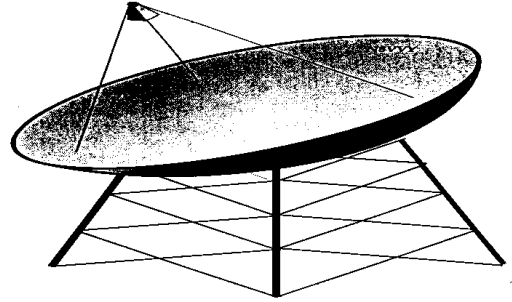


Anomalous Propagation

The home page of

The MIDWEST  
VHF-UHF  
SOCIETY



Vol. 16 No. 9

November 2002

### Club Memorial Call W8KSE

Our **November Meeting** is on Fri. 28<sup>th</sup> at 7:30 PM at the Perkins Restaurant at SR 73 and I-75.

Discussion Topics: Christmas Party.

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 90 members, most from the tristate area (OH,KY,IN) but also from other parts of the US. Why don't you join us, membership is \$ 8.- per year (foreign \$ 15.-). Mail your check (made out to Gerd Schrick) with name/call, address & telephone number to: Gerd Schrick, WB8IFM, 4741 Harlou Dr. Dayton OH 45432.

The Society meetings are on the 4th Friday of the month at 7pm except for May, July, and December when the Hamvention, Central States Convention and the Christmas Party take their place. The meetings are held at the Perkins restaurant located at the NE-corner of I-75 SR 73.

The Newsletter appears monthly except for May, July and December.

Officers for 2002/2003: President Tom Holmes, N8ZM (937) 667-5990  
Secretary Steve Coy, K8UD (937) 426-6085  
Treasurer Gerd Schrick, WB8IFM (937) 253-3993



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**Anomalous Propagation** is the monthly newsletter of 'The Midwest VHF/UHF Society', and subscription is part of the annual dues of the Society which is **\$8.-**, payable by check or money order to:

Gerd Schrick (WB8IFM)

Besides news directly relating to the Society's activities, 'Anomalous Propagation' carries technical articles written by experimenters in the frequency range from VHF through light. Featuring reprints of work being done in other parts of the country with publications that we have exchange agreements with. Occasionally we have commercially produced equipment reviews, but the overwhelming majority of our equipment articles concern work done by hard core home-brewers.

Many articles are tutorial in nature, and occasionally there are results of various operating or construction competitions that many of the Society's members engage in.

The Newsletter appears monthly except for May, July and December.

**Achtung ! Check your label for dues payment !**

**De N8ZM**

Thanks to **John Ackerman, N8UR**, for an excellent and informative presentation at the last meeting. Frequency measurement is an interesting technical problem, and John provided a lot of insight into how to do it well.

We discussed plans for the **VHF/Microwave Forum** at Hamvention 2003. **Red Dakin, W8ULC**, is taking the lead on getting speakers lined up. He is off to a good start, but would appreciate some help with pulling it all together. It looks like the time slot will be a three-hour block on Saturday afternoon. One of Red's ideas is to have the MVUS guys who built the 10GHz white boxes bring their setup's to show the different ways to achieve the same end. Although the time available in the forum would be short, all felt it was a very good idea and an opportunity to show off the talent we have in MVUS. I am excited about seeing this come together!

We want to have another general-purpose tech session for things like checking frequencies, noise Figure, IMD tests on IFs and the like. **Mike Suhar, WB8GXB**, offered to help organize the event, to be held sometime over the Christmas holidays. **John Ackerman, N8UR**, also offered to have it at his home so that we could take advantage of his very accurate frequency reference setup. We'll talk more at the next meeting, I'm sure. One thing that helps a lot is if we know what frequencies and tests you guys want to work with. With Mike's help, I am hoping we can be better organized and prepared than in the past, so that there is less waiting for your turn. John's location in Oakwood is also more centrally located. So please come to the meeting with inputs for Mike to use in planning this event.

The 10 GHz beacon, it turns out, was having a problem, which is why Bruce Lundy, KA8EDE, couldn't hear it at the base of the tower. All is well now, I believe, and a few of the guys have heard it. We decided to go ahead with N8UR's proposal to get the HP GPS frequency standard to use as a reference for the beacon frequency, and it may have very precise 1-second time hacks as well!

