

**November Meeting:** Friday, the **28<sup>th</sup>**, the day after Thanksgiving at 7:30 PM at the Perkins Restaurant at the NE segment of I-75 and SR 73. Program: Report from Microwave-Update (Hear about what you missed!) and planning for the X-mas Party and Hamvention..

**December Meeting:** X-mas Party, Friday, the **26<sup>th</sup>**, the day after Christmas at 7:30PM in the basement of the Huntington Bank in Springboro. Intersection of SRs 73 & 741. This is a **family affair**. Pizza will be on the menu, approximately \$4.- per person (\$3.- per child). Bring some cookies or other item for dessert. The Society will provide drinks.

### Contents

De N8ZM.....	3
This and That.....	4
Big Ear - End of an Era.....	5
Impressions from the Microwave Update Conference.....	7
Microwave Update Bits.....	8
Noise Figure Measurements from Microwave Update.....	9
Parabolic Dish Antenna Setup.....	10
ATV-Repeater System in Dayton.....	11
Meteors, Where, When, Why.....	12

### Upcoming Events

**ARRL January VHF Sweepstakes 17...19 Jan 98**, see QST/Dec97, pg 104

**12<sup>th</sup> SW Ohio Digital Symposium 17 Jan 98**, on the Campus of Miami University, Middletown (Thesgen Hall),  
Contact: Hank Grebe, N8XX, 72277.706@compuserve.com

### Books Available

**Microwave Update 97 Proceedings** \$ 13.- postage paid from Tom Whitted, WA8WZG, 4641 Port Clinton E Rd. Port Clinton OH 43452

**UHF-Compendium Part 1&2 and Part 3&4** \$ 29.-ea postage paid from Gerd Schrick, WB8IFM, 4741 Harlou Dr. Dayton OH 45432.

**De N8ZM**

**Microwave Update** was an absolutely fabulous conference. Tom Whitted ( and all the folks who helped him) put on an awesome conference. OK, I'm easy. Hey, it was my first time! Everything came together smoothly, the conference center was a pleasant place to stay and attend meetings, and everyone was there to have a good time. Although we didn't stay to eat, we did get out to Tom's house at BBQ time, and it was tough to leave. If the smell of food wasn't enough to make me drool, his station shows the results of a lot of hard work by a serious VHF/microwave enthusiast. Thanks for a great time, Tom.

**Xmas party:** We will talk about this at the next meeting. Our natural Friday is the day after Christmas, so folks will no doubt be a bit ragged, but I'd still like to have a little social gathering for the families.

**Big Ear's** receivers were finally turned off on 18 October and the Microwave Update tour group got to see the last box with recording paper. Gerd organized another tour two weeks later (only 4 guys from the club went) and that was the last chance you had. At that time all the useful stuff was removed and big pieces of screen cut out to be cut up in  $\lambda$  pieces (21cm) for distribution as souvenirs. Now the planning on the follow-up project "Argus" can begin in earnest. There was talk about a site near Wilmington. For a while our people helped with the "tear down". More about Big Ear on page 5 where you find an article written by Harry Kitchen, one of the "Big Ear volunteers". Harry was a ham at one time and we hope we can convince him to become active again.

**Web page:** Steve, KB8UHY just created a web page for the Miami Valley FM Association and he has offered to do the same for our society. I think it would be a cool (everything cyber is described as cool) thing to have, to promote MVUS and to communicate with our members and potential members around the continent.

**Hamvention booth:** The paperwork came the other day to sign up for our booth space, which I promptly did. I need volunteers to set up and man the space, as well as take it down on Sunday. Hamvention is making some changes in the floor plan, and I don't have any of those details yet, but I expect that we will be in about the same location as last year.

**Hamvention VHF Forum:** It's time to get the moderator(s) identified and initiate contacts with potential speakers. We may be under some pressure this year to change the time and even the room size available to us, so a good offense and early commitments are in order. I will not be able to exercise as much influence this year as I am not on the forums committee, so we'll have to simply be the early birds.

