June Meeting: Friday, the **26th**, at 7:30 PM at the Perkins Restaurant at SR 73 and I-75. Meeting topic: Sam Laube, WB8ZDF will demonstrate: "How to convert a radar detector to a 10 GHz transceiver". There is no meeting in July on account of the Central States Conference. List of technical topics on page 10.

Contents

Upcoming Events:

Central States Conf. July 23-26, Kansas City, MO.
(for info see previous newsletter, web site: csvhf.org)

Microwave Update Sept 24-27, Longmont, CO

Mid-Atlantic VHF Conf. Oct 3, Horsham PA

AMSAT Symposium Oct 16 - 18, Vicksburg, MS

Greetings from the West Coast!

I am writing this a little earlier than usual, as Gerd has once again been called by AMSAT to assist with the assembly of Phase 3D. I guess he did an OK job for them last time! Anyway, he tracked me down, via e-mail, at a training class out here in the wine country north of San Francisco in order to get my two cents in promptly so that he could put Anomalous Propagation to bed before he leaves. But enough chitchat, on to the important stuff!First, my thanks to all of you who put in time at the MVUS booth at Hamvention. We seemed to have a fair number of visitors, and signed up several new members, including two from overseas. A few more radar detectors have found new homes, and will hopefully be on the air soon on a frequency below 10.5 GHz. Sam, WB8ZDF, brought out a 10 GHz transmitter (exciter?) on Sunday which was based on a detector, also. Generally, things went well, and I am looking forward to our having a booth again next year. Let me know what you think, please.

The meeting this month is planned to be Sam Laube, WB8ZDF, doing a demo on converting a radar detector to transmit on the 10 GHz band, compatible with the receiver conversion he did a few months ago. Once again, we will meet at the Perkins Restaurant at SR-73 and I-75, at 7:30 on June 26th. I haven't had a chance to talk with Sam about the supplies needed for the conversion, so bring a notebook and pencil for notes, and anything else (tools, wire, misc. caps and resistors) that might be potentially useful.

August is fast approaching, and that means the annual picnic/antenna test needs to be scheduled. Daun Yeagley, our annual host for the event, has some business travel plans in August that we need to work around, as well as my schedule. Of course, I am not essential to the proceedings unless you really don't want to entrust (sentence) someone else to be the king or queen of the gas grill. Right now, the 15th or the 22nd are possibilities, but I haven't verified this with Daun. And I am writing this at midnight, his time, so I believe it prudent not to call him at this moment to check it out. We will get it settled at the meeting.

Also, just a reminder that the annual conscription of officers is due to be held in the fall, so it time to start the ritual of the current officers begging to be set free in hopes of attracting some new talent. And I will not accept the excuse from any of you that you don't have the skills for these jobs.

Just look at what I've gotten away with for the last five years! Did I hear someone say term limits? We need at least two people willing to step in to replace Bob as VP/Secretary/co-editor, and me as head cheerleader. And Gerd has certainly earned his freedom, although I know he'll be around to help with the newsletter and such. So give it some thought because MVUS is probably due for some changes that YOU can make happen.

In the last newsletter, I mentioned that I had changed jobs, giving up the car parts business for high quality electronic instruments. The new job is a little bit of sales combined with some teaching, consulting, and opportunities to be creative. So far, I am having a great time and this trip to the California wine country is actually for two weeks of intense training on the company's RF and microwave products. I knew they made a lot of different things, but the list is truly mind boggling.

My wife says I am like a kid in a candy store, and she is right. Now I really know why their annual instrument catalog is over an inch thick. And they would really like it if I could memorize a reasonable amount of it! Bottom line: I am glad I made the jump. Ok, I'll shut up about it now.

Well, this seems like about a page full, so I'll shut down until next time. By the way, don't forget that Central States will pre-empt our July meeting, unless absolutely no one is going!

Laterà N8ZM.

This and That (6,7-98)

- **RS-17** also known as the little Sputnik that created quite a bit of interest in satellites at the end of 1997 reentered and presumably burned up in the atmosphere on May 20th. (F6FAO)

- **New Transatlantic Cable**. A new fiber-optic cable is being laid between Germany and the US. This will be the most powerful cable so far. Only .125mm (.005") in diameter, the cable can carry as many as 300,000 telephone conversations. Completion is expected by November. (The Week in Germany)

- **An Ideal City.** Jules Verne wrote a book by this title. In it physicians are paid by the number of healthy patients they provide.

