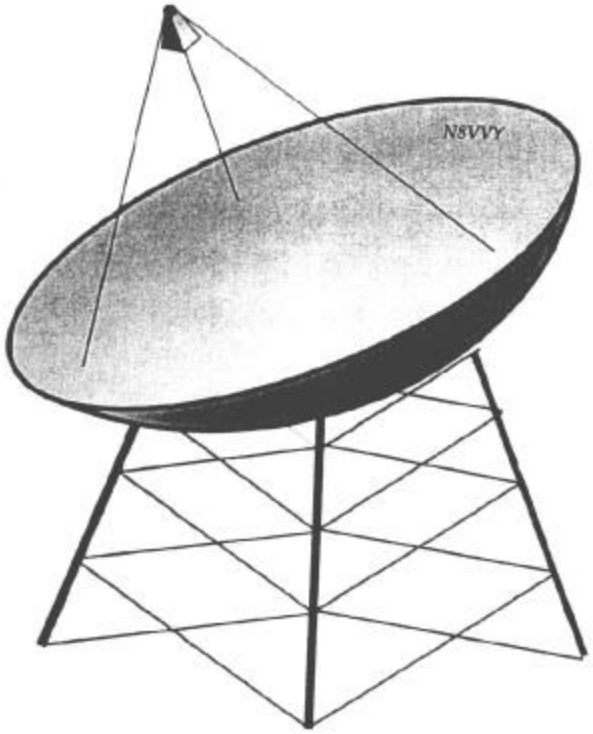
September 2004

ANOMALOUS PROPAGATION

Newsletter: **The Midwest VHF / UHF Society**



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Annual Society membership is $ 10.00. Please make checks payable to Gerd Schrick

MIDWEST VHF-UHF SOCIETY

Vol. 18 No. 7 **www.mvus.org** **September 2004**

Club Memorial Call W8KSE

10 GHZ Beacon: 10368.750 KA8EDE EM89ap Xenia, OH, 50 mW, 16 slot wave guide at 89feet

Another Meeting at the oldE country Buffet !

Our **September Meeting** is on **Fri.24th** at 7:30 PM
at the Olde Country Buffet near SR 725 and Yankee Rd. in Centerville
Discussion: new meeting place, new and old club projects

Contents

Upcoming

Microwave Update Conference

14-16 October **Dallas/Ft. Worth Area** **Hosted by the North Texas Microwave Society (NTMS)**

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See also back page

De N8ZM

Well, we got lucky again with the weather for the picnic. Although it did rain, it wasn't enough to shut us down. Gerd has a good write-up included this month with the details of our activities. We had a great time and enjoyed the chance to converse on many topics of interest.

In one brief moment of poor judgment from an otherwise very intelligent group, Gerd, Steve, and I were re-elected to what have become our almost traditional posts as club officers. We do appreciate your support, and it isn't like it's hard work, but the club could use a change!

We talked a bit about the 1296 beacon project, and work is ongoing by Rod Owen and Mike Murphy to get the antenna completed. It was reported that our window of opportunity to get installed on the tower will happen this fall, and the guys are plugging away to get the antenna ready. Before we get much farther down the road, we need to get the rest of the beacon put together. As previously reported, Rod has built the ID'er, so that part is ready to go. We just need the RF stuff designed and built. As we have a GPS receiver with 10 MHz reference output, and a synthesizer to make use of it, we have the basics. Just need a mixer or multiplier cum amplifier designed and built. Money is not the problem, as we have enough available to cover the parts. Anyone want to tackle this? It doesn't have to be an individual, either. Sometimes team projects work out better when the members help each other along.

Speaking of team projects, I have been advised that we have a shot at hosting Microwave Update in the SW Ohio area in the fall of 2006. We need to start now to get our ducks in a row for this, as there is a fair amount of preparation needed. Mike Schulsinger has agreed to start looking into possible hotels where we could host the event. Mike will be looking for facilities offered, room prices, amenities, location, etc. So far, he has on his list to consider the Dayton Airport Hotel, and sites in Springfield and Wilmington. If you have thoughts on other locations, not too far from Dayton, let me know, and I'll pass them along to Mike. Or tell one of us at the next meeting.

Speaking of the next meeting, it will be this coming Friday, September 24, at the Olde Country Buffet near 725 and Yankee near Centerville. The dinner line starts around 7:00, and the formal (?) part of the meeting will start when I finish my dinner! Lots of good friends and great discussions, as always, so don't miss it!