At the **Upcoming Meeting**, the day after Thanksgiving we will have a Program Review of Microwave Update by the survivors; also discussion of Xmas party plans, etc.

73 de Tom.

Happy  
Thanksgiving

## This and That

- **Big Ear** catalogued about 20,000 radio sources in the part of the sky it could see (70% of the total sky). How does this compare with the total number of stars catalogued so far? There are close to 500 million stars and galaxies catalogued on 388 CD-ROMs in the US Naval Observatory.
- **Yak Yak.** What can you say in 6 seconds? The xyl came home with this little toy that some kids wear as a pendant around their neck. It records and plays back by the push of two buttons. Actually it is called Yak back, but she called it Yak Yak. It has an ingenious way of controlling volume: “to increase volume yak louder!” it says on the box.
- **Cyber Communication.** To reach a friend a few blocks away, I have to type 38 letters that mean nothing, a numeral, two underlines, an ampersand, a hyphen and two periods, all in a uniform, dotty sequence that will go nowhere if I add a single space or omit a stroke. ( Pico Iyer, Time)
- **A Half Million Watts.** This is what WLW at one time was radiating on medium waves. “Standing near the base of the huge antenna tower, it was possible to draw sparks by touching the person beside you. If the spark could be maintained you could hear the music or speech being transmitted.” (John Kraus, W8JK)
- **Radio Sources** (in space) emit such enormous amount of energy as to boggle the mind.... The energy emitted by one radio source in one millionth of a second could fulfill all of man’s energy needs for a million years at a million times the present level! (John Kraus, W8JK)
- **Better Mousetrap.** 100 years ago the world would beat a path to your door. In today’s world “marketing” is the biggy: you better have a “better mousetrap company”. (Richard Chereton)
- **GPS-RX.** Just in time for the Christmas Season a GPS receiver appeared on the market for under \$ 100.- It’s from Magellan and called GPS Pioneer. Available from Cabela’s in Nebraska, (800) 237-4444.
- **Are Computers Improving Work?** “Much of the time saved by automation is frittered away by software that is unnecessarily difficult, unpredictable and inefficient.” (Scientific American, July 97)
- **New and ...** What do you expect when you see these words? “Improved”, of course, “New and Useless” doesn’t have quite the same ring. (Leonard Pitts)
- **Glow in the Dark.** When I first became a ham, radios were big metal boxes full of tubes. They glowed in the dark and were beautiful to see. (WB4HUM)
- **Listen, smile ...** and do as you please. The good Lord gave you two ears so comments like your mother’s can go in one and out the other. (Ann Landers)
- **Take this Job ...** Janet Reno, the Attorney General, just has the desire to get a little truck with a stove and a cot to drive around and see the back country of America.
- **Stock Market.** “Over a long weekend, I could teach my dog to be an investment banker.” (Herbert Allen)

- **The Magic of Radio.**” There is nothing to connect you - no telephone wires, no computer modems - just air, yet you are linked with someone on the other side of the world.” (David Sumner, K1ZZ)

## Big Ear -- End of an Era

By Harry Kitchen x-W8HOG

On Saturday, October 18, at 11:23 am, in the presence of a handful of volunteers at the Big Ear Radio Observatory in Delaware County, Assistant Director Bob Dixon W8ARD pressed the HALT button on a PDP-11/23 with little ceremony. This simple act brought to a close decades of nearly continuous monitoring of the sky at 1420 MHz by a radio telescope the size of three football fields and a rich history of engineering and astronomical success. Years of fruitful signal acquisition for radio astronomy and the search for extraterrestrial intelligence (SETI) are giving way to an expanded golf course and condo development.

