January-Meeting: Friday, the **29th**, at 7:30 PM at the Perkins Restaurant at SR 73 and I-75.
Meeting Topic: TBD (President's Surprise)

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Upcoming Events

Cincinnati Winter Great Lakes Division
Communications & Computershow
Febr. 27 & 28 1999
at Cincinnati Gardens Exposition Center

Southeastern VHF Conference Apr. 9 & 10 1999
Atlanta, GA
www.akorn.net/~ ae6e/svhfs

Dayton Hamvention May 14, 15, 16 1999

Drive safely, don't speed, don't follow too close!

De N8ZM

Like that rabbit in Alice in Wonderland, I'm late for a very important date. Gerd asked me a week ago to get this together, and with the combined effects of workload, weather, and such, it just didn't happen. My New Years cheer will also reach you a bit late, but hey, you've probably had a fine two weeks thus far. I do hope that little bit of snow didn't inconvenience any of you substantially.

OK, down to biz. This month has five (count 'em) Fridays, and the first one was a holiday, so we are going to delay our January meeting by one week, to **Friday the 29th**. So make a note on your calendar NOW! I'm working on a couple of ideas for a program (like the filter tuning demo we didn't get to do in November), but can't promise anything yet. Be there for the surprise!

At the Holiday dinner, which was great fun by the way, Red, W8ULC, suggested that in April we should hold our meeting on a **Saturday** and have a day long opportunity to test equipment for noise figure, intermod performance, sensitivity, and such. The idea was well received (no pun here!), so I am starting to put a plan together. We have to consider things like where and when and what can we obtain in the way of test equipment, as well as getting folks who know how to perform the tests competently. More as this develops, but start getting your receivers, preamps, converters, and such organized for this event.

I don't think I mentioned it here before in this space, but MVUS now holds club license KC8LEZ. Paperwork is in the mill to finish the task to change that to W8KSE, as planned.

Until next month, keep warm,

Tom.

** **The VHF/UHF Spring Sprints** --traditionally held during April and May-- have been dropped from the ARRL contest schedule. ARRL Contest Branch Manager Dan Henderson, N1ND, cites a lack of participation for the change. "Participation in the VHF/UHF Spring Sprints has never reached the level of a healthy national event," he said. "In 1998 only 200 individuals submitted logs spread across the seven frequency bands covered by the Sprints." Henderson said budgetary constraints were another factor. –

ARRL Letter

GI7b tubes available. $ 25.- ea. Postage: one or two tubes $ 3.- Three tubes $ 4.- four tubes $ 5.-
Gerd Schrick, WB8IFM, 4741 Harlou Dr. Dayton Oh 45432-1618 Tel (937-253-3993)

Reminder: For most members dues ran out with the end of last year. Please take time and check your label which indicates the month and year your subscription/ membership is paid. Membership is still only $8.- Please submit to Gerd, WB8IFM.

More EME for John, WA9OUU, (New Holland, Ohio). On the second EME contest weekend of Dec 5&6 98 John had CW contacts with W5LUA, WA8WZG, OE9ERC, OE9XXI, K5JL, K2DH and HB9BBD. He also had a good copy of SSB QSOs between several of these stations with his 4.4 m dish. He's working on getting a little more power! Good luck, John.

This and That 1-99

- **24 GHz Activity**. This issue of the newsletter has reports about the 24 GHz band from both sides of the Atlantic with fairly equal assessments. There were no big surprises. 10 Ghz still is the preferred high microwave band. One problem with 24 GHz is the lack of stations, another the lack of power. Surely both will improve in time. So, why don't you consider getting on 24 Ghz this year. Then come next year you can always say , you were active on 24 GHZ in the previous century!

- **Increased Power**. Every year, as computers have grown in power, programmers have added little gimmicks - always just enough smarts to bring your computer to its knees. W.Wayt Gibbs, Scientific American.

- **Sharp Pencil.** Pencils carrying the anti drug slogan: "Too Cool to Do Drugs." A sharp-eyed fourth-grader noticed that the message changed to "Cool to Do Drugs" and then just "Do drugs" when the pencil was sharpened. The embarrassed company turned the writing around on their new batches of pencils. Why does the forth-grader think the company didn't catch this mistake? " I guess they didn't sharpen their pencils!"

