

March Meeting: Friday, the **27th**, at 7:30 PM at the Perkins Restaurant at SR 73 and I-75.

Meeting topic: Report from the P3d Lab in Orlando by Gerd, WB8IFM, plus the usual discussions on topics of general interest.

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Upcoming Events:

Southeast VHF Society Tech Conference in Atlanta **April 3-4** contact Ted Danley, K3TD

Meteor Scatter Contest 2, 3 May, see page 8

Hamvention in Dayton **15, 16, 17 May** (but you knew that)

Central States in Kansas City, MO. July 23-26 contact Denise Hagedorn, AJ0E, 816-452-2957

Microwave Update in Longmont, Co Sept 24-27 No contact info at this time.

Mid-Atlantic VHF Conf. Oct 3, Horsham PA

AMSAT Symposium Oct 9, Vicksburg, MS

De N8ZM

Thanks to Mike Brown, W8DJY, for an excellent and educational demonstration at the last meeting. I think there were a few eyes opened by the demonstrations, to say the least. There was one young man, about eight years old I'll guess, dining in the restaurant with his parents, who came over to watch Mike's show and seemed quite fascinated, although his father seemed concerned that he might not be welcome. Maybe we succeeded in sparking another career in engineering or physics that night. I hope so!

Also at the last meeting were Jonathon Gain and Krishna Naishadham, representing the local chapter of the IEEE Antennas & Propagation Society. They are a small group in this area and are looking for ways to increase activity, which I have mentioned previously. They were favorably impressed with our group and would still like to find some way to cross-pollinate our activities, so to speak. Mike's demo apparently has gotten him another gig (not as in Ghz) with their group. And I am sure that there is more talent in MVUS to be tapped.

Since I am kind of a fan of actress Helen Hunt, my wife recently picked up a copy of a Jodie Foster movie and hit me with it. I'm kidding about the violence part. For the Hollywood impaired, Ms Hunt has been frequently described as resembling Ms. Foster. Anyway, the movie was **CONTACT**, which some of you may have seen. The plot involves a young radio astronomer whose early amateur radio experiences guide her into the search for ET. Based on a book by the late Carl Sagan, the story is interesting, but the special effects in the movie don't always work for me. For instance, there are some fantastic shots of the Arecibo dish and the VLA in New Mexico, but when they show the motion of the VLA dishes, you know they are moving way too fast. But I still enjoyed the story and there are some interesting concepts about what's "out there" to think about. And I swear I saw Spielberg as an extra in one of the scenes! For a couple of bucks it's worth it to rent the video just to see the antennas and be entertained by a story that isn't the usual sex and violence, although they did manage to include an inoffensive amount of both.

Does anyone think Siskel and Ebert should be sweating about their jobs after that last paragraph?

We still have not picked up any info on the 800 Mhz gear, but I am hopeful that we will have something soon. My garage, and several others, are getting full again!

Til next month...73, N8ZM._

AMSAT News Release (No. 98-01) Orlando, Fl. 23 March 1998 (Excerpts)

AMSAT teams from a number of countries recently covered on the Phase 3-D Lab in Orlando, Fl. to install the remaining electronic and communications modules into the new Phase 3-D International Satellite, and make it "flight ready" for launch.

Despite the very good progress made in this most recent integration effort, a definite launch opportunity for Phase 3-D remains elusive. However, negotiations with the European Space Agency for a ride to orbit are continuing in earnest, and all remain optimistic that Phase 3-D will be successfully launched ... hopefully sometime this year.

This and That

Mild Winter. In spite of the recent cold snap and “killer frost” this was a rather mild winter for the Midwest. Now, as the fleet of ice breakers get ready to push the ice aside to open the Great Lakes shipping lanes for the season, there is very little ice to break putting the fleet pretty much out of work.

Skycraft. If you are in Orlando don't forget to put Skycraft on your “must visit” list. What Mendelson is for Dayton, Skycraft is for Orlando. It's smaller but better organized and prices are right. Both places derive their existence from nearby huge government installations. For Mendelson it is the Wright Patterson Airbase and the Defence Electronics Supply Center (unfortunately being dissolved now). For Skycraft it's the Kennedy Space Center.

Rats Picture the San Francisco harbor during the goldrush 150 years ago: Wharf rats from a hundred harbors dart along the rigging of the ships: the gray rats from Valparaiso, Canton and Singapore; the long, white, pink-eyed rats of Batavia; the furtive brown rats of New York, Liverpool and Boston; and the kangaroo rats of Sidney.