The brainchild of Director John Kraus W8JK (yes, the inventor of the 8JK beam), Big Ear was conceived as a way to move a narrow beam (8 x 40 minutes of arc) around the whole sky without the cost, unreliability and safety hazards of a monster movable dish. A tiltable 30 x 120-m reflector took care of the declination, or vertical steering, and the rotation of the earth scanned the sky in the right-ascension, or horizontal direction, typically three days per complete scan. A fixed parabolic reflector and dual feed horns focused the beam into a pair of low-noise amplifiers multiplexed to YIG preselector, and a variety of filter banks over the years allowed detected-signal resolution down to 1 Hz. Thanks to the magic of digital synthesis, the local oscillator even maintained Doppler compensation that matched the motion of the center of our galaxy!

Big Ear contributed two major sky surveys to the astronomical literature, and even now the Hubble Space Telescope is acquiring objects near the edge of the viewable universe that were first spotted by Big Ear! The crowning achievement in the SETI domain to date was the 1977 discovery by Jerry Ehman of a coherent signal in Sagittarius, which has been dubbed the Wow! signal because of its remarkable strength and absence of earth-based motion (and because Dr. Ehman wrote "Wow!" in the margin of the printout when he first saw it).

Even as the telescope nears demolition, plans are on the drawing board for the Big Ear Argus array, comprising thousands of low-gain antennas with digital beamforming, so the whole sky can be visible at once. Based on OSU thesis research by Jim Bollinger and Chief Engineer Steve Brown, the first prototypes are expected to use crossed bowties at 611 MHz – the original UHF channel 37 that has been re-allocated to radio astronomy. Big Ear volunteers are in search of land, labor and capital to bring Argus to "first light" -- an astronomer's term for the initial entry in the logbook.

Thanks to the footwork of Gerd Schrick WB8IFM, Big Ear volunteers recently hosted members of the Microwave Update Conference, the Midwest VHF-UHF Society and Dayton area hams in separate tours of the facility. The mesh of the flat reflector is being cut into one-square-wavelength pieces (you do the math!) to be exchanged for contributions toward the Big Ear Argus project.

Those interested in contributing to Big Ear's continued development (including those who carted off pieces of mesh during the tour) can make tax-deductible donations payable to NAAPO (North American Astro-Physical Observatory), and send them to Dr. Philip E. Barnhart, NAAPO Coordinator, Dept. of Physics and Astronomy, Otterbein College, Westerville, OH 43081. Those interested in keeping track of Big Ear progress can view its Web site at <http://www.bigear.org>. Quoting Volunteer Ang Campanella, "the next generation of SETI researchers is here." And the continued search for extraterrestrial signals just has to be the ultimate in UHF DX!

Turn page for a picture and graph.

## **Impressions from the Microwave Update Conference At Sandusky OH, 24,25 October 1997**

As our president already mentioned (de N8ZM) the conference was a smashing success! There were 124 attending the conference including a few from foreign shores, and 138 signed up for the BBQ. (figure that)

This being after the tourist season there were only 4 xyls, but they had a good time seeing the various local attractions. The winery on Put-in-Bay , an off-shore island, got high marks! Although we were only a few miles from Lake Erie we never found the time to see the water. The sun made a few appearances but it was generally overcast, rather cool with here and there some sprinkles.

There were few “tourists” around and our group had practically the run of the huge holidome type Holiday Inn. Prices were reasonable too and included breakfast and lunch so you could stay on the premises and not miss a thing. For two full days one excellent presentation followed another. We did miss out on the “tour of the surplus places” on Thursday and came late for the first presentation by Jim, WB9SNR about “rovering”, but everything else we took in! \*

It was even hard to get away during breaks, as per the old tradition prizes were drawn and everybody got something. Of course, if your number was called early you had the pick of the crop. Mike, N8QHV and Red, W8ULC were among those. More prizes were offered at auction also taking place during the breaks and masterly conducted by Joel, W5ZN who must have been a horse trader in his former life. Under his reign even certified boat anchors were bringing in a few bucks. All the prizes were donated by companies or individuals and the proceeds from the auction went to the organization. The whole auction was great fun and sometimes took the air of a comedy show and made everybody laugh. I got into the spirit, bid on a dummy load and actually got it.