- **56kbps, My Foot.** Finally brought my internet connection "up-to-date" with a new Robotics 56 kb/sec modem. Well, over a period of a month I recorded the "connecting" speed of my telephone line. I usually connect two to three times a day and here is what I found. The highest speed was 26,400 bps, this I got twice! Most of the time I wound up with 21,600 bps, but also often less than that. The lowest speed I recorded was 14,400 bps during a snow storm.

- **The Cosmos**. Don't you wish you could come back and visit? Almost nothing is "forever", the cosmos will be a very different place 10^{14} years from now and it will be alien indeed in 10^{100} years. And in a billion years the earth will definitely be inhospitable (too hot) for life. Fred C. Adams & Gregory Laughlin

- **More than Meat and Potatoes.** They still serve steak and eggs, but now along come fruit, cereal and bagels at the traditional NASA breakfast before lift off. At Glenn's mission back in 1962 it was strictly "meat and potatoes". Time

- **Penny Pinching.** If you have a good design you stay with it! But many manufacturers tinker with their products on a periodical basis in order to attract more buyers. In that process, good features sometimes get lost. Conversely, a normal person would want to improve on a bad feature. Not so the automobile manufacturers. We all remember the poor, near useless clocks they put in cars, before the "quartz" took over. A knowledgeable engineer just told me that for an extra $ 1.50 the clock supplier could have fixed the problem, but the car companies found this unacceptable.

- **Some Assembly Required.** Which do you fear more, this or "call our free tech support line". You certainly can judge a product from the "support" that the maker provides. When you call and wait and wait, then get shunted and keep pushing buttons, what does that tell you? Yes, there is a problem! A good product would require minimum support and that would be quick. Margaret Thatcher said: "Quality is about products that don't come back for customers that do."

- **CD-ROM**. The original CD-ROM (invented in 1987) has a capacity of 2.8 billion pits! There have only be a billion seconds since the Roman Empire flourished. Optical Imaging Systems, Inc.

- **Peace and Quiet.** A Japanese Company has sold many thousands of "Wave Wall" devices. This pocket size product costing about $500.- prevents all cellular phones in a 20 foot radius from ringing. It caters to people who are bothered by the incessant ringing of portable phones in public places. A very desirable feature! Does anybody know how these devices work?

24 GHz CW/SSB ACTIVITY IN NORTHERN ILLINOIS

by Jim Mitzlaff - WB9SNR

Here is an article summarizing our first year on 24 GHz CW/SSB. There is nothing “outstanding” to report, like a 200+ km QSO. That never happened. Nevertheless I thought to let y'all know how things have been going on 24 GHz. I figure that some of our fellow "flatlanders" might want to know what to expect using low power over obstructed paths.

This all began in the middle of 1997 when W9ZIH, K9PW, K3SIW/9, and myself decided to make a group purchase of 24 GHz SSB/CW modules from DB6NT. We each got a basic transverter module (MKU 24 G) and a combination LNA/PA module (MKU 245), all of which have been working perfectly. Three of us got DB6NT LO modules (MKU 12 LO), but two of these have been replaced by 12 GHz "bricks" because of frequency drift problems. K9PW and I also assembled DB6NT LNA "kits", both of which worked well from the first time they were powered up, with little or no tuning. All of us spent winter 97-98 putting these modules together with some re-tuned 23 GHz waveguide filters and various T/R switching arrangements to come up with 144 MHz to 24.192 GHz transverters with about 3 dB noise figure and 60 mW output. Right now, we're all using "portable" type setups with 30 - 60 cm (1-2 ft.) diameter dishes.

Our best DX so far has been 113 km, across Lake Michigan from EN62CF (Waukegan, IL) to EN62SC (St. Joseph, MI). Band conditions across the lake were wide open at the time, giving 20-30 dB over S9 signals on 10 GHz and S3 signals on 24 GHz. A later attempt over nearly the same path yielded only S5 signals on 10 GHz, and nothing on 24 GHz.