- **Working Together**. In long-duration spaceflights the composition and compatibility of the crew is the most important thing ... We did not spend time criticizing one another, if a mistake was made; it was understood, corrected and then forgotten. Most important, we laughed together a lot. (Shannon Lucid)

- **Find it Yourself**. There is no way turning back the clock. Once if you wanted information, you got on the phone, talked to a **real** person and got the answer. Now we live in "voicemail hell" and listen to "robots" most of the time. I just tried the IRS and got the word from the robot: "We are busy right now, if you want to talk to a person, call back later." Those of us with a computer and connection to the Internet can use "search engines" and "browse" or "surf" the "web" for needed information. But then you might get lost also, usually you find a lot of stuff you were not really looking for.

- **Computer Hardware Failures**. An Intel Study indicated that hardware in computers breaks down as follows: 50% Disk Drives, 28% Power Supplies, 8% Fans, 5% CPUs, 4% Memory, and 1% Motherboards.

- **Girls Prefer Horses**. While one of three girls would like to have a horse, more than half of the boys would rather have a racing bike or a computer.

- **Save Film**. One of the best ways to save film (and holiday memories) is to write legibly. Each year Kodak disposes of 400,000 rolls of film because of illegible return addresses. Amazing!

- **Gift Wrap**. Here is another interesting statistic: Annual trash from gift wrap and shopping bags totals about 4 million tons. Third class mail adds another 4.4 million tons to mailbags and, ultimately, to garbage. Although recycling is important, reducing waste in the first place should be priority number one. (Bob Lilienfeld)

- **Mowing the Grass**. Why, asks a retiring Dayton Daily News editor, are Ohioans so obsessed with mowing the whole state of Ohio at least once a week, and why do they seem to actually enjoy it?

- **Looking for Microwave Power.** During WW2 the push to generate high power at microwave frequencies was on. Civilian scientists were rounded up and after a whole summer of searching for an answer, a report was written. This took place at the Rad(iation)lab, so called as to pretend it had to do with nuclear physics, considered a harmless endeavor at the time. To the leader of the effort this was a sure sign of failure. It took the British invention of the magnetron, which was "hand carried" to the US to change that picture. The Germans did not get into microwaves much but concentrated their Radar effort in the VHF/UHF range.

- **High Speed Oscilloscope**. This from a 1931 page of the "Electronics" magazine: What the microscope does in separating elements which lie close together in space, the electronic oscillograph achieves in separating events closely following each other in time. In the same way as improvements in the design of high power microscopes have furthered progress in science and industry, the high-speed cathode-ray oscillograph is bound to promote our understanding of important phenomena.

1998 HamVention VHF/UHF Forum summarized by Merle Rummel, W9LCE

I) Jack Nyiri AB4CR A Microwave Rover Station

Some people like the challenge of the Rover Station: helping get a sparse grid on the air, operating from different locations under limited conditions, etc. Here are several hints, learned by experience, which can help make your operation a success:

1) Why are you doing it? What is your goal of achievement? What will make it a success for you? Know this before you start planning. It may change with time and experience, but set your goal.
2) Determine where you are going? Be realistic about what you want to do. Pick a route, pick what bands you want to use. Determine what equipment you want to use, what power level you will be able to have, what type of antennae for the chosen bands, what vehicle you will use.
3) Plan ahead! - drive the route, 2 to 3 months ahead of the event. Look ahead at what the traffic will be on that day and hour you will be driving through, and where possible -what road repairs are being planned. Determine alternatives, the unexpected **will** happen.
4) Put the full station together, and have it operating, with plenty of time for alteration, before the event. Find all required tools, place them where they will be easily accessible.
5) Have backup equipment, spares on hand (gas/water/batteries/fuses/food/humor). Have everything for the isolation of the midnight location. Check out the vehicle thoroughly.
6) Choose a partner who is experienced with the bands, and can operate the equipment, someone you can be with congenially, someone you know.
7) Publicize your operation, route. Make schedules!
8) Get rested - sleep good the night before! (who knows when you may get to sleep again!)

II. Tom Whitted WA8WZG Microwave Contesting Methods

Many people participate in the Microwave Contests. Here are some basic ideas to help you improve your score from a winner!