Friday night there were the fleamarket and the noise figure measurements. You find the results on page 9. Saturday night was the barbecue (an excellent idea) at Tom’s QTH (WA8WZG). What a place! We theorized: at one time Tom build his place “out in the country”. Then, at some point he acquired the farm next door, rented out the house but kept the barn and the grounds for himself. He is using the barn for his hamshack, repair and measuring facility and for storing cables for his business. On the outside there are several towers with numerous antennas including various size dishes. One big dish (15’) sits on the ground obviously being set up for microwave EME. There is a big pile of assorted tower sections and other hardware good to have when you live out in the country and far away from a decent junkyard.

The BBQ was held in a big 40’x40’ tent, set up for the occasion. A construction-type blowtorch or afterburner or whatever you call it, created some heat, but nobody really seemed to have any problem with the temperatures. The food was superb; there were ribs, chicken, baked potatoes and other good things. To drink there was hot cider, pop or beer, even iced tea for our southern friends. For desert you had the choice of several pies or other sweet things.

On Sunday morning on the way back we stopped at Big Ear, John Kraus’s radio telescope, just south of Delaware, OH. Between 15 to 20 people showed up for the arranged tour. Three volunteers lead us around and we could take a peek at the last recording done the week before. In another 2 weeks dismantling would commence. It was hard to say “Good Bye” and we stayed for a while and listened to Dr. Barnhard, the leader of the volunteer group explain plans for the future.

In all, this was a “darn” good show and Tom and his crew deserve a big hand of applause! I can hardly wait till we get another Microwave Update at Sandusky!

- You can get a **copy of the Proceedings** from Tom for \$13.- pp.  
His address: Tom Whitted, 4641 Port Clinton E Rd. Port Clinton OH 43452, Tel: (419)732-2168.

## Microwave Update Bits

- **Search in All Directions.** To a distance of at least 1,000 light years the stars are distributed quite uniformly. So in a search for extra terrestrial signals no particular direction can be singled out. At the present only 100 private stations are monitoring a tiny fraction of the sky. (N6TX)
- **P3d.** After extensive rework to strengthen the frame of P3d and other improvements the spacecraft will be ready for launch by February. The successful launch of the Ariane 502 on 30 Oct 97 started the countdown of 503 for launch around April of next year. This presents the first opportunity for P3d. Keep your fingers crossed for ESA's nod. (W5IU)
- **Rainscatter** works different on 24 GHz compared to 10 GHz. Apparently the drops are too big to give optimum reflection. So far only forward scatter has been observed. (G4DDK a. PA0EZ)
- **EME on the Microwaves.** Here is a run down on the activity by bands with the number () of active stations. 902 (5), 1296 (150 to 175), 2304 (35 to 40), 3456 (4 to 5), 5760 (9), 10 (20+). (WB5LUA)
- **A 3m Dish,** the standard for US-C-band satellite-tv is a favorite with microwave EME-ers. What are the required power levels for hearing your own signal? At 1296 you need at least 100W and at 2304 at least 50. At higher frequencies 15 to 25W will suffice. (WB5LUA)
- **Sequencers.** A lot of sequencers are so slow they make it impossible to hear yourself. A lot stations have worked EME but never heard their own signals come back, which provides a good check and, of course, gives you that extra thrill! (WB5LUA)
- **One dB!** If you see a dB somewhere, you want it! Even a fraction of one dB can make a noticeable (bigger) difference in S/N since the sky noise at microwaves is extremely low. (WB5LUA)
- **Open up your Hood** while stopped for operating on a roving trip. It will help cool the engine and people will think you have a legitimate reason to stop. Often they stop and offer help. (AB4CR)
- **Motion Detectors.** Avoid operating too close to stores after hours that use motion detectors. They are easily set-off and before you know it security and police will investigate. (AB4CR)
- **Four Months** out of the year are not suitable for tower climbing. Have you ever thought of using a wet suit? (NJ2L)
- **Why Fix it if it is n't Broken?** Maybe it is broken! (NJ2L)
- **Where are the Problems on Microwaves?** Way too much feedline! Too many relays in the rf path. Tower mounted stuff exposed to the elements. (NJ2L)
- **A Computer Clock Oscillator** at 16 or 48 MHz provide excellent (weak) test signals (harmonic) for 1296. (NJ2L)
- **Little Crawling & Flying Things** really like heated boxes. (NJ2L)
- **Tower Mounted Boxes.** Think mounting these flat to reduce wind resistance, paint them white or silver to reflect heat. (NJ2L)
- **Cut First Measure Later! NO!!** The proper way is like this: Measure twice, take a break, measure again, mark it but before cutting measure once more! (WA1MBA)
- **Before Firing Up** your new installation check "cold" with a VOM, then say at least a short prayer. (WA1MBA)
- **All your Preamps,** power amps ... belong on the back of your dish, but don't forget a by-pass for "just in case"... (WA1MBA)