Under more typical conditions, all of us have made 80-85 km QSOs over various paths. Signals were always weak and had deep, rapid QSB, which made for difficult CW copy. This is probably the best we can do without more power or a band opening. We just don't have the high mountains that the east and west coast guys use to give longer LOS or near LOS paths. For us, a typical hill might only be 15-30 m (50-100') above "average terrain", just high enough to clear the treetops on the next hill. Even our best hills are only about 150 m (500') AAT which yields a typical radio horizon distance of just 50 km.

One final thing worth noting are the results of a couple tests run over a 77 km path, from EN52SA (between Elgin and Burlington, IL) to EN52HB (Mt. Morris, IL). Operating positions at both locations were on hills at about 30 m AAT. The first test was on 9/19/98 when the temperature was around 85 F and the dewpoint was 68 F, and the second test was on 11/6/98 with a temperature of about 40 F and a dewpoint of 26 F. Somewhat surprisingly, the 24 GHz signals were about the same on both days despite the large differences in water vapor levels. According to W3EP's article in the ARRL UHF/Microwave Experimenter's Manual, the lower dewpoint during the second test should have reduced the path loss by 24 dB, assuming that the signal remained near ground level over the entire path and all other propagation effects remained the same. I see two possible explanations for this. First, the signal propagation may actually have been by troposcatter, higher up in the atmosphere where the dewpoints are always so low that water vapor attenuation is not significant over a 77 km path. Second, the ground level path may have become more "obstructed" due to the reduction in water vapor levels, which would have reduced the "normal" refraction of radio signals due to the decrease in water vapor with increasing altitude. The resulting path loss increase could have just canceled the path loss decrease due to the lower dewpoint. Right now, I'm leaning toward the latter explanation because I've also observed that 24 GHz signals quickly deteriorate if even one station has to operate from a location that is less than 30m AAT. I don't think that a true troposcatter path would be quite so sensitive to antenna elevations.

Right now, it looks like most of our 1999 24 GHz tests will be on paths over Lake Michigan, since that's where we've had our best DX this year. With one station in one of the "dunes" parks at the southern end of the lake and the other station running north along the WI lakeshore, it should be possible to work paths up to 200 km given a reasonably good band opening. From what I've seen during my trips along the lakeshore, I suspect that there are quite a few microwave band openings across the lake. What we need however, is a way to reliably predict these openings far enough in advance that we can get our portable gear set up before the opening fizzles out.

GHz-Report from Germany

By Ann and Ernst Willert, DJ 0 IX + DK 3 FF

Concerning 10 GHz-activities we had a most rewarding 1998. The real improvement came, when we added a 5.5 W transistorized power amplifier to our 200 mW transverter. It wasn`t cheap though! As all my other microwave gear, this module was also totally homebrew including machining the aluminum casing. It still ran up to USD 650.- with the driver and final transistor absorbing 90% of it. Feeding the RF to a combined 10 / 24 GHz 62 cm dish with a gain of 33 / 40 dBi results in an EIRP of 11 KW. *

It paid off during the IARU microwave-contest in October. All Dx-stations (i.e. 100 miles +) reported the signal to be stronger than on 1296 MHz; this is the band we usually use to set up scheds on higher frequencies. Because of the weather the propagation has been moderate during the past year. We didn't have many pronounced highs and there were also no solid cold fronts for rain scattering. The best situation for rain scatter-Dx is a heavy cold front about 200 miles away with no precipitation between it and yourself. Then, 400 mile contacts can be accomplished at 59+ with numerous stations. Two features are noteworthy during this condition: 1. One can hear several local and Dx-stations call CQ at the same time (just like on a VHF-band) and 2. the pointing accuracy of a high gain dish - normally +/-2dg - has a lot of tolerance. Quite a few times I have found several signal maxima spread as much as 20dg apart with only one S-unit of difference. It seems that in order to have a comfortable Dx-QSO at 55 levels one should have a minimum of 300 mW into the dish.

