 720 mi
N2NRD /170537z <= seen by N8QLT 469 mi
N3OBQ /170622z <= seen by WA4HEI 681 mi
W3ADO-2/170653z <= seen by K4RS 821 mi 23 times
W3ADO-2/170653z <= seen by KE4CUA 651 mi
W3ADO-2/180718z <= seen by WA4HEI 690 mi
K4RS /170655z <= Seen by W3ADO 821 mi twice
K4RS /170655z <= Seen by W2EV 1100 mi twice
K4RS /170800z <= Seen by N3ZLL 871 mi twice
WA4HEI /.....z <= Seen by W2EV 462 mi
WA4HEI /.....z <= Seen by N3ZLL 690 mi
WA4HEI /.....z <= Seen by N2NRD 720 mi
WA4HEI /.....z <= Seen by N3OBQ 680 mi
WA4HEI /.....z <= Seen by N3OZB 680 mi
WB4RXZ /170400z <= Seen by N3ZLL 437 mi
WB4RXZ /170400z <= Seen by KB4LCI 350 mi
W0IBM /.....z <= Seen by W2EV 740 mi
W0IBM /.....z <= Seen by KE4CUA 1185 m
W2EV /17....z <= Seen by WA8INZ 866 mi
N3UYI /170537z <= Seen by N8QLT 537 mi
N3OBQ /170536z <= Seen by N8QLT 536 mi
VE2DWE /170825z <= Seen by N8QLT 560 mi
VE2DWE /17????z <= Seen by KA1LM 535 mi
N2QAE /170936z <= Seen by N8QLT 456 mi
K7RR /171500z <= Seen by WA7HRA 1000 mi
N8DEU /17????z <= Seen by N5TAM 670 mi
N8DEU /171415z <= Seen by WD0E 1071 mi
N8DEU /1811??z <= Seen by N3OBQ 670 mi
N8DEU /1811??z <= Seen by W2EV 757 mi
N8DEU /18????z <= seen by K4RS 621 mi
N7HXP /17????z <= Seen by KF6QNC 689 mi
N3OZB /180530z <= Seen by WA4HEI 690 mi
N8QLT /??????z <= Seen by W2EV 296 mi
KC8CSD /??????z <= Seen by W2EV 304 mi

VE2DWE /??????z <= Seen by KA1LM 535 mi

HISTORY OF MVUS

Here's an article that was found deep in the archives of someone's home the other day and I would like to pass it along to everyone else. This is the way it was presented in its entirety on the last page of the
The National 220 MHz Newsletter, Volume 10, #6 dated December, 1987

MIDWEST VHF/UHF SOCIETY FORMS

A new, apparently regional weak signal group has formed in Southwestern Ohio.

Called the Midwest VHF/UHF Society, the group seeks to increase support for weak-signal work throughout the eighth, ninth, and northern fourth call districts.

Some of the participants include W8JJR, Terry WD8ISK, Axel N8AXA, Mike WB8IFP, Joe WA8OGS, Gerd WB8IFM, and Steve KA8IFC, most all from the Dayton/Cincinnati area.

Just some of the activities being looked into by the group include the DXpeditions to rare grid squares, an award for "Worked All Ohio Counties" Award, a six meter net, a ten meter net, a TVI committee, an OSCAR committee, promotion of existing VHF/UHF contests, and various activities for the Dayton Hamvention, including a re-birth of the antenna measuring and noise figure competitions, neither of which have taken place in a couple of years.

If you are interested in becoming a part of this organization, you may find out more by writing to The Midwest VHF/UHF Society, c/o Terry Netzley, W8NJR, 1821 E.Troy-Urbana Road, Troy, Ohio 45373.

Please Note: If you are really interested in becoming a member, do not contact Terry as listed above, this is an old article and is no longer taking care of membership. Please see below for current information.

Steve, KB8UHY

The Midwest VHF/UHF Society brings together hams with strong interest in building and experimenting at the higher frequencies including microwaves & light. The society provides exchange of ideas with monthly meetings and a technically oriented newsletter (called Anomalous Propagation). Noise figure and antenna measurements are performed at the Hamvention or on demand. Building projects are undertaken and surplus or special parts are procured. The society has presently 100 members, most from the tristate area (OH,KY,IN) but also from other parts of the US and the world. Why don't you join us, membership is $ 8.- per year (foreign $ 15.-).

Mail your check with name/call, address & telephone number to:
Gerd Schrick, WB8IFM, 4741 Harlou Dr. Dayton OH 45432.

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