**Parabolic Dish Antenna Setup**  
By Paul Wade, N1BWT (n1bwt@qsl.net)

**More Dish Bits:**

**The Real World** is never as good as you calculate or if it seems to be too good something might be wrong. The usual efficiency you can expect is around 50%, and 60% is pretty good, that is compared to the geometrical area of the dish (ideal capture area).

**Coffee Can Feeds** are basically open end waveguides, and as such they have undesirable side and backlobes. Rings (Chaparral feed) should be used to suppress these lobes.

**A 10 GHz Dish** should have about 10x the diameter of its feed and it is desirable to have a slight dimple in the center. A two foot dish is just right for the little low gain feedhorns (AT68UP, 7.5dBi).

**Focal Length Error** or having the feed at the wrong distance is the "Biggy" and should be taken care of first: see above!

Final advice: **Get it on the air, measure sun noise, see how it works.**

# Amateur Television Repeater System

of the Dayton Amateur Radio Association

by Reuben Meeks, K6GUC

The Dayton Amateur Radio Association (D.A.R.A.), Amateur Television Repeater (TV) is an 'in-band repeater with full color capabilities. It has vestigial sideband with commercial quality outputs at **426.25 MHz** video, and **430.750 MHz**, the audio subcarrier. The two input frequencies are **439.25 MHz** and **1270 MHz**. The **439.25 MHz** is the standard television (NTSC quality), and the **1270 MHz** input is FM.

The repeater is located about 10 miles south of Dayton, near the 'Dayton Mall', with its tower at a ground elevation of 1020 feet. The main receiving and transmitting antenna is at the 140 foot level. The antenna is horizontally polarized and fed with 1-1/2" heliax. The video transmitter has an average output power of 80 watts, with a 55 mile radius of coverage. The antenna pattern is omnidirectional from the antenna, to all unobstructed locations.

There is a two-meter audio communications channel at **144.340 MHz** simplex. This is our calling and contacts frequency for initiating our video contacts and general inquiries. There is also a 'video controller' frequency at **147.45 MHz**, that is used to setup the repeater for the various modes of receiving and control of our video transmissions.

There are a number of "user" functions that can be realized by the use of your touch-tone key pad. The '\*10' from your touch-tone will enable the 'transmitter identifier' for approximately one-minute. This is excellent for tuning up your TV receivers and letting you know that the repeater is active.

In Dayton, Ohio and the TV repeater coverage area there are approximately 23 active ATV users. Each operator has their own personalities and their varied means of getting on the air. You will find home brew rigs, to the commercial type of ATV equipment's. With varied acquisition prices at low end of approximately \$120.00 to the high end at over \$700.00.