It Can Happen

By Lloyd, NE8I

For starters, apart from the record-low temperatures over the northland, Murphy was in attendance and had brought along his good friends Sod and Damn for moral support. His cousin was also in attendance over at the Michigan encampment as I understand. On our end, Glen, KC0IYT, found his rig, that he had dropped the day before, had suffered catastrophic damage and would neither receive nor transmit. And Doug, N0NAS, was experiencing intermittent transmit failure. As for myself, it was evident that I was plagued by some transmit problem too as my signal locally was weaker than the also-weak signals being received from 313 km distant. It turned out that the Qualcomm amplifier in my transverter had died, and I had made the conscious decision to MINImise my load by only bringing "essential" spares, as I was going to be running the north-shore from my new MINI Cooper (which has not the BIGGEST cargo-space known to man!).

Oh, that is the good news; the MINI averaged **35.5 mpg** over the course of the weekend!

This and That 9-04

- **Contest Wisdom.** Operating skill is NOT the be-all and end-all of contesting. And: The contest is too short for QRP. [Lloyd, NE8I]

- **Cockpit Displays**. The 737 is the loudest, least comfortable passenger jet ever made, but its flight displays are gorgeous! [Rick Fleeter]

- **Account Number.** Does it irk you that your electric service account number has enough digits to specify the date of birth, sex, hair color, height, and weight of every human on earth? [Rick Fleeter]

- **Accessories. …"**the 'xyz gizmo', does just about everything. But checking the details reveals the device isn't quite as impressive as it may seem. Some of the best things the unit can do require buying and installing expensive extra accessories." [James Cummings]

- **New Headgear**. They are part hat, part mask, and part visor. Women in Asia picking up this strange headgear in droves. The real, original version comes from Korea. But this being Asia, many women are buying the cheaper pirated version, known as a "three-no" product: no factory name, no address, and no label. [Robert Marquand in CSM]

- **Hydrogen.** You hear a lot about hydrogen replacing the gas in our automobile engines. But, pray, where does the hydrogen come from? Its easily produced using electricity, we did it in school by splitting water through electrolysis into hydrogen and oxygen. That gets us back to generating more electricity and there we have choices, we can generate it from coal, oil, nuclear or from wind, water or the sun. Now, however, Australian researchers have found a way to use titanium oxide ceramic and sunlight to generate hydrogen directly. Application of this process that would employ a fuel cell to generate electricity is still an estimated seven years away.

- **Handy Throwing Contest.** They had a "handy throwing contest" in Helsinki this year. Record for adults 82.55 m, for juniors 45.51m. Will have it next year again. Maybe it will be an Olympic discipline one year? [Reported by Horst, W3/DJ7LC]

- **Headset.** Watched a demonstration of a voice reading computer program and was surprised by the clarity of the voice from the microphone (amplified and coming from a speaker) Upon questioning I was told that they tried numerous headsets (head phones & boom mike) as they are offered for computers and found this one the best. It is actually included in the software. The type is AC-100 (the AC-400 should also work, it has left & right phones) from Cyber Acoustics. I found it offered on the Internet for about $ 8.00 (+ shipping). [Gerd, WB8IFM]

- **60 Cycle Danger.** …Later a bought a pocket size gaussmeter, appropriately named Dr Gauss, and measured fields in and around my home and under power lines. The field under a 765,000-volt line was less than the field at my computer workstation. The reading of the electric shaver was so high, I immediately switched to brush and blade… [John Kraus, W8JK]

- **Sports Mania.** In 1979, when the Entertainment and Sports Programming Network (ESPN) began, the average salary for a major league baseball player was $ 113,558… today it is $ 2.55 million and there are 1,702 million dollar athletes. [George Will]
- **Immature Technology**. Automobiles have evolved, but a computer is still a complex collection of immature technologies. Although they've come quite a ways since they were introduced, computers still regularly frustrate us, and we're often forced to get more involved in their maintenance and repair than we'd care to. [Rod Scher]

MVUS Picnic and Measurements, **8-28-04** by Gerd, WB8IFM.

We had a pretty good picnic, not a whole lot of measuring took place though. There was a brief shower and Tom, N8ZM, put his expensive equipment back into his car, never to get it out again. However, Daun, N8ASB, kept going with pattern measurements. Around 6:30 came the big storm with an estimated 1 to 4 inches of rain. At the time the xyl and I drove home well protected in the car! Lightning did strike a church steeple in East Dayton, set it on fire and caused $ 10,000 in damage.

We set up the usual antenna range with a distance of 100 feet, with the 2m-source antenna at a height of 14 feet.
We used our regular 12 feet measuring masts. However, we did not use the range as such, but provided sources on 2m and 70 cm for a number of antenna pattern measurements. These were done rotating the test antennas mounted at about 12 feet at a distance of 50 feet from the source. Data points were taken every 2 degrees for the full circle and at 4 different frequencies, which made the total rotation last about 8 minutes. Great care had to be taken that nothing in the set up changed during that time including anybody walking around nearby.