10 GHz in the VHF contests is another possibility that we explored. The experiments in the September contest showed that the rigs need to be about 50 feet above the ground at the contest site we use near Urbana. There are enough nearby trees that the additional height is desirable. While I doubt that we'll have anything in place for the January test, nor would I expect to find too many hardy souls wanting to brave the wind and cold to play on a tower, I think the June test is a good target for getting some things in place. By then, we hope to have a third tower in place that can provide a fairly easy way to mount and aim the microwave antennas.

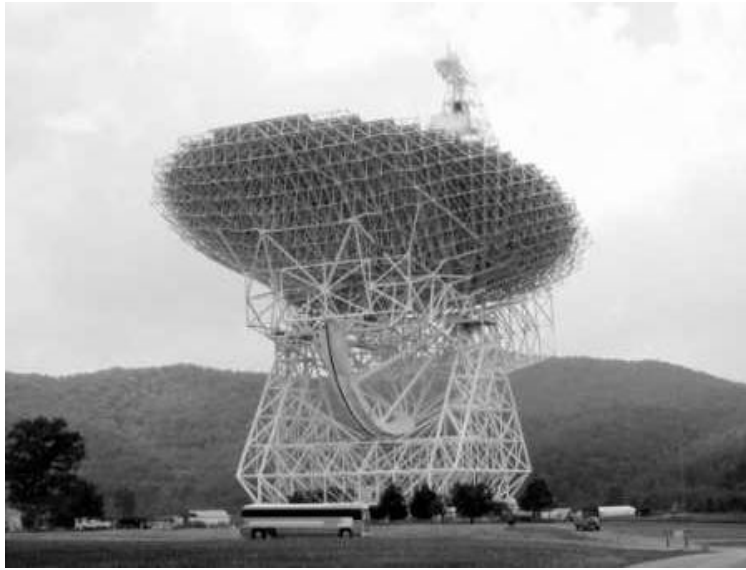
Well, enough for now. See you on Nov 22<sup>nd</sup> and at the Christmas Party on the 27<sup>th</sup> of Dec.