Tom uses a separate radio for each of the VHF/UHF bands. In the microwave bands he uses a common IF/exciter, with a single switchbox which permits him the quickest possible bandchange: transverter, power amp, mastmounted preamp, and antennae. He uses separate control lines, with full sequencing, for fail-safe protection. The last thing you want -is to lose vital equipment in the contest.

A tube amplifier will give less TVI, and possibly avoid the time and delay of an irate neighbor, right when the big opening is heard.

Tom has discovered the facility of Computer Logging -during and after the contest. He has his Equipment Controls right in front of him, a **single** CW key line, a **single** Headphone control. Get everything done well ahead of time, so that everything is tested and working long before you will put it to this burn-in. Be rested!! -mentally and physically.

Some secret weapons: Use EME operation with the "big guys" to give you band and location multipliers. Use FM/WBFM gunnplexers/laser for extra multipliers.

III. Rus Healy NJ2L **The High Performance Station**

There are several alternatives you can use, to improve **your s**tation performance. Some of these are relatively low cost, yet give optimal performance.

One major consideration is the line-loss between the amplifier and the antenna. There are a couple alternatives that you can consider -best for your station:
--Avoid the relays: use separate transmit and receive lines; use separate lines for each band; use separate antennas for transmitting and receiving.
--Don't have long feed lines: use a solid state power amplifier, pole mounted at the antenna -for minimum line loss (and equivalent power at the antenna?). Put your receiving pre-amp up there at the antenna.
--Put the WHOLE THING up there on the tower -transverter, pre-amp/power amp! - come down with cheap coax at IF freq (best possible performance).

There are some definite cons (special considerations): it will need careful planning; there are service problems; it can be complicated, there will be HEAT/COLD (temperature extremes), tower wind-loading/guying. This is expensive equipment! [almost a Remote Station!!] You will want to use output sensors/directional couplers on each band; use remote weak signal reception at the house (hear yourself); use good weather-proofed containers (NEMA 4X).

Eliminate High Voltage UP the Tower, but avoid long High Current DC runs! which result in Voltage Loss. Plan for the future -get more current capacity where possible, use BIG wire. Bring AC to the tower base (breaker in the house!).

There will be breakdown, and service difficulties --use Good Quality Components!, even redundancy where possible (like the TR Switch being on Transmit -so if failure -you can use the station WO the tower pre-amp).

Evaluate the station. Do careful planning. Plan ahead. Make improvements on only 1 to 2 bands at a time. Consider what your options may be.

IV. Al Ward W5LUA **Microwave EME**

EME/Moon-bounce is a challenge. Microwave EME has its own trilling challenge to the experimenter ham, yet it is NOT something impossible. Its easier than you think! There is activity out there -and there will be more -when you join up.

The most active band is 1296, with 10 Gig being second. Weekends are active, and there are special EME Activity Nights. The location of the moon -in relation to the sun (big NOISE generator) and the Milky Way (another), determines most useable times. The moon moves in a pattern -closer (perigee) and farther (apogee) from the earth, and there is 2 dB difference between them.

With the very low noise LNAs available (1/2dB), a ham can start with a 3 meter dish. This will require about 20 Watts on 10 GHz, or 45 Watts on 2304 MHz. A 5 meter dish will give 5 dB gain over the 3 m. On 1296 and 2304 use Circular Polarization, 10 GHz uses Horizontal Polarization (Faraday Rotation decreases with frequency).

Doppler Shift is proportional to frequency (22 kHz @ 10 Gig). It will be 0 degrees at the zenith (overhead), be positive as it approaches the zenith, and negative as it recedes from the zenith. Libation is a noise, resulting from the variation of distances that the reflected signal makes with the mountains and valleys of the curved moon, and also from an oscillation (wiggle) of the moon, in relation to the earth. The very fact that the moon reflects the sun, gives it a 2 dB noise factor. (This can be used to assist in tracking the moon!)

There are several programs available for computerized moon-tracking. Al uses the W9IP NOVA Software, although another good one is VK3UM/F1EHN, on VE1ALQ webpage. The moon moves across the sky, as the earth turns beneath it. It also moves up and down in the sky, as the seasonal tilt of the earth changes. The moon has a 1/2 degree

diameter from the earth. This is the 3 dB beamwidth of the 5 meter dish, so there must be good accuracy in tracking the moon, in order to send and receive EME signals to/from it. The echo delay is 2 1/2 seconds.