The best times to see activity on the TV repeater is early in the morning from 0730 hrs to about 0930 hrs, and in the evening from 2030 hrs to about 2200 hrs. There is an abundant amount of repeater usages and test that can be had and found almost anytime during the day. This is an open and an active repeater of which all are welcome

For the interested and prospective ATV person we have a number of informational packages that will show you how to get on the air for the least amount of dollars. For those interested people, you may contact **Harry Covault, K8GCS at (937) 434-5412, or Reuben Meeks, K6GUC at (937) 294-0575.**

## Cable TV Sideshow

If you are subscribing to cable tv you can quickly receive the repeater on channel 58 or the input on channel 60. Just disconnect the "cable" and connect a 70 cm antenna instead.

70 cm band frequencies: 421.25, 427.25, 433.25, 439.25  
Ch 57      58      59      60

# Meteors, Where, When, Why

(Satgen 450)

by GM4IHJ 8Nov97

Thanks to readers who have pointed out that the excellent astronomy magazine Sky and Telescope Dec97 p108, has finally recognised that meteor observation via the radio propagation properties of the ionized trails they create in the ionosphere, is both interesting and potentially far more productive than outdoor visual observation with its attendant risk of pneumonia.

S+T recommends far field reception of FM broadcast stations between 88.1 and 107.9 MHz. A band also available in Western Europe. But there are lots of other useful bands if you have a suitable receiver :-

Radio Amateur beacons and FM repeaters 28 to 29.5 MHz Low VHF TV Europe 48.25, 49.75, 55.25 MHz ( very hi power strong sigs) Radio Amateur beacons 50 to 50.1 MHz (24 hours a day) Low VHF TV America 56.25 MHz Low VHF FM Eastern Europe around 72.1 MHz

These lower frequency meteor scatter signals are much stronger than those at frequencies above 80 MHz and they can be received on a simple home made dipole or Turnstile antenna. Equally important :-

- a. You should be aware that many TV and FM stations go off from midnight local to about 0600 local time. Whereas radio amateur beacons though weaker in signal strength stay on 24 hrs/day as do a few TV stns..
- b. FM stations overlap in frequency. You can get 3 or 4 stations in different parts of Europe all on the same frequency . So using FM stations for meteor flux rate counts is suspect.
- c. Radio listeners using audio reception , hear far more meteor signal echoes than visual observers see visible meteor trails. The smallest dust grain contains millions of atoms which when ionized in a collision with the atmosphere produce excellent reflection and forward scatter of low VHF radio signals. Indeed if you try echo counting in a big shower like the January Quadrantids, the August Perseids or the Leonids (1100 to 1300ut peak) 17 Nov , you will find the echoes coming so fast they overlap into a continuous tone. To counter this wall to wall effect the IHJ station DX TV was left tuned to 48.25 MHz and actual locked TV pictures were counted in order to discern when shower maximum occurred (BWTV bandwidth to audio rx bandwidth gives about 100 times reduction in observed echoes which makes maximum timing clearer)
- d. However times change, and starting with the 96 Leonids the IHJ shack features a dipole feeding a Drake R8E rx sending audio 2.7 kHz wide to a sound card feeding AF9Ys excellent FFTDSP software. This allows continuous observation and recording of a low VHF spectrum in 2Hz channels over 2.4 KHz , in a band tuned 48.252 which covers 4 TV stations, on different frequencies in Denmark, Sweden , Germany and Spain, permitting simultaneous records over 140 degree arc of bearing.
- e. But you do not have to wait for big showers. Every morning 0600 to 0900 local time your part of the earth is running into the paths of ancient comet dust streams which provide the bulk of meteoric material. You must of course ensure the TV stations of your choice are on the air ( furthest east, soonest on) Then once you know the regular performers you can enjoy meteors with your breakfast, every morning, rain or shine, cloudy or sunny, dark or light.