**Tom, N8ZM.**

## This and That 11/12-02

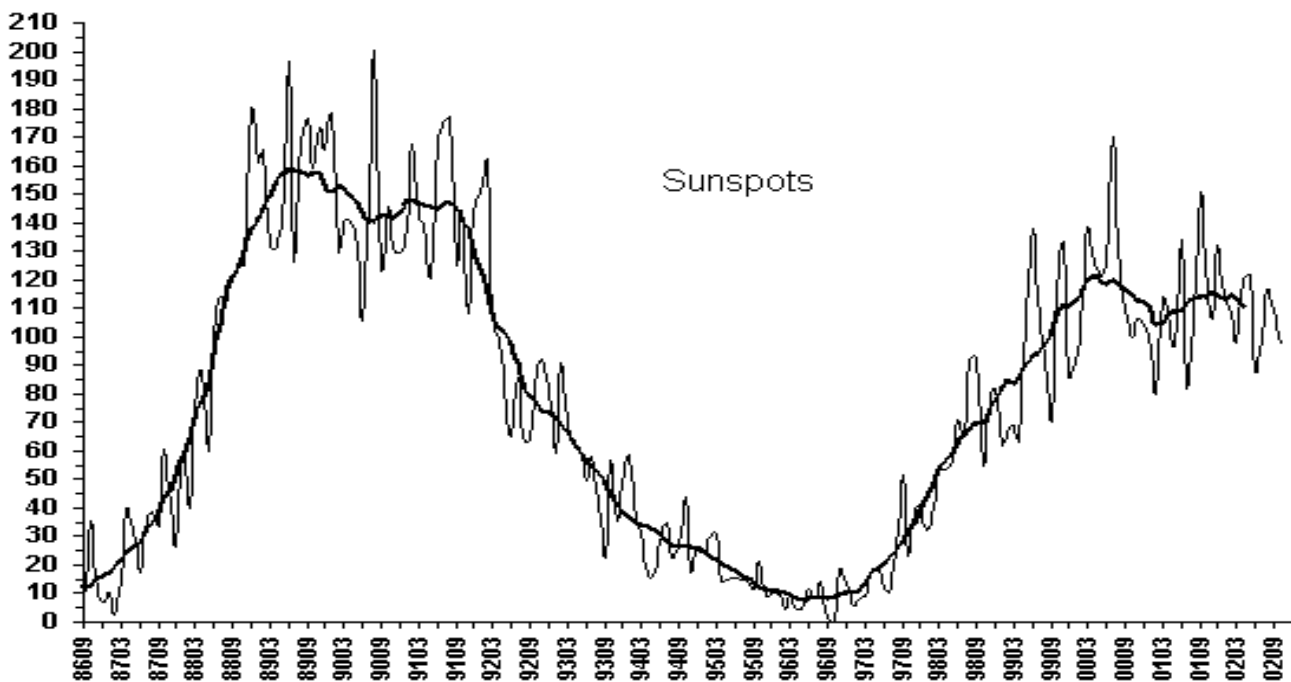
- **MVUS.** The Midwest VHF/UHF Society continues to exist as a tax-exempt organization. We just received a certificate from the State of Ohio that says so. Every 5 years or so we have to reaffirm our existence to the State by sending in \$ 25.
- **Wireless Internet.** San Diego has done it again. You can now access the Internet from anywhere in the San Diego area using a portion of the 2.4 GHz band. Years ago, parts of this same area were among the first to have experimental wideband glass fiber connections. [K8UD]
- **Lost in the Woods.** ... "And if you get lost, don't ram around, but sit down and wait, and somebody will come and find you. It's irksome to have a lost person who keeps trotting around so you can't catch him." [John Gould]
- **Doing Research.** "Just because something doesn't do what you planned it to do doesn't mean it's useless" [Thomas Edison]...and "Research is what I'm doing when I don't know what I'm doing." [Werner von Braun]
- **Verticals.** "Vertical Antennas, compared to horizontal antennas, radiate equally bad in all directions." [KF4TP]
- **Noisy Signal.** Watching the "World Series" I noticed a very strong background noise, pretty much like white noise. On closer examination I found the source of this "white noise". Seemed like half the fans had a pair of oblong balloons that they were beating against each other creating a sound pulse. Add maybe 20,000 together and you have the perfect noise generator. [WB8IFM]
- **Cell Phone Mania.** There was a "fan camera" at the "World Series" also and occasionally you could see what the fans were doing. "One shot settled on five fans. Four of them were talking on their cell phones. A Nokia moment. Not sure what was wrong with the other guy..." [D.L.Stewart]
- **Bytes in Space.** Glenn's Mercury spacecraft flew without any computer. The two-man Gemini orbital missions carried computers with about 16 Kbytes, and the Apollo Lunar flights had computers with all of 128 Kbytes in both the command and lunar modules. [Electronic Design Magazine]
- **Commuting Bicycle.** It's been a long time since the bicycle was used for its intended purpose. Consequently, all you could get was gimmick type bikes: uncomfortable saddle, thin tires pumped up to twice the pressure of automobiles, 20 or more gears and so on...Now the "comfort bike" is making a come-back and it has the long forgotten essential of a bike that serves you. It has lights, locks, suspension (they probably mean fat tires pumped up not too hard), fenders (to keep the dirt away from your clothes) and even a bell (so you don't have to shout "On your left!") [Newspaper]
- **March of Technology.** Newer products are not always technical progress. The marketing people and the CEOs try often to increase revenue by aiming for higher ARPU, which stands for "average revenue per user". The cell phone merchants think about this day and night!
- **Bones.** "Parents are the bones on which children sharpen their teeth." [Peter Ustinow]
- **"Insanity ...is inherited. You get it from your children!"** [Erma Bombeck]
- **"Stuff ... ought to work!"** [James Cummings / Home Life]