A good indicator for the overall situation are the many 3 cm-beacons in central Europe which pop up just as the 50 MHz beacons during sporadic E. Signal quality appears to be the best when the energy is being bounced off of heavy rain-, sleet- or snow-curtains as they are typical for thunderstorms. There also appears to be a relationship between signal strengths and the velocities at which the precipitation is falling. Rapid movement of rain and ice particles seem to cause higher electrostatically charged masses of air, thereby increasing the mirror effect. As the front comes closer and breaks up into individual thunderstorms, Dx and signal quality go down too. In this case, it is essential to be able to adjust the elevation of the dish; elevations of up to 10dg are possible (see photo in QST July '98, page 19). The signals often resemble aurora transmissions; in one case a very loud SSB-signal became so garbled that we both had to switch to FM-mode. Although rain scatter on 10 GHz has been around for quite a few years, there are still a lot of unknowns to be more scientifically looked into, e.g. electrostatically charged air masses. Friends told us that there were some rain scatter contacts on 5.7 and 24 GHz also; for some stupid reason I didn't fire up those rigs. Something to look forward to in 1999!

I hope I was able to get one message across: It doesn't have to be a large metropolitan area to have an occasional (line-of-sight) SSB or CW QSO on 10 GHz!

*) For 6 and 9 cm a 1m dish is used and Yagi antennas for the lower bands.

AMSAT P3d Temperature / Vacuum Tests successful

A report from Germantown near Washington DC by Peter Guelzow and Werner Haas

From the 13th to the 30th of October (98) AMSAT's P3d satellite spent time at the Orbital Science Corporation in Gemantown, Maryland, approximately 50 km outside the US capital Washington for testing. Transporting the satellite from Orlando, Florida and back in a rented truck took not quite two days each way. Drivers were Bob Davis, KF4KSS and Rick Leon, KA1RHL both from the integration team in Orlando. After the arrival at Orbital the satellite was put in a cleanroom and prepared for the thermal-vacuum test. Among other items additional temperature sensors were installed. In the cleanroom air is exchanged at a rate of 65 times per hour. The ventilation system is never turned off in order to prevent contamination. Persons entering the cleanroom must wear protective clothing. (Photo)

Other than integration manager Lou McFadin, W5DID and his team, there were Michael Fletcher, OH2AUE from Finland as well as Werner Haas, DK5KQ and Peter Guelzow from AMSAT-DL. Project leader Dr. Karl Meinzer, DJ4ZC, joined us e a few days later, having had to attend to some important meetings following the successful launch of the ARIANE 503.

Prior to bringing the satellite into the test chamber all systems received a final check out. Using a crane and a special suspension fixture, P3d was brought into the 11 by 16 foot vacuum chamber. Cables were connected to receivers, transmitters, power supplies, the umbilical plug (telemetry and command per wire) and the additional temperature sensors. More cables provided 30 quartz halogen radiators with power which were later used during the "hot phase" of the tests.

(Photo http://www.magicnet.net/~phase3d/dailyphotos/dp981022.html

Following a suggestion by Rick, KA1RHL to put a microphone on the satellite a simple RadioShack type piezo electric buzzer element was obtained for a few dollars and installed. Of course, in a vacuum only mechanical oscillations and vibrations can be picked up. Initially only an oscilloscope was connected. Later, however, a simple amplified PC speaker, also obtained from RadioShack, was hooked up. The outcome was so surprising and spectacular that we now plan to include such a "mechanical mike" for the upcoming launch. ... More to follow ..

Dummy loads were connected to the transmitters out side the chamber and attenuators to the receivers for protection. Antennas for 2m, 70cm and 23cm were installed on the roof of Orbital Science Corp.

A few kilometers away in a room of a hotel a complete P3d command station was installed. Using just "indoor" antennas P3d could be monitored and commanded at all times. The RUDAC-group (Chuck Green, N0ADI, Harold Price, NK6K, Jim White, WD0E and Bdale Garbee, N3EUA) operated several ground stations at the hotel. Thus the programmers were able to work in parallel with the RUDAK-A and RUDAK-B processors.