Too many in the past have taken the technical challenge of moon-bounce, especially on 10 Gigs, done it once, and quit! Consistent Operation is needed, and there are enough hams who CAN do it, to make this an active mode of operation. There is an EME Net on 14.345 MHz and the K2OYH Newsletter "70 cm/
and Above" gives activity reports.

V. Barry Malowanchuk VE4MA **The GI7b High Power Amplifier**

The Russian Army War Surplus Tube, GI7b, has been commonly seen in Europe, and is very reasonably priced. The tube is useable to above 2 GHz, full power. It is rated at 2500 Volt at 0.6 Amp (1500 Watts input). Its biggest problem is cooling, since the Anode is rated 300 Watt dissipation and the Grid 7.5 Watt (air). Water Cooling seems to be necessary. It is absolutely necessary to keep SWR low. The grid is heat sensitive, more work is directed to better cooling of the grid in the cavity. Drive should be held to about 20-25 watts.

Barry viewed several approaches in obtaining higher power at the Microwave frequencies, and some of the problems with them: devices in parallel; power divider/combiners (and their isolation between ports), water cooling vs oil cooling, etc.

He brought a 1296 Amplifier that he built around the GI7b. He used 1 1/2 inch copper water pipe, in a standard cavity amplifier configuration: 3/4 wavelength anode cavity; 1 wavelength grid cavity. He used a 10-32 nut soldered to an N-connector as the probe. He had not run it up to full power, since he only has a 1500 Volt power supply. He was surprised to find that he was getting better than 50% efficiency, (that would be about 800 Watts out -on 1296!) He will be publishing his amplifier construction details. He is currently working on the same tube for 2304.

Our club has imported a few of these tubes, and we can get more on special request. (We were able to get these at $22.50/ea.)

VI. Mel Larson KC0P **Tropospheric Propagation**

An article in QST, Nov 1961 -DW Bray K2LMG, "A Method for Determining VHF Station Capabilities" predicted that there was a +/- 7 dB Tropo Hot Spot to Fade condition that would be encountered. How can you tell when your band conditions will be Up/most favorable?

Mel tested this by viewing several UHF TV stations near him, and watching the Weather Radar Observations broadcast on 162 MHz. His conclusions are: -the fades are mostly negative, not the predicted pulse-then fade -there is an early morning->evening improvement -better than the predicted 7 dB! -high pressure does not always bring enhanced tropo - especially if there is moisture near the ground -there will be many more 100 mile enhancements that 1000 mile (the latter maybe once a summer) -the test should have been done with the antenna higher off the ground -there is a lot of ground level echo/clutter that hinders accurate readings. Tropo needs height good above ground! -the location is everything - especially above local terrain.

Motorola's Iridium Spacecraft: Why They Flare/Glint

The mechanism providing the flare/glint appears to be the Main Mission Antenna (MMA)on each of the satellites. These antennae (of which there are three- 120 degrees apart, 188 cm wide x 86 cm long x 4 cm thick each) are highly reflective aluminum flat plates (treated with silver-coated teflon for thermal control) that are angled 40 degrees away from the axis of the body of the satellite. The axis of the satellite body is maintained vertical to the Earth's surface. On each plate are 106 electronic radiation elements.

The plate or MMA can provide a direct (specular) reflection of the sun's disk. This specular reflection is only tens of kilometers wide at the Earth's surface. In order to see a very bright reflection, the observer must be within this relatively small area. Prediction programs are available to determine this area.

The three sided (similar to an equilateral triangle) satellites themselves are not very large, approximately 4 meters long and less than one meter in width.

The above is from the Visual Satellite Observers Home Page (Steve Daniels)

Interested ? You can obtain date and times of the Iridium Flares for a week from:
http://www2.gsoc.dlr.de/scripts/satvis/satvis.asp Enter your city, and let the program give you the specifics.

The Iridium System of 77 satellites will be ready for use by September. The cost of this system was about $ 4 billion. The system got its name from the fact that the atomic number of iridium is 77. (ed.)

New HP Line of PLL Components

HP has a line of PLL gear. A recent announcement is a 3V PLL synthesizer "to complete the four-chip IC set that provides all the active radio functions needed for several wireless applications in the 1.5-2.5GHz range."

The HPLL-8001 is intended for use with an external VCO and the dual modulus prescaler contained as part of HPMX-5001 (a 1.5-2.5GHz up/down converter with a half-rate VCO with a 32/33 dual modulus prescaler, at +2dBm, down conv. gain 14dB, 10dB noise figure). Programming is over a 3 wire bus. Only 4mA operating current. Intended for DECT, WLAN and PCS applications...