Tom, N8ZM, brought the following instruments: an Agilent E 7405A spectrum analyzer, 100 Hz to 26.5 GHz
Also an E 4417A power meter, 10 MHz to 18 GHz, 1µ W to 25 W (w. attenuator).
Daun was using a HP 8753C network analyzer, 300kHz to 3 GHz, and a laptop pc for the pattern measurements. So we were quite well equipped for all kinds of measurements.
All these very fine (and expensive) instruments are for indoor or fair weather use and although we had three canopies, the commercial types you see at exhibits set up adjacent in a triangular shape, this was no real protection for a heavier rain accompanied by wind. But a real disadvantage are the displays that are very hard to see in bright daylight. We tried cardboard shades that helped but not much.

Rich, W2RG, had a small 10 GHz horn with approx. 7 dB gain, a dielectric lens with a focal length of 44 cm increased this gain by 7.5 dB (5,6 times). This was measured using a portable 10mW beacon at 75 feet, brought by Bill, K9AYA, and then measuring the power at the receiving horn antenna.

Next the power output of Bill's (K9AYA) Qualcom 1 W amplifier was measured at .5 to .8 W.

After that the above mentioned rain shower stopped the measurements. Tom used the lull in the action to conduct some club business. As it was time to elect or reelect officers, we voted to keep things as they are. There were 13 votes for and 3 abstentions. Pres. Tom Holmes, Vice Pres/ Secretary, Steve Coy and Treasurer, Gerd Schrick. Then we had some time left and everybody was briefly talking about what was cooking at his place. This was turning out to be an interesting feature and proof of what a divers group we are. I took a few notes but was otherwise preoccupied (we had resumed pattern measurements), so I cannot relate the details here.

Anyway, it was time for the cook out and Tom went about to grill the burgers, brats and hot dogs. As usual there was plenty of good food. We had five xyls, Karen, N8CSX, the hostess, Barb, N8EYW, Carolyn, N8JQR, Marilyn, (W8ULC) and Traudl, (WB8IFM). Marilyn's birthday was the day before, so we all sang "happy birthday" and had a piece of birthday cake for desert.

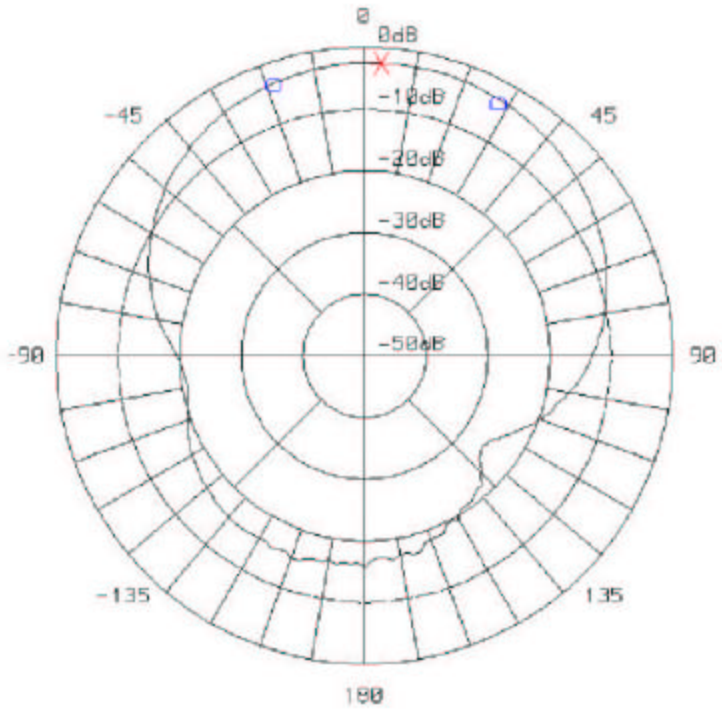
Afterwards we continued with the pattern measurements. Following a list of the antennas measured:

WB8GXB	2m	8 el, 105" boom.
N8UR	2m	4 el, 48" boom, Arrow.*
	2m/70 cm	v-shaped log periodic 3 ele, boom 13.5" (70 cm harmonic excitation)
K8UD	70 cm	boomer 36 el, ?? boom *
	70 cm	
N8QOD	70 cm	last year measurement
N8ASB	70 cm	K2RIW ?? el, ?? boom, no reflector

There are 14 PDF-files, totaling 2.5 MB zipped, that Daun (Daun@Yeagley.net) will e-mail you on request