After a last brief function test the heavy doors of the chamber were closed and the diffusion pumps were activated. Almost eight hours later the chamber was down to 2x10E-7 Torr. P3d for the first time experienced the conditions of the vacuum of space. The 70cm tx was turned on first and P3d was "on the air". Hams in the surrounding area were able to observe the telemetry beacon of P3d for the first time. Immediately Michael Fletcher, OH2AUE and Werner Haas, DK5KQ began measuring the transmitters and receivers while Peter Guelzow, DB2OS commanded the spacecraft, checked the on board processor and other digital systems. Following this phase the green light was given for the first temperature cycle. P3d's temperature was lowered to below -20C, with temperatures on the skin of the satellite considerably colder yet.

The walls inside the vacuum chamber were cooled down by liquid Nitrogen to approximately 100K (-173C). Remaining air molecules and other remnants are being deposited on these inside walls. This simulates the cold, black condition of space. With no convection taking place the only heat transfer is by radiation. Consequently it took close to eight hours before the -20C temperature was reached. Inside the satellite heat transfer also takes place only through radiation or conduction through mechanical connections.

In the development of the satellite one had to consider the fact that some modules like the high power transmitters generate a lot of heat while others like the computer generate very little heat. Consequently the heat resistance of the fastening methods of the modules was adjusted according to whether they got too hot or stayed too cool. The high power transmitters were outfitted with "heat pipes" which quickly carry the heat away from the modules. The satellite had to be leveled to within one degree when brought into the chamber to make the heat pipes perform properly while still under the influence of gravity on the ground. After arriving at the desired temperature and holding it steady at that point all components in the satellite were tested again.

After the conclusion of the "cold" measurements and experiments the satellite was heated up with the quartz lamps to a temperature of + 45C which took approximately 6 to 8 hours. The process was speeded up by activating some of the high power transmitters. When the high temperature was reached, again all modules were checked in their functions. After that, taking some 8 to 10 hours, the satellite was cooled again down to -20C. When that temperature was reached receivers and transmitters were again measured. At the conclusion of the tests a total of 5 complete cycles with temperatures from -20 C to +45 C had been performed.

Aside from all the transmitters and receivers other systems were as well checked. The magnetically suspended momentum wheels were for the first time tested in a vacuum at 3000 rpm. This test was very successful. The microphone mentioned above provided for a spectacular listening experience for all participants. Besides making out the on and off switching of the magnets one could clearly hear the acceleration and deceleration of the wheels. Team workers from Optical Sciences could not recall any comparable crazy idea from other satellite tests. In deed, the microphone provided a real benefit, in that the proper functioning of the wheels could be ascertained. After connecting the mike output to the audio input of a laptop with a sound card and an FFT (freeware) program, one could determine the exact rpm of the wheels. The switching of the antenna relays and other phenomena could also be captured. The release of mechanical tensions were noticeable when the satellite cooled down from the + 45 C. Plans are to connect a comparable microphone directly to the IHU-2 (YAHU). Then one could not only observe the momentum wheels but also the release of the solar panels, the valves of the two motors and their burn phases.

Special thanks has to go to Orbital Science Corporation which supported the AMSAT P3d project in an exceptional manner by making their resources freely available. Around the clock were three shifts with two technicians present to maintain and control the vacuum chamber.

Also support was obtained from hams in the Washington area who maintained a “vigil” during the night to alert the P3d team at the motel, if needed. Fortunately no such situation occurred.

P3d concluded successfully the five temperature cycles on 29 October. The chamber was brought back to normal temperature and in another 8 hours the pressure was back to normal as well.

Project leader Dr. Karl Meinzer, DJ4ZC declared the test very successful. A few problem areas were identified that need to be addressed. This was to be expected, since this severe test is designed to show weaknesses before the satellite is released into space, he said. No major problems or other irreversible failures occurred. P3d is now a real satellite with its own personality and quirks, before it was just a collection of components and modules.