## The New Green Bank Radio Telescope



A bus parked nearby gives an idea of the size of the newest instrument at Green Bank: a radio telescope so massive the Statue of Liberty, including the pedestal, could lie down on its blindingly white observing surface with room to spare. Its 43-story height and 16 million pounds of tilting, turning mass make it the largest thing on land that moves. Welcome to the National Radio Quiet Zone. Feel free to shout, play the tuba or let out a primal scream. Just don't think about using a microwave oven. One stray zap from a microwave -- or a car's sparkplugs, or even an electric blanket -- in the heart of the 13,000 square mile zone could interfere with science at the National Radio Astronomy Observatory at Green Bank, a patch of forested Appalachia just west of the Virginia border. (Reuters - Handout)

## Solar Cycles 22-23



# Amazing Numbers...and Phase Three Is Marching On

By Gerd, WB8IFM

For years now, there have been quite a number of ham satellites aloft. Actually, it has been difficult for a ham interested in satellites to really keep track of what is going on in this arena. When asked about the number of active ham satellites, I have been telling 20, give or take a few. So, recently while preparing for a talk about satellites, I dug into this question a little deeper and in the process learned some surprising facts.

Starting on 12 Dec of 1961 with OSCAR 1, there have been 62 ham satellites launched to date. Of those 27 are presently active, sure an impressive number. They offer us a wide variety of options from analog, old-fashioned radio contacts over a few thousand miles across the North American continent to contacts worldwide. Many of the satellites are using packet, a natural for low orbiting birds that might be "visiting" several times a day for short periods. Look at them as flying mailboxes providing packet mail and bulletins from one end of the earth to the other, usually twice a day.

In 1980 the first of the so-called phase 3 satellites, P3a, was launched, but the carrier rocket exploded and the satellite fell into the ocean. In record time a substitute was built and launched three years later. This satellite became known as OSCAR-10 and it provided for the first time worldwide coverage for multiple users for many hours a day. Using transponders that were applying one band for uplink and another band for downlink, simultaneously transmitting and receiving, you were able to listen to your own signal and have a conversation like on the telephone. Even a number of hams could talk to one another in a conference type arrangement. This was made possible by an on-board rocket engine that was capable, after release from the carrier rocket, to move the satellite into a high inclined elliptical orbit.

OSCAR-10 did not achieve the ideal phase 3 orbit, the inclination was 27 degrees instead of the desired 64 degrees, but the bird was a great success, got me into satellites, and is partially useful to this day.

The next phase 3 attempt, P3c, became Oscar 13 in 1988, the most successful dx bird so far with an inclination of 56 degrees. Unfortunately, at launch the constellation of sun and moon added some pull that caused, over the years, the perigee to shrink, eventually leading to its burning up in the atmosphere by the end of 1996.

At that time, the next phase 3 bird was still under construction. This P3d was a very ambitious project and many hams involved spent a large part of their life on it. I was privileged to help out just a few months with the construction and testing of this bird. So expectations were high when it was finally launched in 2000. Christened OSCAR 40, operation was not expected for at least another year. However, trying to maneuver it into the desired orbit, a few things went wrong with the on-board rocket, keeping the satellite from achieving the proper inclination. The present orbit is useable and stable for at least the next twenty years, but the shallow inclination gets it into deep eclipses twice a year, which prevents operation for several weeks each time. Oscar 40 was unceremoniously opened for use in the spring of 2001.

What is on the horizon? Here is the next surprising number. 26 satellite projects are being pursued at the present time. Of those, two are of the phase 3 category.

Project "Eagle" is pursued by AMSAT-NA; it strives for a geostationary transfer orbit similar to Oscar 40. A small engine, like the arc jet on AO-40, should provide some maneuverability. The eclipses will be combated with extra solar panels. Three transmitters and three receivers are planned. Launch is conservatively planned for 2006.