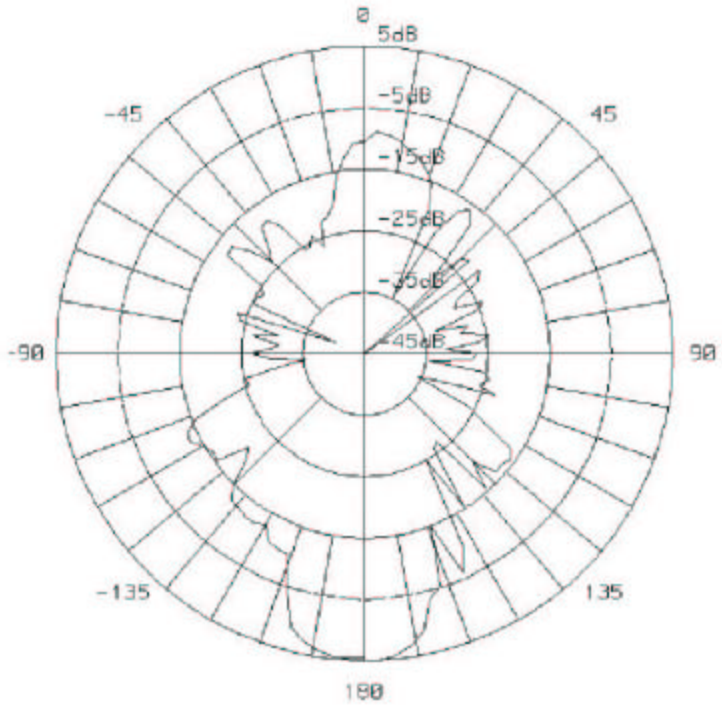
* Graphs on next page.

Frequency: 146.00 Mhz



Antenna Model: N8UR 2M 4EL Arrow
Operator: NBAS8
Marker = -2.45 dB +4 Deg
Beamwidth = 46 Deg.
f/B Ratio (MAX & 180 Deg.) = 21.4 dB
Area Mean = -8.11 dB
Linear Mean = .39 dB
Std. Dev Pattern = 8.35 dB
Max Level = -2.41 dB
Max/Min ratio = 23.60 dB

Frequency: 434.00 Mhz



Antenna Model: K8UD 70 Cm Booser
Operator: NBAS8

Area Mean = -7.12 dB
Linear Mean = .44 dB
Std. Dev Pattern = 15.83 dB
Max Level = 4.98 dB
Max/Min ratio = 58.98 dB

Azimuth Inverted

MVUS Transponder Plan

By Gerd Schrick, WB8IFM

FM repeaters, mostly on 2m and 70cm, have been and still are amateur radio's mainstay for local and regional communication. These repeaters are very limited: they only provide a single channel at half duplex operation. This requires discipline and limits traffic, which is, particularly in an emergency, a big handicap. To ameliorate this problem dozens of repeaters have sprouted in big cities, which is true to the first American rule: Bigger(or more) is better. However, the basic problems still persist.

A transponder, long being used on satellites, has a number of advantages over a FM repeater and does away with its limitations. First, a number of users can be accommodated simultaneously. Second, the transponder is linear, it accepts any kind of transmission: FM, SSB, Packet, PSK, RTTY, Slow-scan TV, and Morse, to name just the usual group. And third, full duplex is the norm. It is like a telephone, you can interrupt the other side at any time, and, of course, many users can be accommodated simultaneously. Conferencing, very helpful in an emergency is also possible. There is a difference, however, in that two bands are involved. The transmitter is in one band and the receiver is in another. Thus the Tx does not block your Rx. In a repeater, where Tx and Rx operate simultaneously in the same band, high Q filters (at 2m and 70 cm quite bulky) are reqired.

The transponder is inherently a simple machine: the receive antenna feeds an LNA, the output is mixed with a local oscillator to produce an IF at the transmit frequency. An amplifier brings the signal up to power which is then feed to the transmit antenna.

I have asked Michael Kuhne, DB6NT, to look into his inventory to compose a AO-40 type, US/L transponder, meaning inputs on 70cm and 23 cm and a single output at 13 cm. Below a draft sketch of what the transponder might look like. (See figures on the next page)