[Richard Reinhard, in American Heritage Feb 98]

Why Snakes make Good Pets. They don't bark in the middle of the night and they fit in tight spots.

Titanic the Movie, Facts or Fiction? The movie gives short shrift to the radio room. However, what baffled me most is that the lights stayed on for the longest time, in fact, to the very end. My son claims that this has some factual background. There were a lot of spectacular scenes and a lot of noise, guess just right for the folks accustomed to rock music. Lasting slightly more than 3 hours, one hour of it could easily be cut out, thus making it a better picture. IMHO

More from Murphy: **Tolerances** will accumulate unidirectionally toward maximum difficulty to assemble.

A fail-safe circuit will destroy others! And a transistor protected by a **fast-acting fuze** will protect the fuse by blowing first. **Profanity** is the language all computer programmers know best. And, any given program will expand to fill all the available memory.

Three Decibel. We are all accustomed to equate 3 dB with double of some quantity, power antenna gain, what have you ... but double is actually 3.010,299,97 dB which is .3% off! [Smart Marilyn, bet she looked it up]

EME ... Whale Style. A whale swims 12,000 miles in a years time. The average speed is only 4 to 6 miles per hour, however, over 40 years that distance adds up to a trip to the moon and back

Michael Flatleys Shoes used only to last for one performance. They (and he) get a good workout with up to 28 steps per second. He is now using aviation strength aluminum heels which last about a week. [Irish dancing]

Clinton. On my recent trip to Orlando I had a chance to see President Clinton come down the stairs of Airforce One. He had come to visit the areas that had been hit hard by a tornado. Being some distance away I strained my eyes to catch him hugging some beautiful Florida woman only to see him surrounded by tall men dressed in dark suits escorting him to one of the two waiting choppers.

View from Cyber Space. Ham radio got a boost with an article in the New York Times of March 5th. The article, labeled “Hamradio Version 2.0” contains comments and a picture of Keith Baker, KB1SF, AMSAT Vice Prtesident. How far ham radio has progressed is made clear with a picture of an “early ham at his station”, which looks like an alchemist from the dark ages.

Flying Antenna Beams. The April issue of the Scientific American has a picture on the front cover that looks like a child's toy. However, as Ed, WR8A found out, the issue is a “Special Report: The Unwired World”. It has a number of very interesting articles on the future of telecommunication inside and is highly recommended reading.

P3d is Getting Ready to Fly

by Gerd, WB8IFM

As the reassembly and check out of the P3d (Phase 3 d) satellite at the Orlando Lab is in full swing, everyone wants to know, when it finally will be launched. We all hope that this might be soon, since our “star satellite”: Oscar 13 now has been “off-the-air” for the second year.

I just spent some time at the lab in Orlando, and I am quite impressed with this “bird”. P3d is by far the biggest and most complex amateur satellite ever built to-date. In fact, as far as the multitude of transponders, cameras, propulsion, station keeping and other systems and experiments are concerned, it might well be more complex and innovative than any commercial satellite. Commercial satellites might be bigger and have lots of transponders, but those are all of the same design and transmit in the same frequency band.

P3d has 39 major electronic modules, not counting preamps, relays, various sensors and couplers. All of these electronic components have been developed and built by hams from various countries, making this satellite a truly international effort, and you cannot but be impressed by all this talent bringing to bear on completion of this satellite. I was fortunate to meet most of these people, look over their shoulders, learn and help with their tests. Work goes on at the assembly lab 7 days a week. However, we from “out of town” took Sundays off to relax and gain strength for the upcoming week.

The part of the satellite, that we “electronic types” usually do not pay too much attention to, is not less impressive. It includes the frame, the covers including thermal blankets, two propulsion systems, an ingenious heat distribution and qualization system, and for “just in case” some electrical fuel tank heaters. One aspect of the mechanics is the weight distribution which should lead to a close to perfect balance w/o adding extra weights. Excess weight has to be paid for with a compromise in the desired orbit and, as it stands, the satellite is a bit on the heavy side already.

