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www.mvus.org

November 2007

MVUS Sunday Net at 14:30 UT (currently 10:30 AM local time, EDT).

The net frequencies are primarily 144.280 Mc and 28.960 Mc.

Nov Meeting Fri 23rd of Nov. (Day after Thanksgiving)

At the Hometown Buffet near SR 725 and Yankee Rd. in Centerville

X-mas Meeting, Bring XYL Fri 28 Dec. Same place

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Miscellaneous

We are inviting Papers/Presentations for the **2008 Dayton Hamvention** to be presented at the VHF Forum on Sat, 17 May 2008. Submit Abstract & Bio to: Red Dakin, W8ULC 4519 N Rt 123, Franklin, OH, 45005

2006 Proceedings still available

We have a few 2006 Microwave Update Proceedings left. Available for \$ 15 (including postage) or at the meetings for \$ 10.50. Send check to Gerd Schrick, 4741 Harlou Dr, Dayton, OH, 45432-1618

De N8ZM

As I write this, I am in mostly sunny California, a little north of San Francisco, getting ready to start a 2nd week of training for the company. It seems they still think the effort to fill my head with knowledge has a suitable payback. Well, who am I to argue?

Anyway, I have had a chance to hook up with some of my ham acquaintances out here, so it hasn't been all work and no play. Being as I am at the north end of Silicon Valley, these guys are on top of a lot of cool technology, and lots of neat junk as well. It makes me wish I had driven out in a truck instead of flying in a cigar tube.

A couple of weekends ago, I attended one of the Mid-America Microwave Society's Saturday meetings at the home of Bill Eaton, K9AYA. Several MVUS folks were also there, as well as many others. Bill and his wife were gracious hosts and opened their beautiful new house to us. Dave Sublette, K4TO, gave a talk about his efforts to build a precision LO using GPS and other technologies to stay on frequency while roving. Great Stuff!

Also there was Jeff Kruth, WA3ZKR, who is now at Morehead State in Kentucky. We have had a standing invitation to visit his Space research facility at the school since last year's MUD. Most of you know Jeff, at least indirectly, as the source of the 10 GHz 'white boxes' that we bought a few years back. Well, those were just the tip of the iceberg of microwave stuff that he has. I have tentatively set this up for the late March – early April time frame. The thought is that we would head down there on a Friday evening so that we could spend a large part of Saturday touring the facility, and then toddle off to Jeff's to check out his warehouse, and head home on Saturday afternoon. It is about a three-hour drive from Dayton, and carpooling and room sharing are possible.

Let me know if you are interested in an overnight field trip, or would prefer a different strategy. I haven't set a date yet, so that is also up for discussion. I would like to get something locked in no later than the end of January however, and with the holidays coming up, a lot of things will obstruct the planning process.

On another topic, be sure to check out the web site for the **MVUS FMT**. It now has the results and the winners. This event really attracted some attention, so we are seriously thinking about doing it again in the spring. While we now have a lot of the hardware covered, we would like to have amplifiers for 80 and 40, and maybe 20 meters more readily available. For our first effort, we only had an amp for 80, and it was borrowed. While we did have some QRM due to the QRO operation, we think we can handle that next time. We just need to find some cheap but reliable horsepower.

Well, that's all for now. Remember to check with Gerd to see that your MVUS dues are current. Have a Happy Thanksgiving, and I'll see you all on the 23rd.

73, Tom.

Happy Thanksgiving
Merry Christmas
and a Prosperous New Year 2008!

A Stiff One. When they fly on the space shuttle, astronauts are locked into a 12-story tube bolted to a canister with 2 million liters of liquid oxygen and liquid hydrogen. When what is in effect “ the largest bomb on earth” gets lit, everyone else retreats to a safe distance of three miles. If you were sitting atop that eruption, with no real piloting to do, wouldn't you need a good stiff one? [Charles Krauthammer]

GPS. “A pleasant voice guides you each step, and best of all, (unlike a human navigator) that voice never becomes angry if you miss a turn or just don't feel like following a particular instruction,” [Jay Koblenz]

Turn Off That Boob Tube. “Serving your customers means giving them something they need. I don't need a TV in my face when I enter your place of business; I need your attention and your assistance. I'm assuming you need my money. I think this will work if we can just keep those objectives in mind. [Allison Wood]

Digital Over the Air TV. When it comes to digital television, it's an "all or nothing at all" proposition. Once the signal is acquired, a steady stream of data assures you'll get a perfect picture and great audio. If that bit stream is interrupted, however, there will be nothing - just a blank screen. In areas with lots of buildings or obstacles, multi-path distortion can cause a "cliff effect" to kick in. The fix is to use a higher-gain antenna assuming the multi-path can be tamed. Work is being done to determine the optimal designs for improving error correction in set-top receivers.