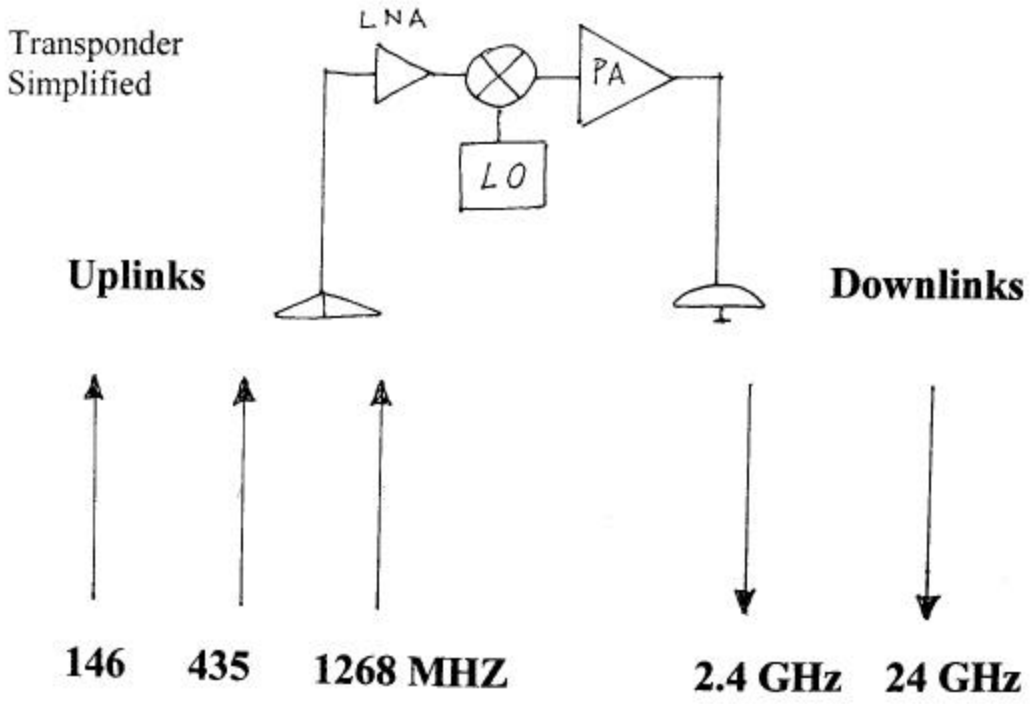
As this transponder is going to be operated "on the ground", power can be provided by the power grid, thus removing all the limitations, e.g. efficient modulation schemes, that apply on the satellite, where power is limited. Also the fact that there is no Doppler, simplifies operation. On the other hand, it would be not a bad idea to provide solar panels and a battery, to be prepared for power outages in an emergency. Also, it might be a good idea to have a small "portable version", that could be set up anywhere and powered by any emergency source, including from car batteries.

Initial users could be all the hams already set up for satellites, using one of the satellite tranceivers, which are dual band types with the capability to transmit and receive at the same time. My preference are separate transceivers because of the confusion factor in the "do-it-all" type boxes (this also might be cheaper and definitely more flexible.) Two antennas are needed also, which are relatively small for UHF and above. Dual (or even triple) feed patches would permit you to use a single dish for several bands. A whole interesting range of possibilities for the experimenter exists.