The thermal vacuum test is an intensive experience requiring a considerable amount of work which has to be performed in a short period of time. During the tests roughly 30 megabytes of telemetry data from the on board computer were recorded . These data will be further evaluated by AMSAT engineers in order to better understand the performance of the satellite. These tests and examinations will assure that P3d will perform well after launch and have a long life.

The RUDAK team also could report a positive outcome. All goals were achieved and the test was a full success. RUDAK was capable to communicate via the CAN bus with the SCOPE camera. A series of pictures were taken during the tests. For this purpose a space qualified mirror was installed in the chamber. Of course, the heat lamps had to be turned on, or else everything would have been just black. Also the Smart-Node controller, the RF monitor experiment and the CEDEX radiation experiment were successfully activated and data could be collected.

Next on the agenda is the shake test in early 1999, which in particular is simulating the vibrations experienced at launch. All modules will be checked one more time and if necessary corrected, then filled with foam before this test. After that P3d is ready for launch. The reader might want to know: how come that only now the thermal vacuum test was done and the shake test is planned for later yet? Was not P3d supposed to be ready much earlier? The explanation is simple: the shake test can only be performed after it is known which rocket will be used and how severe the requirements are. After we were forced to further delays last year and then again earlier this year, eventually even leading to a cancellation of the launch, there was no reason to rush. The additional time gained could be used to implement further corrections and improvements. New experiments were included; e.g. the new IHU-2 (YAHU) computer was developed and built in record time. It survived the thermal vacuum test with flying colors.

A very positive sign and hope for optimism was also the visit of Bernard Lacoste, a ranking representative of ESA, during the thermal vacuum tests at Germantown. Just prior to this was the successful launch of the Ariane 503 from the spaceport Kourou, albeit without P3d. The ESA visitor was impressed by our satellite work and promised all possible support in identifying a new launch opportunity and in future negotiations.

In the meantime P3d is back in Orlando. Preparations for the shake test have started. After all modules have been foamed a spin balance test will be done. A special machine was developed by AMSAT for this purpose so that this test can be performed at the integration center in Orlando. In January (99) a team from Germany will again travel to Orlando to perform final work on P3d.

A successful launch of P3d will make a high tech satellite available to amateur radio operators which is unique in the large number of operating possibilities and will open up a new area in satellite communications.

SCOPE-Projekt der JAMSAT: www.jamsat.or.jp/scope/index_e.html P3D Lab in Orlando: www.magicnet.net/~phase3d/
RUDAK: http://users.sgi.net/~hprice/rudaktv.htm

MirSuccess Dec 12, 1998 Rev 3

Historical Achievement for Amateur Radio and the Mir Space Station!

The rewards of success is now a reality for a group of Experimental Amateur Radio Operators and is currently being shared around the world!

Almost 2 years ago an idea was discussed among Don Miller, W9NTP, Farrell Winder, W8ZCF, Hank Cantrell, W4HTB, Dave Larsen, N6CO and Miles Mann, WF1F, about the possibility of putting a small, lightweight Amateur Radio SSTV System aboard the Mir Space Station. On Saturday, Dec 12, 1998 exciting rewards were received after obtaining , assembly and getting the equipment aboard Mir. Beginning around 17:25 UTC a series of perfect pictures were recorded , 3 of which are shown here:

The 1st picture shows Cosmonaut Gennady Padalka (Flight Engineer aboard Mir) with the SSTV equipment in the background. This equipment was sponsored by Tasco Electronics, Kenwood Corp, PictureTel Corp, Apple Computer, and assembled by W9NTP, W8ZCF and W4HTB . See below.

The 2nd picture shows both Flight Engineer Gennady Padalka and Commander Sergej Andeyev aboard Mir in front of the camera.

The last shot is a typical picture being received from the Piroda Module showing a part of Mir and the Earth in the background. See below.

A very detailed history and narrative of the evolution and progress of this story can be found at the MAREX(NA) web at: http://www.geocities.com/CapeCanaveral/Hangar/7355/sstv_proj.htm

Initial tests were set up on 145.985 MHz FM being shared with the Mir PMS frequency. At the conclusion of tests, the frequency set aside for SSTV from Mir is 437.975 MHz(+/-) doppler. SSTV Mode is Robot 36, pictures every 2 minutes, with the possibility of 720 pictures/day.