[Solid Signal]

The Old WLW. Here is a reference for our Old Timers (newcomers can also look, but the terms will be sounding strange comparable to an OT hearing the word geek or I-pod.) This courtesy of Carl, K8CM and his ham friend who alerted him. Take a look: <http://www.ominous-valve.com/wlw.html>

What Happened? At the time of the first moon landing in 1969 NASA's Thomas Paine predicted vacations to the moon in 2 decades, that would cost an affluent thrill seeker as little as \$5000 round trip.” The spacecraft we use will be descendants of today's Boeing 707s and Douglas DC-8s, married to today's hydrogen-oxygen rockets.” In the same Time magazine where I found this tidbit is an ad by Philco-Ford showing a picture of the earth taken from the lunar orbiter with the note “Look at it this way: On July 21st the entire Earth becomes just another country.” [WB8IFM]

Remembering the old WLW By Jim, WB8SKY

I actually got to see that big stuff many times in the late 50's. Several of us from UC visited WLW and we knew R. J. Rockwell quite well. He would never stop explaining how everything worked from the old non-working 500 kW transmitter to his new cathode transmitter. On several occasions, he would switch the commercial service back to the "grindstone" 50KW AM transmitter (the backup) and play hi-fi records thru the cathode transmitter into a water cooled dummy load just to demonstrate to us students how good it sounded. Can you imagine anyone doing that today?

The whole place was very impressive (for electrical engineers). The two audio output transformers were especially impressive and massive. They were in the basement, with the insulators sticking up thru the floor into the output tube compartment.

The VOA site, close by, was just as impressive, especially that "wall" of transmitters. Professor Restemier (of UC) had designed most of the antennas and transmission lines during the war and if you acted interested, he would explain how everything worked. None of that experience could be duplicated in any way today at all. Today everything is secret and in "lockdown".

Direct Digital Synthesis (DDS) Oscillator

By Gerd Schrick, WB8IFM

There is now an affordable integrated circuit available that performs DDS. This circuit forms an oscillator by constructing a sine wave digitally. It does this by taking ticks from a reference oscillator to form a sine wave. The waveform can be modified to change frequency as well as provide many types of modulation.

The reference oscillator does not need to have an exact frequency as corrections down to a fraction of a Hz can be made in software. This permits the use of a quartz oscillator running at the optimum stability rather than tuning and pulling it to the exact desired frequency. That case is comparable to tuning a low noise amplifier for the lowest noise, which is not necessarily the point of best match and highest amplification.

Volker, DL2RZ, known for his work with slow scan, weather satellite reception and more, just put together a 5 MHz DDS vfo for the good old Drake TR7 and let me have a prototype to play with. One of the advantages of the DDS vfo is its clean spectrum with very low side lobes. As it turned out they even beat the original TR-7 known to be very good and certainly better than the phase lock loop type radios. (See graphs below)

The stability of the DDS vfo, of course, is as good as the reference oscillator. For Microwaves a combination of a DDS VFO and a PLL might be a good choice.