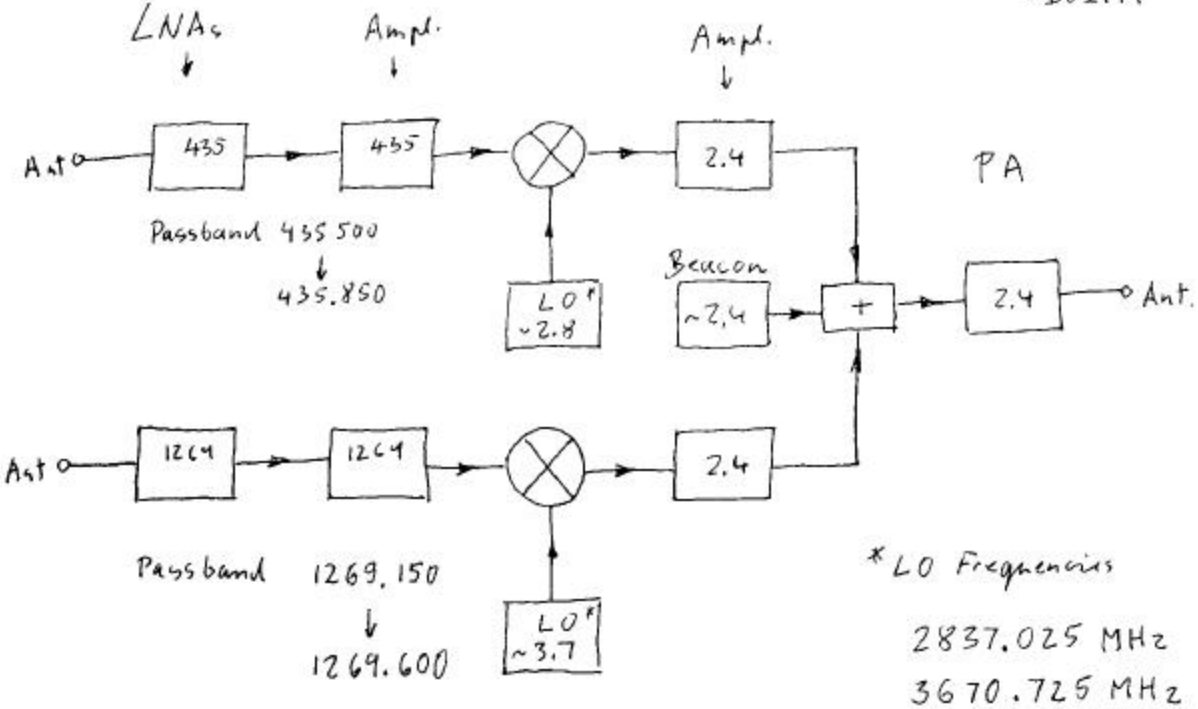
10 GHz ATV Repeater

The Columbus, OH, Amateur Television Group (ATCO, www.atco.tv) did install a 10.350 GHz FMATV TX (1W into a 40-slot antenna) output on the existing repeater (WR8ATV). The location is downtown Columbus, at 83.00 W and 39.98 N (**EM89ax**).The height at 650' above ground should have great coverage of the central Ohio area. If anyone in the Dayton area would like to try and receive the 10.350 signal, I can provide (loan for extended time) a dish antenna, LNB and FMATV rx. [Ken, W8RUT]

OSCAR-40



8-21-04
WB8IFM



(AO-40 Frequencies)

MVUS - Transponder

Temporary Tower for Field Day or similar Operations Supporting VHF Antennas.

By Rod Owen, WG9F

This tower erection procedure we used on field day may be of interest to MVUS members for their portable operations so it will be described in detail. The tower is made up of four 10 ft sections of Rohn 25, and is erected in the following way: A hinged base plate is placed on flat ground. The sod was removed at the base to provide a firm footing on clay for the base plate. The base plate has a ½ hole in each corner, through which four three foot lengths of ½" re-bar are driven into the ground, leaving about a foot of each bar protruding. Two sections of the tower are assembled horizontally and attached to the hinged base plate. These can then quite easily be walked upright on their hinged base by two OMs. Three ropes are attached to the top of the second section prior to walking them up. These three ropes are then pulled out and tensioned and tied off to tree trunks or other stout structures close to ground level The tower is then climbed by two OMs and the third section pulled up by a rope and stacked. Three guy ropes are added at this level (30 ft) and tied off. The procedure is repeated for the fourth section, but no more guy ropes are needed. The top section is the "bottle nose" type with a tube for a mast support.

Before the tower is assembled horizontally and tilted upright, five 10 ft Radio Shack mast pipes are rested inside the base section. These are strong steel tubes, about 1.25 " diameter. During manufacture, one end of each tube (the top end in this case) is swaged to a slightly smaller diameter and to a slightly conical form, for about 5" of its length. In this way the tubes may be joined together with a tight fit. When the tower is upright the tubes may be pushed up one at a time from the bottom. As each tube is raised 10 ft it is then lowered on to a lower tube and joined. The lower tube is then raised and the process is repeated until all five sections are assembled. One OM remains at the top of the tower to guide the top section of mast through the tower top. As the top mast section is raised through the top of the tower an antenna is attached, together with its coax. As the mast is raised further another antenna is attached. At this point there will be 10 ft of tube protruding through the tower with an antenna at the top and one (or more) antenna(s) below this one. Finally, the whole mast assembly may be raised another five or six feet from the ground and supported by a short section (a foot or so) of two-by-six lumber pushed through the tower rungs. Now there will be up to 16 ft of mast protruding through the tower top with antennas at the top and near the top. This is obviously too flimsy for a permanent installation, and is not suitable for large beams, but it is fine for a weekend. Radio Shack mast tube is also available in 5 ft sections and we included one 5 ft section in our stack, for an amazing 21 ft of mast protruding through the top of the tower. Had there been any strong wind during the weekend we would have lowered the mast by removing the two-by-six and resting the mast base on the ground. The "Armstrong" method of beam rotation is used from the base of the tower, this is fine for field day, and beam heading changes may be made quickly. At our operation we had a 4 element two meter beam at the very top and a 4 element six meter beam a few feet below this. We had planned to include a 432 beam but we ran out of time due to a late start. Next year we hope to include 432 Mc. Our two meter beam was at an amazing and wobbly height of 61 ft above ground, and the six meter beam was about 4 ft below this height.