Earth Stations should now be able to become closely aquainted with the Mir Space Station and share in the excitement of receiving pictures from Outer Space. Schools who schedule contacts with Mir will especially benefit in educational aspects by being able to see who is actually speaking to them.

Picture 1. (Original is in color!)

Picture 3 (Last, original is in color!)

HAMVENTION 99 Lineup for the UHF/Microwave Forum

Moderators: Merle Rummel, W9LCE and Red Dakin, W8ULC:

Joel Harrison, W5ZN --ARRL Vice President; Engineer, Ultrasonic Imaging, Nuclear Industry, Robotics

"10 GHz-24 GHz -Dual Band Antenna, Transverter" these cm waves have a lot in commo n
put these two bands together -for lots of new experience

Paul Wade, W1GHZ Computer and Microwave Engineer: Compaq; QST, Handbook and Microwave Update articles

"10 GHz - Its Getting Easier"
Narrow Band Microwave -at 10 GHz now easier than its ever been

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Doug Smith, KF6DX --Chief Engineer, Kachina 505DSP Receiver; QEX Editor; QEX DSP Articles '98; working on ISS (International Space Station) ham equipment

"IF-DSP for the HomeBrewer" (given a 1 hour block)
Digital Signal Processing on homebrew equipment emphasizing the Direct Conversion Receiver/Phasing Exciter
use a DSP Microprocessor and a little programming the latest thing in a typical homebrew challenge

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Ed Krome, K9EK --Engineering Manager for Rockwell Automation; builds own Radio Gear; Holds 9 Patents, is a "Distinguished Corporate Inventor" Akron; Authored AMSAT's "Mode S: The Book"

"Construction Techniques for Microwave Transmitter Cavities" building of a Microwave Cavity for Power Tubes
the GS9 and the 7289 tubes on 23 and 13 centimeters

Dave C Olean, K1WHS --Engineer, owner: Directive Systems -manufactures loop yagis for Down East Microwave.
EME "The Maine Monster" (1980)

"An Aurora Detector"
See Earth's Magnetic Field -in real time low cost flux gate magnetometer -monitor storms directly
"How many openings have you missed? "How many times have you quit -when it appeared to die
only to come back later -and you missed all the DX?

NEW ARRL TECHNICAL AWARDS…

The ARRL Technical Service Award

This award will be awarded annually to the licensed radio amateur whose service to the amateur community and/or society at large is of exemplary nature within the framework of Amateur Radio technical activities. Formal nominations may be made by any ARRL member. Supporting information, including the endorsement of ARRL affiliated clubs and elected or appointed League officials, should be submitted along with the nomination document. The award is intended to provide encouragement, and a tangible reward, for amateurs who are outstanding in the field of technical service. It also provides an opportunity for Amateur Radio and its many benefits for society to be brought to the attention of the public. Nominations should be received at ARRL Headquarters by March 31, 1999.

ARRL Technical Innovation Award

The amateur community has witnessed great changes over the past 75 years, all the way from spark to space. At the heart of many advances in radio art has been the amateur himself. It has been and will remain ARRL policy to encourage amateurs to continue to lead at the forefront of technological advancement. The ARRL Technical Innovation Award will be granted annually to the licensed radio amateur whose accomplishments and contributions are of exemplary nature within the framework of technical research, development and application of new ideas and future systems, all in the context of Amateur Radio activities. The winner will receive a cash award, a suitably engraved plaque, and travel and accommodations expenses to enable him or her to attend an ARRL convention at which a formal presentation will be made. Nominations should be received by March 31, 1999.

ARRL Microwave Development Award

A great frontier for amateurs is the microwave bands. With room to move, the microwave region of our spectrum presents amateurs with a vast test bench for new modes, as well as development of traditional ones. The ARRL Microwave Development Award will be given each year to the amateur

(individual or group) whose accomplishments and contributions are of exemplary nature within the framework of microwave development. Nominations should be received by March 31, 1999.