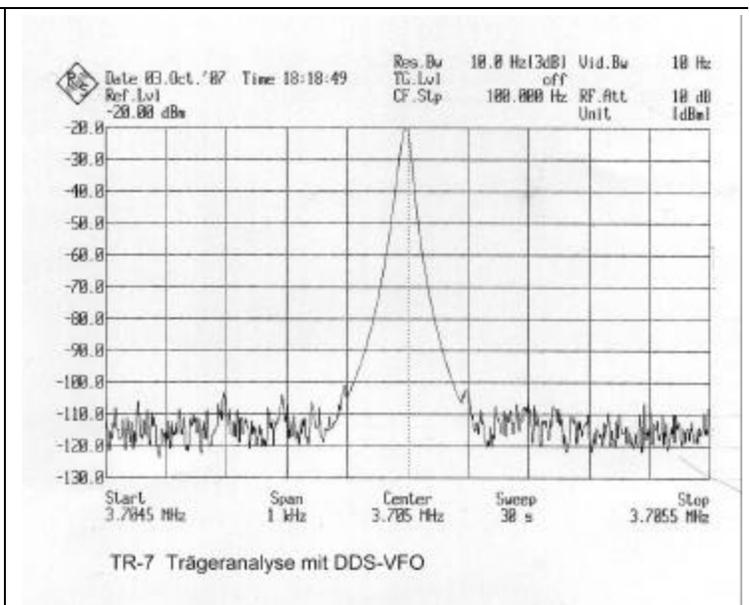
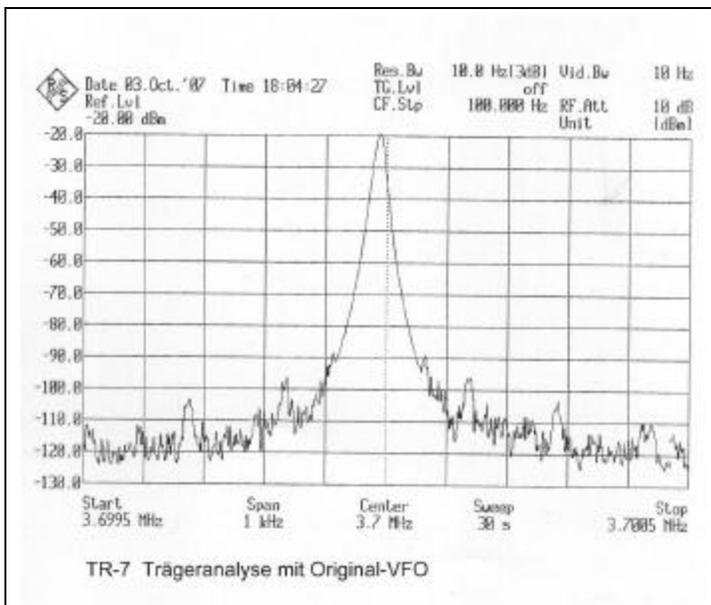
The IC is the AD9832 from Analog Devices; it requires a 25 MHz oscillator permitting DDS up to 12.5 MHz. There is also an evaluation board with all necessary parts including a crystal available. The IC costs \$6.50 , the kit \$ 150, both in 100+ quantities. For a single chip/board contact Analog Devices for samples.

I like this second VFO for my HF Drake TR-7 . It is a very small box, has its own built in frequency display and indicates: VFO on, off or split. The DDS frequency is also indicated on the Drake readout. One drawback is the “digital tuning knob” where you feel the indents and hear the frequencies jump. For satisfactory tuning in an SSB signal you have to go to steps of 100Hz. Of course, then it takes forever to move up and down the band. You can change the steps by pushing the button in and turning it. For some reason it is hard to get to do this, so at the present time Volker and I recommend to use the DDS for transmit and tune on receive with the regular VFO.

Graph of TR-7 signal with Drake VFO

DL2 RZ Measurements

TR-7 signal with DDS-VFO



The Future of Hand Held Radios

By Alfonso Torres, KP4AQI

Future hand-held radios will have many capabilities, which will nullify most of the present capabilities of existing radios. Technological advances which include, GPS, Voice over IP, Auto-Meshing Functions, Orthogonal Frequency Division Multiplex (OFDM), Dynamic Power Adjustment, Streaming Video (MPEG-4) and finally the capability to do data linking at the rate of 3 MB or better. If you think the above statement is a lot of stuff in one package, then let me tell you, it is. Let me explain.

Global Positioning System (GPS) will become a standard feature for most hand-held radios. The position of the operator will be provided to other units or to the "Meshing Repeater". This feature will allow operators to better serve the community during emergency situations (location for rescues, disasters, etc.). The units will have a revolving map.

The second nice feature would be that since the radio is **all-digital** Voice over Internet Protocol (VoIP) will become the standard method for communications.

Auto Meshing functions means that each radio will automatically recognize another radio within its range and will automatically link to such radio just like you do with Cell towers. Since each radio is linked to each other, it would be possible to go long distances without the use of repeaters. Present units have a capability to auto mesh 30 units but future units can auto mesh up to 3000 units.

Orthogonal Frequency Division Multiplex (OFDM) is a relatively new type of modulation (within the last 5-10 years), which is very robust against interference and is capable of being implemented in a digital format. Basically OFDM takes a normal carrier and splits it into tiny little carriers (maybe every 200 Hz). Each carrier is then transmitted orthogonal to each other (that is at 90 degrees in phase). Since each carrier is at a different phase, there is very little interference between carriers but at the same time, any outside interference which jams one or two carriers (out of a 100 carriers or whatever number is being generated based on bandwidth), has a very small impact. The OFDM could be generated with Spread Spectrum and/or Frequency Hopping functions. The FCC will have to authorize this type of communications for the ham community.