I learned a lot about how to put a satellite together. A distinction is made between actual “flight hardware” and test or mockup hardware. Flight hardware is treated and stored special. All final installation, work and check out takes place in a “clean room”; before you go in, you clean your shoes, then put on a clean white coat and use gloves; if something is dropped on the floor it stays there to be picked up later and cleaned. For wiring no mechanical stripper is permitted, all is done with a heat stripper, you never pull a wire to avoid stress and form gentle bends only. Connections are soldered and covered with shrink tubing. Only special sticky tape “Kapton” is used which is suitable for the cold temperatures and the vacuum of space. I never asked the price of this tape, but I bet it is not cheap. So are prices for other parts and components. Various “alcohols” are everywhere for cleaning components you work with, and critical parts get covered with Kapton temporarily.

I helped install a bunch of thermal sensors (thermistors) which were glued with two component epoxy to the critical points that needed to be monitored. By the way, a number of these came right from our area. They were donated by YSI, the Yellowsprings Instrument Company, and more were sold to AMSAT at cost. As each installation progresses in steps, the work is carefully labeled with different color tags. For an outsider work seems to go on deliberate, but slow. This, of course, is done to minimize errors, and believe me, errors do occur. The point is to correct these and make sure that by the time of launch everything is in tip-top shape.

The lab is well equipped, although most test equipment is somewhat dated which was no problem since I spent my carrier with this “older equipment”. Furthermore, I could supply the talent for making “semi automatic” measurements, having started as a young engineer in a “measurement lab” of a big manufacturer. The machine shop had all the essentials of a well equipped garage but lacked the precision machinery needed for some components. These parts were either made in Marburg, Germany or by some friendly mechanic in a nearby aircraft repair facility in his spare time. Outside of the lab there are three small offices, a storage room and a large open area for storing large pieces as the SBS (satellite bearing structure) and satellite mockups for antenna measurements and for doing some crude and/or noisy work and packing ...

After a few days I started working “full time” on the ASSP (Attitude Sun Sensor Project) This is an important system for the purpose of keeping the solar panels and the antennas aligned, since the spacecraft is not “spin”stabilized but depends

on momentum wheels, dampers and the tiny arc jet motor for maintaining the proper attitude.. It consists of two earth and 16 sun sensors. My task was to calibrate the sun sensors and provide the proper amplifier settings for the system to work in space. We were shooting for 90% of the max reading and were assuming that the Florida sunshine provided 65% of the radiation that would be received in space. Sometimes readings had to be halted to let some clouds go by and we liked best the days with clear sunshine. I developed some suntan, although no. 30 sunblock was provided by the lab. With the tan it was hard for me to explain, I was “working 6 days a week”. (Hi)

In the meantime module after module was installed and checked out. Eventually telemetry was tried and it was fascinating to hear once more the 400 Baud sound, we are so familiar with from Oscar 13, and without any fading! The digital experts would come in and spend a few days mostly sitting at their laptops and getting their software to communicate with the rest of the satellite. So intense was their concentration that they preferred not to be interrupted by going to lunch but rather have some sandwich brought in.

The German group brought all the main players to Orlando and I spent a lot of time with them in and outside the lab. Of course, being originally from Germany myself and being quite familiar with the language and customs helped. Most of the guys had been with the Phase 3 project from the start and it was fascinating to listen to the stories they could tell.

There is a lot of documentation involved with such a big project and Wilfried Gladisch is doing a super job of keeping things up-to-date. He started doing this at the Marburg Lab with P3a and at the time nobody appreciated it. “The next satellite we build, will be entirely different” he was told. You know what happened: P3a hit the drink and immediately there existed a need for a quick replacement! Were they happy to have all the detailed drawings? You bet! That generated P3b which became Oscar 10 and was then followed by P3c our last big one. These three were practically identical, with, of course, some improvements. And would you believe, even P3d has many features that were tested and proven on the earlier birds. Wilfried keeps track of this and is indispensable for the project.

If you have a mechanical problem, possibly with parts that can only be appreciated with a magnifying glass, you talk it over with Konrad Mueller, Konni, and very quickly he will assess the situation and surprise you with the comment: “No problem!” Dr. Karl Meinzer, DJ4ZC, the P3d project leader and Director of the Marburg Facility, in the 80s thought about a release mechanism which Konni then built in his machine shop. The two then traveled to a ESA conference in Toulouse France and presented their creation. A lot of interest was generated and it got AMSAT-DL firmly engaged with ESA, leading to a number of successful (and affordable) satellite launches. By the way, both Wilfried and Konni had no hamradio experience. They’ ve been too busy to get involved in “operating”. However, Konni took some classes, he was the oldest one there, passed the test and is now DG7FDQ.