Early Morning Conditions

Report from Lloyd, NE8I

This last weekend, Sept 11/12, VHF & up conditions were excellent. Early Sunday morning, from Sterling State Park, EN81, Western end of Lake Erie, Tony, WA8RJF, was 9+20 on 2304. After 10 AM the band conditions evaporated, literally within 5 minutes, 20 over to s3. Towards sunset, and a bit after, things picked up somewhat. Typical Lake Erie Tropo. Best conditions, again, **early** AM.

A remarkable conference is anticipated

The North Texas Microwave Society is the proud sponsor of **Microwave Update 2004** being held in Dallas, Texas on **October 15 and 16, 2004**. The conference will be held at the beautiful Harvey Hotel DFW Airport, just minutes from the north end of DFW Airport.

Microwave Update is the premier technical conference for the amateur radio operator interested in pursuing activities on the frequencies above 900 MHz. This year's event will host technical presentations on both Friday and Saturday from your friends and peers pursuing projects in the microwave bands. This will be an ideal event for you to meet with and talk to your fellow microwave hams from around the world. As usual, the ARRL will be publishing the conference proceedings. The list of speakers is quite long as there were a considerable number of volunteers. As a result we were not able to accommodate several people this year for which we apologize.

Experiences with the CT1DMK reflock board by Wes Atchison WA5TKU

Microwaving in the UK by Peter Day G3PHO

Building and using the DSP-10 as a microwave IF by Dave Robinson WW2R

A 10 GHz linear translator by Gary Lauterbach, AD6FP

Millimeter-wave LO references & phase noise considerations by Brian Justin WA1ZMS

Introduction to 802.11 HSMM (High Speed Multi Media) by John Beadles N5OOM

Using WR-28 waveguide at 47 GHz by Barry Mallowanchuk VE4MA

Joining the fun on 1296 EME by Jay Liebmann K5JL

Multi-band microwave operation at K4TO by Dave Sublette K4TO

Contest operation at K8GP by Gene Zimmerman, W3ZZ

Multiple-reflector dishes and feeds by Paul Wade, W1GHZ

Extra-Terrestrial LASER Communication by Paul Perryman, WA5WCP

ARRL Forum to discuss the regulatory environment as it applies to the microwave bands by Joel Harrison W5ZN, Dave Sumner K1ZZ and Chris Imlay W3KD

Tropospheric enhancement VHF and Up by Joe Jurecka N5PYK

Building beam lead diode multipliers for 80 and 120 GHz by Will Jensby W0EOM

Writing code for DDS and PLL chips for microwave synthesizers by John Miles KE5FX (tentative)

Update on microwave capabilities of AMSAT's newest and future satellites by Keith Pugh W5IU

Rainscatter in Europe by Sam Jewell G4DDK and Jonathan Naylor, G4KLX

Demonstration of Software Defined Radios by FlexRadio Systems by Gerald Youngblood AC5GO

The latest list will be kept current on http://www.ntms.org/

Surplus Tour

The usual surplus tour hosted by the ultimate junk hound, Kent Britain, WA5VJB, will be conducted on Thursday. Kent's world famous surplus and electronic store tour will visit such places as TESCO, Nortex,

Texas Towers, Altex, Tanner Electronics, several small parts stores, Fry's Electronics just to name a few. Maps will be available Thursday morning at the hotel at 8:00AM. As always, drivers with extra seating will help those that flew in to the area and are without a car. If you will have space for extra people, please contact Kent. Your help is appreciated.

MUD Auction

Kent, WA5VJB will again head up the customary auction which in past years has been very helpful in bringing in extra money to help keep conference costs low. If you have any extra unwanted equipment that you would like to donate, please let Kent know.

At the conference...

We are expecting several microwave component and microwave surplus companies to be present during the conference. The tentative list includes Down East Microwave, TESCO, Holtzman Electronics, Hanger 18 (Phil Galloway) and Bogden Electronics.

As with most Microwave Updates, a test equipment table will be available to help tune up your equipment. Noise figure measurement capability will cover VHF through 47 GHz. This will be great for measuring those new microwave LNA's and converters. Network analysis capability will cover frequencies to 50 GHz. Tuning up filters and finding out the bandwidth of that unknown amplifier will be easy with the network analyzer. Spectrum analysis will cover frequencies to 26.5 GHz allowing one to take a look at the spectral output of a local oscillator. The spectrum analyzer also has a special phase noise module to measure and record the phase noise of your favorite LO(s). Power supplies will be available for your equipment. However, bring your special tools for opening and tuning your projects. We will also be hosting a Reflock tune-up session to help those that have built the CT1DMK reflock boards get them programmed and tuned up and de-bugged if need be. Antenna gain measuring will be available at frequencies from 902 MHz through 47 GHz. There is a possibility that we will be able to push our equipment limits to 74 GHz, however, if there is anyone that would like to bring signal sources, noise sources, etc for 74 GHz please let us know.