Dynamic Power adjustment is a function that since the two radios or more are already "meshed" they will tell each other the quality of the signal and adjust the output power to conserve battery power. This function already takes place on cell phones.

Streaming video is normally limited by bandwidth requirement and at the present time, the radio configurations are using about 20 MHz of bandwidth. With such large bandwidth real time streaming video is possible in a digital format.

The last capability for these new types of radios is the ability of performing **data link functions**. This will provide the capability of linking computers externally or using the built in computer located in the radio. At 3 Mbs rates, sufficient data can be transmitted or received to be equivalent to a "broadband" Internet system provider.

The typical transmit power for these radios are anticipated to be about **500 milliwatts** but an external amplifier can be connected to it for fixed location operation (or vehicle mobile units).

One key component of these types of radios is their long battery life, which presently is about **7 days of continuous use** without recharging. Present batteries are Lithium Ion based with plenty of ampere-hour ratings. The units are ruggedized and made from composite materials, which are covered with rubberized conductive polymers to shield the units from any spurious radiation.

If you think all of this capability is "wishful thinking" then think again. The units are being fabricated for the US Army and are being deployed in Iraq. The units sell to the military for about \$5,500 and as such they are outside the range of the typical ham radio operator but hopefully a commercial version with most of these features can be manufactured by one of the largest ham radio equipment suppliers. Attached is a picture of the Tacticomp 1.5 Unit. The units operate in the 2-3 GHz frequency domain.



Sam & Dave go to Philly.....(MUD 2007)

By Dave Powis, G4HUP/ND8P

...well, not quite as the musical stars of the last century, but in October Sam, G4DDK, and myself, along with John G4BAO and Sam's XYL Shirley made the trip to PA for the 2007 Microwave Update. Apart from some small logistical problems (like finding that the Inn at Valley Forge isn't – it's in King of Prussia!), the domestics of the trip were quite mundane.

We decamped on Thursday evening, in time to get a meal and meet a few friends, and get ready for the action over the next couple of days. The programme this year was very full, and the technical quality was, as ever, very high. This included a reasonable smattering of speakers from outside the US – from Canada, Belgium, the UK and Texas, as well as the usual good representation from within the country.

The organising committee had put together an interesting and diverse programme, including some updates on work of current interest, such as W1GHZ's continuing work on the Septum Transformer feeds, K2UYH's work on stressed dishes for portable EME, and Tom' WA1MBA's update on the higher band work at 78GHz. New material included frequency control systems from myself and from Christophe, ON4IY; a very interesting and often humorous presentation from Steve of DEMI on how he set up and tested a very large 2.3GHz amplifier – some indication of the scale of this is that 2 60amp supplies in parallel were limiting the output capability! He was seeing over 500W of RF output – and given that these amps are not very efficient, that means an awful lot of DC input! Roger, W3SZ gave a very useful and practical presentation on how DSP techniques can be used at VHF and up – thoroughly recommended reading for anyone starting in this area.

Perhaps the most graphically memorable incident was in the presentation by Grant, G8UBH, on the work of the microwave SDR group – Grant successfully demonstrated the difference between TCP* and UDP* by jumping from side to side and shouting out the Tx and Rx message headers – this brought the house down!

There were many more excellent presentations, both practical and theoretical – I can only cream off the surface in this short review, so my apologies to those who haven't got a specific mention!

The Friday evening Flea Market was well supported, and many bargains were to be had, as usual – of course, a number of trade stands were open during most of the event, and the measurements facility, kindly sponsored by Rhode & Schwarz, did brisk business on both Friday and Saturday. The Gala Dinner was well attended, and Joe, K1JT, gave an excellent after dinner speech which introduced us to some of the work he did back in the '80's and 90's, including standing at the focus of the Aricebo dish with a 70cm HT, and hearing his echos from the moon! He also took the brave step of allowing his Nobel medal to be passed round the audience – many people were photographed holding it, and I believe he did get it back in the end!

The weekend was rounded off by a trip to a local hamfest on the Sunday morning – where I managed to pick up a couple of items I'd been searching for for a long time – one of them a glass chimney for a 4-400A tube (and I know it won't go on 23cm!)