These are just a few stories and impressions from spending a few weeks at the P3d lab at Orlando. By no means is this the complete picture, there would be many more players to be mentioned and their specific contributions described. Help at the lab is always appreciated. Particularly a few hams who live in a 50 mile radius of the lab spend many of their Saturdays helping out. Visitors are always welcome and usually get a brief but complete tour of the lab (photo ops included), the visitor book is filled with names and calls from all over the world. If you are in the area, stop by and say hello, better yet, arrange for some time you could spend at the lab to help with their chores.

So, when is it going to fly? Really, nobody knows yet. The next Ariane 5 (No. 503), still declared an experimental flight, is now scheduled for July 98. We might be on this flight, but then some commercial customer might push us aside yet. Let’s be patient and let our folks at the Orlando lab do their job readying the bird.

Simple Microstrip Lines

by Knut Brenndoerfer, DF8CA

assumed

W = Width of strip line

H = Thickness of substrate

ϵ = Dielectric constant of substrate

A number of formulas to calculate micro strip lines are available from various sources. Those should be applied with caution since no limits for validity or the expected size of errors are given. Some formulas offered are precise but very complicated. The main problem is that exact formulas cannot be found only more or less accurate approximations can be achieved. The following formulas from the book by **Reinmut K. Hoffmann: Integrierte Microwellenschaltungen** are fairly accurate and not too complex:

Characteristic Impedance (Z) for

Effective Dielectric Constant

Characteristic Impedance (ZL) for $\epsilon > 1$

Valid for

Error < 1%

Proceed as follows: Calculate whether W/H is < 1 or > 1. This determines whether to use the left or right formula for Z. ($\epsilon=1$). The effective dielectric constant is always lower than the constant of the material as not all field lines are within the material: therefore calculate the true impedance (ZL) using the last formula.

These formulas permit to calculate the characteristic impedance if the width of the strip line, the thickness of the substrate and its dielectric constant are known. If, however, the impedance is given and the width of the stripline has to be determined, one has to assume a width and modify it so as to arrive at the desired impedance. With a computer this is relatively easy to accomplish. (A spreadsheet program probably would work well. Ed.)

Compensated Right Angle

A sharp bend in a microstrip line is always an impediment for rf. By cutting off the corner one can obtain a wideband compensation and minimize reflections. The formula for this diagonal cut-off follows:

$$\begin{aligned} \text{Range: } W/H &> .25, 1 < \epsilon < 25 \\ \text{Frequ.} \times H &< 10 \text{ GHz} \times \text{mm} \\ \text{Error} &< 4\% \end{aligned}$$

Open End Microstrip Line

Caused by radiation the length of an open end line appears electrically longer than its physical dimension. This “extension” (Δ) can be calculated using the following formula:

High Speed Meteor Scatter (HSMS) Contest

Introducing the North American High Speed Meteor Scatter (HSMS) Contest, sponsored by: The Western States Weak Signal Society.

Purpose: To promote the development of skilled HSMS operators in North America.

Contest Period: **0000z, 2 May 1998 to 2400z 3 May 1998**

Objective: Work as many North American stations as possible via meteor scatter during the contest period, using HSCW on the 2m amateur radio band. HSCW for the purpose of this contest is any speed no less than 495 LPM (99WPM).

Contest Operation: Only random QSOs count for contest credit. The use of the letter system for CQing is REQUIRED, ie. CQF, CQX. Report is your four digit grid square. Use of skeds, spotting assistance or nets (operating arrangements involving other individuals, DX-alerting nets, PacketCluster, etc.) is not permitted. The area around 144.100 is considered the HSCW calling zone. The use of the area around 144.200 for HSCW CQ's is poor operating technique.

More details/contest point calculation: Robert N7STU/YB2ARO, DM07aa/OI52ee
e-mail: n7stu@psnw.com Web: <http://www.psnw.com/~n7stu>

This list has been **updated**, however, members that have not paid their dues for the present year are still included and will receive **this issue**. We have no particular membership year, so dues are coming in throughout the year in particular from new members. We will **“purge the list”**, however, next month. So, check the date and **mail in your check**, please! It is not fair to the paid-up members, that we continue to send the newsletter to the “delinquents” (hi).

For Sale: IFR FM/AM 1000 service monitor. With AC and DC power cords. Also has internal battery (this one is weak, however). Otherwise very clean. \$950.00

HP 141T Spectrum analyzer. 10Mhz to 1.2 Ghz with storage CRT (CRT is excellent!). Clean!\$2100.00

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