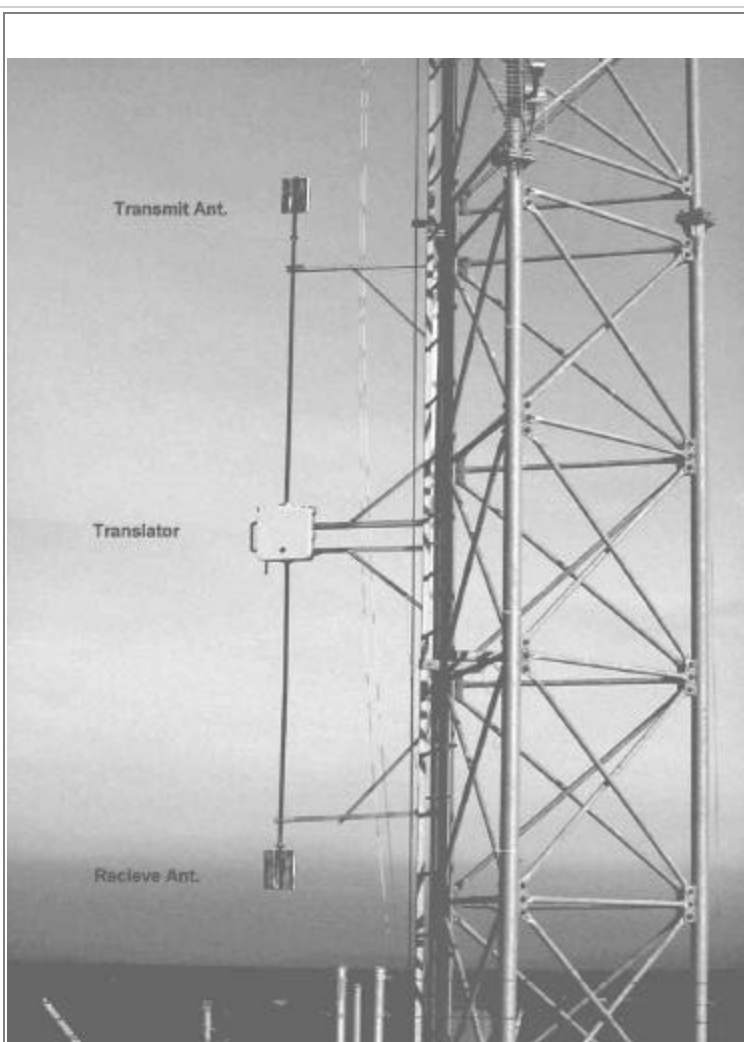
A more ambitious project, labeled P3e(xpress), is planned by AMSAT-DL. This bird is along the lines of P3d but smaller and with fewer transponders. However, labeled as a test bed for a later planned Mars mission (P5a), it has the full size rocket engine for significant orbit changes just like its predecessors. It is called express since its launch might be as early as 2004 on an Ariane 5.

# 10 GHz Linear Translator (from Web)

By Gary, AD6FP

On April 7, 2002 with help from Lars AA6IW we installed a 10 GHz linear translator at the site of the Stanford Amateur Radio Club W6YX (CM87wj). This site will only be used for initial testing and burn-in of the translator. After initial testing the translator will be relocated to a higher peak such as Monument Peak (CM97bl) or Mission Peak where the coverage area should be considerably better.

The translator is mounted on a leg of the W6YX east tower, the transmit antenna is on top and the receive antenna is on the bottom. 11 vertical feet providing over 100 db of isolation between them separate the antennas.



The noise floor of the receiver is set 20 db below the beacon power. It's quite likely that most stations will be able to hear the 40 KHz wide passband noise of the receiver. Several of the translator parameters can be remotely controlled over the 440 MHz FM control link:

Power Consumption  
48 volts, 0.7 amps

Input Frequency Range  
10368.608 - 10368.648 MHz

Output Frequency Range  
10369.208 - 10369.248 MHz

Maximum Output Power  
500 milliwatts

Beacon Frequency : 10369.208

Beacon Power : 50 milliwatts

Rcv. and Xmit. antenna gain : 10 dbd

Control Link : 440 MHz FM / DTMF

Location : CM87wj 525' asl

System Gain (including antennas)  
> 130 db, 60 db agc range

Transmitter On / Off

System Gain High / Low ( >130 db / > 90 db )

Receiver On / Off

2nd LO

Translating / Non-translating

Transmit power High / Low (500mw / 50mw)

## Report from Microwave Update 2002

By Brad Totten, K4EFD

I attended Microwave Update 2002 October 24 - 27 in Enfield, Connecticut at the Radisson Hotel. The North East Weak Signal Group hosted the conference. In addition to being a very informative session it was like a homecoming for me. I got to see many of the fellows again that I had met in the past during 10 GHz and Up contests in New England and I got to meet for the first time some of the fellows that I had talked to on microwave but had never seen in person.