Overall verdict – first class event – and would we come again? Of course. Maybe not next year - it's in Minneapolis, although that's not a factor in the decision. I'm hoping to bring an update on my Direct Frequency Synthesiser to Dayton, so that will my trip for 2008, and Sam is going to the South East Weak Signal event in April. But maybe in 2009, when MUD is expected to be in Dallas/Fort Worth.....hope to see you there!

* In the TCP and UDP protocols used in computer networking, a port is a special number present in the header of a data packet. Ports are typically used to map data to a particular process running on a computer. [Wikipedia]

MVUS Frequency Measurement Test 2007

By John Ackerman, N8UR

The first MVUS FMT test was held on October 13. We transmitted three simultaneous signals (on 80, 40, and 30 meters) from Mike, W8RKO's house, doing one transmission during the daytime and one at night. Each transmission had three segments, so there were a total of 18 possible measurements to take.

We had 19 entrants from 13 different states/provinces, who submitted between one and 15 measurements each. Three entrants came from Canada and five from the west coast.

Connie Marshall, K5CM, from Muskogee, OK, was the winner. He submitted 15 of the possible 18 measurements (he didn't hear us on 30 meters for the nighttime run). His average error over those 15 measurements was -1.6×10^{-11} (that's 0.1 Hertz at 10 GHz!) and his "worst" measurement was 1.2×10^{-9} , or 12 Hertz at 10 GHz.

Three other hams -- W3JW, VE2IQ, and VE3OAT -- were bunched with average errors of around 2×10^{-9} ; they submitted 13, 13, and 8 measurements respectively.

We gave an award to the best score west of the Rockies, to recognize the tough job more distant hams have. W5UFZ in Maricopa, AZ, won that prize.

Martlesham Microwave Round Table – Nov 2007

Dave Powis, G4HUP / ND8P

Following just a few weeks after MUD is the prime microwave event of the UK calendar. This is one of a programme of 3 events that take place in the UK each year, co-ordinated by the UK Microwave Group. It is the largest, being a 2 day event which typically draws around 120 devotees each year from the UK, Europe and the USA.

There are similarities to MUD – we have two days of speakers, we have test equipment and measurement facilities, a Saturday night dinner, and we have a traders/flea market area. In previous years we have also operated an antenna test range facility, but demand for that seems to have ebbed at the moment.

There are also some differences from MUD – the event does not move in location each year – we are always hosted by the labs of the Telecomms company BT – but this means also we don't have the convenience of staying and meeting in the same venue – those who visit stay at a number of local hotels.

The range of talks and presentations this year was very wide, covering aspects of construction, microwave and EME operation, SDR techniques, remote station control, and common planning issues, such as beacon coordination. This event is also the venue for the UK Microwave Group's AGM, and some of the UK operating and achievement trophies are presented here, this year by the RSGB president Angus Annan, MM1CCR.

At the dinner on Saturday evening we were treated to an excellent after dinner speech from Angus, who admitted he was not a microwaver by experience, but had learned a lot from attending the event. The prime focus of his speech was on the theme of expanding interest in radio as a hobby and differentiating it from the 'commodity radio' (ie cellphones, bluetooth adaptors etc..) that have become such a part of modern life.

The UK Microwave Group is an active body representing the interest of microwave enthusiasts within the UK, but also has a very significant overseas membership. 10 issues of its excellent magazine Scatterpoint are produced each year.

<http://www.microwavers.org/>

Dream Location – Dream Job – Bill Eaton, K9AYA

I had heard a lot of Bill's fantastic hilltop location and when word spread he had an open house for his ham friends on Saturday 3 Nov I tagged along with Mike, W8RKO, and John, N8VZW, on the 50 mile drive to Hamilton in southern Ohio about 25 miles north of Cincinnati on the western ridge of the great Miami river.

It was a beautiful day and a pleasant drive. Mike was driving and I marveled at his GPS unit, sitting on the dash, which gave us verbal instructions when a turn came up. I had gotten a similar demonstration a few years ago from a friend in Germany where the technique has been in use for quite some time.

John had been to the place before so he knew which driveway to turn also. A very friendly German Shepherd greeted us. The garage was open but we didn't pay much attention to the many goodies arranged on two tables. Later Bill let us pick anything piled up there for free. Walking to the front of the house we marveled at the spacious driveway loop. We were greeted by Bill and his wife Judy and after a quick glimpse at the upstairs living area Bill led us to the "basement" where on one side he occupies a large room serving as shack, lab area, storage and mini shop. There we met a few early arrivals and after a short while I took a group picture (see xxx) More hams came later and I counted a total of 13, a number that the house could comfortably accommodate.