HPMX-5002 IF mod/demod includes VCO, prescalers, phase freq detector, downconverter to 2nd IF, limiting amp chain, data slicer and received signal strength indicator (RSSI) with >75dB range.

HPMX-3003 LNA/switch/PA is a GaAs IC with LNA (2,2dB NF, 13dB gain @ 2GHz), T/R switch (55dBm 3rd order intercept point) and PA with +27.5dBm output with 23.5dB gain (at 3.6V).

Peter R. Ellis, VK1KEP

Solar Maximum Rush

In a recent notice by Dr. Dick Altrock of the USAF and in conjunction with the National Solar Observatory, the following bulletin regarding the current state of the solar cycle as it pertains to coronal Fe XIV emissions was released.

It is of interest because of its prediction for the timing of this solar maximum, which according to current estimates of Fe XIV data, might occur much earlier than other predictions indicate. The most popular and previously accurate methods have estimated that the solar maximum in sunspot activity will occur sometime in the year 2000.

We have quoted Dr. Altrocks statements verbatim as follows: "RUSH TO THE POLES" HAS BEGUN

The first reliable precursor to the maximum of solar activity that will occur near the turn of the century has been identified. A study of the long-term variation of emission features in Fe XIV has shown that, prior to Solar Maximum, emission features appear near 55 degrees latitude in both hemispheres and begin to move towards the poles at a rate of 9 to 12 degrees of latitude per year. This motion is maintained for a period of 3 or 4 years, at which time the emission features disappear at the poles. This phenomenon, which represents the fastest global motion of any kind on the sun that is sustained for such an interval, has been referred to as the "Rush to the Poles". The maximum of solar activity, as represented by the number of sunspots on the sun, occurs approximately 14 months before the features reach the poles.

In early 1997, emission features appeared near 55 degrees latitude, and subsequent observations have shown that these features are moving towards the poles. This then is the Rush to the Poles that heralds the next Solar Maximum. Based on previous observations, these features will reach the poles sometime between March 2000 and January 2001, which results in a prediction for Solar Maximum of between January and November 1999, substantially earlier than some other predictions.

Dick Altrock, altrock@sunspot.noao.edu USAF/AFRL/VSBS and NSO/Sacramento Peak (505)434-7016

The Leonids Shower ...

(in November) is getting its own conference, because there's to be a 33 year high this year with the prospect of satellites being hit and damaged or destroyed.

Read the story at: http://www.msnbc.com/news/161597.asp

There's some hype, but at least it's not "Armagedon": "... The particles, known as meteoroids, are vastly smaller than the asteroids that could one day slam into Earth, and none are expected to come anywhere near the surface of the planet when they strike this November... "

But, there's much talk of turning satellites away from the stream, etc.

I'm just glad that P3D *isn't* there (yet) to catch a meteoroid on the chin ! That'd be just our luck, wouldn't it !

Peter R. Ellis, VK1KEP

A Sample of the Upcoming **Central States Technical Program:**

"A Pair of 3CX800's for the Magic Band" by Dick Hanson, K5AND (ex N4HSM)
"A 144 & 432 MHz EME Array" by Rick Phillips, KB3BD
"The Simplest Beacon Keyer" and
"The FCC TV/FM Broadcast Database on Your PC" by Bob Carpenter, W3OTC
"The Early Days of VHF Amateur Radio" by Bill Tynan, W3XO
"The FCC's Safty Rules - Two Years Later" By Wayne Overbeck, N6NB
"An Overview of the May 8 to May 15, 1998 Tropo Openings" by Jon Jones, N0JK
"High Speed CW via Meteor Scatter, a Primer" by Jim Mc Masters, KM5PO
"A Single Conversion Hydrogen Line Receiver for Radio Astronomy and SETI" by Paul Shuch, N6TX
"High Accuracy Frequency and Time Standards" by Tom Clark, W3IWI
.....and many more .....

The Midwest

Did you ever wonder what constitutes the Midwest? The map below should help to explain. The following States belong, listed from North to South and from West to East: North Dakota, South Dakota, Nebraska, Kansas; Minnesota, Iowa, Missouri; Wisconsin, Illinois; Michigan, Indiana; Ohio.