The trees in Connecticut were at their peak with the colors of fall and the temperature was about 10 degrees below normal, which made for a beautiful and brisk backdrop for the event. There were about 200 people in attendance with hams there from Australia, Belgium, Columbia, England, France and Japan.

One of the highlights of the updates for me is the various technical presentations. There were 15 of these at this year's update three of which I found especially interesting.

Bill Seabreeze, W3IY, gave a presentation entitled "Rover Observations and Comments from the Mid-Atlantic". Bill has outfitted an Astro van with equipment for the 12 bands from 50 MHz to 47 GHz and is one of the best rovers in the eastern part of the US. His website at <http://members.fcc.net/wseab> is excellent.

Brian Justin, WA1ZMS, gave a presentation entitled "An Example of Gear for the 241 GHz Amateur Band". Brian has operated on all ham bands from 1.8 MHz thru 322 GHz and holds the current world DX records for 145 and 241 GHz. More information on this can be seen at [http://www.mgef.org/zms\\_241.htm](http://www.mgef.org/zms_241.htm).

Joe Taylor, K1JT, gave a presentation on "WSJT & JT44". Joe is the holder of a Nobel Prize in physics and astronomy for his study of pulsar stars at the Aricebo radio telescope. Joe's DSP software is very useful in meteor-scatter and EME communications for copying those weak signals that are undetectable by human ear. His software is available free of charge at <http://pulsar.princeton.edu/~joe/K1JT/>.

A 384-page book containing a written summary of each of the presentations plus lots of other information may be obtained from the ARRL. Ask for publication 8764 entitled "17th Annual Microwave Update 2002 and the 28th Eastern VHF/UHF Conference".

Next year's Microwave Update will be held in Seattle, Washington on September 25 - 28, 2003.

### Rocket Engine Thrust (NASA)

The "strength" of a rocket engine is called its **thrust**. Thrust is measured in "pounds of thrust" in the U.S. and in Newtons under the metric system (4.45 Newtons of thrust equals 1 pound of thrust).

A pound of thrust is the amount of thrust it would take to keep a 1-pound object stationary against the force of [gravity](#) on Earth. So on Earth, the acceleration of gravity is 32 feet per second per second or 21 mph per sec.

If you were floating in space with a bag of baseballs (at one pound ea) and you threw one baseball per second away from you at 21 mph, your baseballs would be generating the equivalent of 1 pound of thrust. If you were to throw the baseballs instead at 42 mph, then you would be generating 2 pounds of thrust. If you throw them at 2,100 mph (perhaps by shooting them out of some sort of baseball gun), then you are generating 100 pounds of thrust, and so on.



## EM89ap 10 GHz Beacon on the Air

By Bruce Lundy, KA8EDE

The 10 Ghz. beacon is up and running. John, N8VZW, has been able to receive it in several places around the Miami Valley. Here is his list with locations and approx. miles: I-675 / 35 (10), I-675 / 235 (12), 4 / 235 (14), I-75 / I-70 (19), I-75 / 725 (15).

Brad, K4EFD, combined a brick oscillator, 10,368,750 kHz (nominal), with a homebrew 16-slot waveguide antenna. The brick's output is approximately 50 milliwatts. This assembly is mounted inside a neat weatherproof radome, which is mounted on the side of my tower at the 89-foot level opposite of the 903 beacon. See photos below!

I took the keyer output from the 903 beacon over to the 10 Ghz beacon. That key line shifts the 10 Ghz

signal approximately 5 Kc. The beacon information is: "de ka8ede/b em89ap Xenia, Ohio ar. Time intervals are 36 second cw message, 15 second steady carrier, then 30 seconds off, then auto reset.

The location is 1 mile south of Xenia: **EM89ap** = 39<sup>0</sup> 39.10' N Lat., 83<sup>0</sup> 56.20' W Lon.

The ground elevation is 985' MSL, putting the the beacon at **1074' MSL**.

Please forward your reception reports to Gerd, WB8IFM, for publication in our newsletter.