A Friday night flea market for the microwaver will provide the opportunity to both buy and sell. So ..bring your goodies!

Family Program

The women will have a chance to do some local shopping including antiquing, touring a local winery and participating in some craft projects if they would like. Here is what we are working on so far. Friday morning will start off by caravanning to Grapevine where there are a multitude of shops, antique stores, wine tasting rooms and some nice restaurants for lunch. On Friday afternoon, the plan is to meet at the hotel and then venture out to tour the Delaney Vineyard in local Grapevine. The cost of the wine tasting tour is $7.50 per person and is set up only for the wives. On Saturday morning, the women will have an option of attending a "Holiday Card & Gift tag Craft Project" to be held at the Hotel. Attendance is free and is limited to about 20 women. Saturday afternoon has been reserved for local shopping like the Grapevine Mills mall….Or you can venture out to other attractions in the DFW area.

For those that would like to spend some extra time in the DFW area, there are plenty of attractions to take in, including the Ft. Worth Stock Yards, Billy Bob's, Dallas West End, Dallas Arboretum, Kennedy museum, Gilley's in downtown Dallas, Six Flags over Texas, the Meyerson Center and numerous great golf courses in the DFW area.

Good Eating at the Banquet...

On Saturday evening following the last of the technical sessions will be our usual Microwave Update banquet. With the help of the Harvey catering service, we are pleased to present a wonderful Italian Buffet for our guests. The buffet dinner will include:

Fresh Garden Salad with a selection of Homemade Dressings

Traditional Beef-and-Cheese Lasagna

Chicken Parmigiana

Fresh Pasta with Marinara Sauce and Parmesan Cream Sauce

Antipasto Tray includes: Fresh and Smoked Cheeses, Olives, Cured Meats, Roasted Peppers, Marinated Mushrooms and Artichoke Hearts
Served with Italian Bread and Crackers, Warm Garlic Bread Sticks and a Vegetable Medley
Tiramisu and Mini Cannolis
Iced Tea, Coffee (regular and decaffeinated)

The cost of the buffet dinner is $30 per person.

Prior to dinner, our guests are invited to an informal cocktail hour. The hotel will provide a cash bar serving your favorite drinks.

Bob, WA5YWC, will be coordinating the prize drawings. As usual all prize donations are greatly appreciated. If you have something to donate, please indicate so on the registration form or contact WA5YWC. The prize table will offer both ham and women's prizes.

Location

The Harvey Hotel is within minutes of the DFW airport and provides exceptional conference facilities. The hotel offers free shuttle service to and from the DFW airport. Due to the popularity of the hotel for corporate functions during the week, the nightly rate for Thursday night is $89.00 plus taxes and $65.00 plus taxes per night for both Friday and Saturday nights. These rates are considerably reduced from the usual corporate rates, so we are real fortunate to be able to take advantage of the Harvey Hotel facilities for Microwave Update.

Important registration information

The Harvey Hotel will provide on-line registration. Go to www.dfwairport.harveyhotels.com/ and click the *Reservations* box (the Boeing 747 picture). Once on the Reservations page, enter the dates you will be staying and 10606 in the *Group/Event ID* box. Scroll to the bottom of the page and click the *Begin Search* button. On the next information page, click the *View Rates* button. Then click *Detail* to see the rates for the following nights. These are the Microwave Update discounted room rates. Failure to mention Microwave Update will make it difficult for us to get the discounts on the meeting rooms which are based on the number of room nights that we book for our attendees. If you have not already picked the room type then click the *Select* button next to the desired room type. On the next page, Click-check the box "*Accept Guarantee/Deposit & Cancellation Policy*" and click *Enter Guest Info* button. Fill in your personal information and click the *Complete Reservation* button. It's that easy! For those wishing to call the Harvey Hotel reservations direct, the telephone number is 972-929-4500. Please mention Microwave Update.

Please register for the conference as soon as possible. The registration form is up on our web site http://www.ntms.org/. *Pre-registration cost is **$40.00 and is due to W5LUA by October 1***. Regular registration after October 1 and at the door will be $45.00. Make checks payable to the North Texas Microwave Society.

We will have special prize drawings for pre-registered attendees.

Also, check out the NTMS website http://www.ntms.org/ often for further information about MUD 2004.

This conference will be the microwave event for 2004. Don't miss it! Come join the fun and camaraderie in Big-D.

Al Ward W5LUA
Bob Gormley WA5YWC
Kent Britain WA5VJB
August 5, 2004