The first thing you noticed in his shack was a huge Moosehead on the wall to the right and on asking Bill told us his mother had shot this moose in the early 1940s before he was born. He also showed us a newspaper article with this story. His mother was a real sharp shooter and belonged as the only woman to the Dear Hunters Association, a regional big game hunters club. The newspaper compared her to Annie Oakley.

The house had other interesting artifacts that I just noticed in passing and had no time to ask about. There was a small cannon, a slot machine, a Tesla coil demo and more.

Of course, we concentrated on the assortment of ham and test equipment of all kinds. Actually in hindsight there were two unusual things I noticed. The abundance of test equipment and the lack of big antennas. Of course there was some ham equipment in between the many test rigs and Bill had a 50-foot crank up tower with a yagi and dish on top. He also had mounted a camera on top of his tower, which he could rotate, a feature I have been thinking of for my tower for some time, and might tackle it now that I have seen one in action.

The lack of big antennas is easily explained as at the frequencies Bill is interested in, 90%+ of the antennas use dishes and so he had a number of

dishes set up around the house for the various bands and ready for roving with most of the necessary electronics integrated.

Bill's set-up could inspire you as it could depress you when you realized you had a long way to get there where he is now, starting with finding the ideal microwave location.

Bill graduated from Purdue University and his latest position is with the city of Hamilton to maintain a fiber network to all the city installations, which include all the water towers in the area. So he could obtain a permit to install beacons (presently on 5.6 and 10 GHz) at a good water tower site a few miles away. He solved the omni direction problem in a very clever way by mounting directional antennas underneath the tower illuminating the rounded bottom which effectively reflects the signals in all directions from a respectable height.

Just when we had taken all that in came the announcement: Pizza had arrived and we should come and get something to eat. Well a lot more than just pizza awaited us. Judy had prepared a delicious salad with homegrown tomatoes and a classy American fruit salad with fresh melons, pineapple, strawberries and blueberries. And, of course, there were the mandatory cookies as well. A big thanks has to go to Judy for that.

After lunch we settled down in the very large basement family room for a presentation by David, K4TO, about his Phase lock Oscillator project which approaches conclusion and which sometime soon will replace the individual oscillators in his tower mounted equipment. All oscillators then will be tied to one stable reference, which would end the guesswork for locating his signals on the various bands because of frequency.

The gist of a lot of the conversations, I overheard, was the uncertainty of the frequency readout on x-band but basically on all the higher microwave bands actually. It brought back memories of a Field Day where I spent maybe an hour or so to find my satellite downlink on 2.4 GHz. Fortunately the satellite (AO-40) was still available for a few hours thereafter.

Bill showed us a small portable box containing an 1152MHz oscillator phase locked to a stable 12 MHz x-tal oscillator. This frequency then drives a small "brick" which in turn drives a diode, which generates plenty of harmonics to calibrate your equipment. A very handy gadget indeed and highly recommended as standard equipment for rovers, field day etc!

For a goodbye, Bill got out a box of 9.6 MHz variable x-tal oscillators that he had purchased cheap at a flea market and gave everybody one, who raised his arm.

[Gerd, WB8IFM]

K9AYAA



The House on a Hill



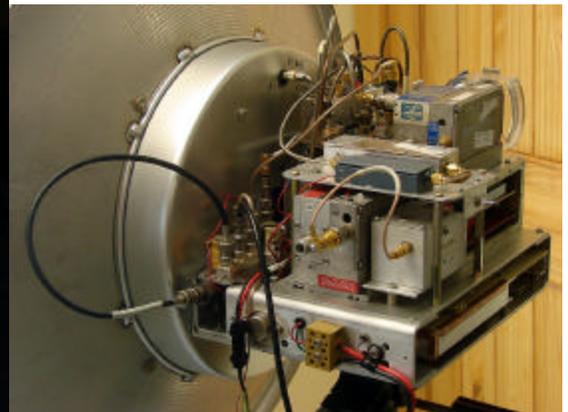
Bill, K9AYA & xyl Judy



Do You Like the View?



Can You Read the Frequency Now?



One of Several Integrated Stations: Dish, Feed and Equipment