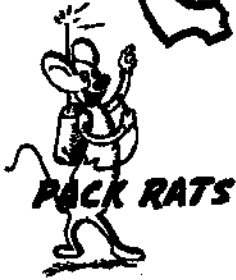


CHEESE BITS



W3CCX

CLUB MEMORIAL CALL



ARRL
Affiliated
Club

VOLUME XLII

February 2000

Number 2

The PREZ SEZ

What a pleasure it was to work the contest this year! The first reason I can think of for the extra enjoyment was "frame of mind". I, among others, have been making those small improvements needed all year. Now it was time to see if any of that made a difference. So, with the idea of checking out the performance of the new improved station, I had clearance from my family that this was *contest weekend*. In effect, this was all being set up for a long time, and by contest day I had gained a rooting section. With their support, I set out for a weekend of fun. I thought the activity was really good, especially Saturday. To me, it seemed like non-stop bedlam until I stopped for some sleep. Sunday was a continuation of this, until sometime in the late afternoon when there seemed a lack of new "targets". I guess we lost some operators to the football playoffs, and it seemed like slim pickins! I stuck it out, maybe I'm foolish, but the only FM contacts made here were on 223. My stuff really isn't set up for that mode. I'll have to think about adding 2M FM for next year, as this may have filled the gap. And then there was the last minute scramble. As always, there are the illusive band hoppers that show up somewhere at the last minute, and it's down to the wire. END OF CONTEST (almost a blur now).

The best improvement here was using a REAL radio. In previous years the little ICOM 706 had yielded many contacts and grids. But I didn't even know how bad it was 'till now. It was really great working w/ a real IF and decent filters. The new DEM transverters are set up to handle tons of RF without caving. I could never go back to working in that environment with a micro-radio again! And now that I think of it, I had to really spin the dial on that little radio to get away from the QRM. Now I can nestle in right next to one of our kilowatt alley neighbors. That made operations for me on 2m thru 432 very enjoyable. That leads to the other "treat". *The "thru" part from the previous statement.* 222, wow! I added a transverter with an attic mounted stack of loops. LOTS of QSO's, and the grid count went from 2 (FM box days) to 13! Moved a lot of guys there, from elsewhere. I had doubts, and almost without fail, worked out *NO problem*. I still had a dismal IC706 experience on 6 meters. I think I can move this to the success column next year by adding the fourth 28 MHz IF transverter into the lineup.

Microwaves! Seems like the new trend, as we experienced at Camelback, is to start moving guys as soon as the initial surge is over. This worked great for me, as sometimes you never hook up again once the band hopping starts. The microwave stuff was very busy filling this role. From my story last month, my lead project for the year was of course the last completed! The 3.5G station went online Friday afternoon. This of course, was preceded by my mandatory spectrum

(Continued on page 3)

MEETINGS

Third Thursday each month at 8:00 PM
Southampton Free Library
947 E. Street Road
Southampton, PA 18966

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222.98/224.58 MHz, Churchville, PA FN20LE

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PACK RAT BEACONS - W3CCX/B

FM29JW Philadelphia, PA
50.080 144.284 222.065 432.295 903.072 MHz
1296.251 2304.037 3456.220 5760.190 10,368.170 MHz

MONDAY NIGHT NETS

<u>TIME</u>	<u>FREQUENCY</u>	<u>NET CONTROL</u>
7:30 PM	50.150 Mhz	WA3EHD/K3EOD
8:00 PM	144.150 MHz	N3ITT
8:30 PM	222.125 MHz	W2SJ/N3EXA
8:30 PM	224.58R MHz	W3GXB
9:00 PM	432.110 MHz	W3RJW/WA3DRC
9:30 PM	1296.100 MHz	WA3NUF
10:00 PM	903.100 MHz	N3AOG

COMMITTEE CHAIRMEN

LADIES' NIGHT:	N3AOG	215-443-9965
JUNE CONTEST:	N3ITT	610-847-5490
HAMARAMA:	NK8Q	610-847-2285
VHF CONFERENCE:	KB3XG	610-584-2489



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The PREZ SEZ (Continued from page 1)

analyzer consult a week before the contest with Ron W3RJW, (and of course Bill K3MFI, who has the appointment after mine). This band worked good, with 4 grids, first weekend on. The rest of the microwave station improved over the year too, and really helped the score. All I can say for those that haven't made the jump is that these contacts are a challenge, and a WHOLE LOT OF FUN!

No breakdowns, no crying towel story from here. I am still just trying to calm down!

73. Ed WA3DRC

Calendar of Coming Events - February 2000

- 9 Birth of Brendan Behan, Dublin 1923.
- 10 Packrat board of directors meeting at the QTH of Harry, W3IIT, 3012 Potshop Road, Norristown, PA at 8:00 P.M. Call 610-584-4846 for directions.
- 12 Contest Wrapup Session at the QTH of Joe, AA3GN, 16 Fairhill School Road, Hatfield, PA 19440. Phone 215-721-4286. Bring your printed AND computer file on a 3.5 inch floppy or get them to your contest captain ahead of time. Note that if you log with a computer (Highly recommended), it is mandatory via the contest rules to send the log files either electronically or via mail to the ARRL. Do NOT send them directly. The contest coordinator will see that they are sent.
- 12 Lincoln's Birthday, 1809.
- 12 Microwave Update 2000 Planning meeting after the contest Wrapup Session.
- 13 Harrisburg Pa ARC Winter Hamfest at the Oberlin Fire Hall, Oberlin, PA. 717-939-4825. VE exams.
- 14 St. Valentine's Day. Remember your sweetie.
- 17 Packrat meeting at the Southampton Free Library on Street Road in Southampton, Pa. at 8:00 PM. The theme of the evening will be our annual "Crying Towel" session. The best story of what went wrong during or in preparation for the January contest wins the coveted "Crying Towel". All friends and interested parties are welcomed to come and enjoy the evening with us.
- 20-21 ARRL International DX Contest-CW. See Dec. QST page 97 for rules.
- 21 Presidents Day.
- 22 Washington's Birthday.
- 24 LEAP INTO THE MICROWAVES with the Packrats! 903 and above. Every 4th Thursday of the month operate from 8 to 10 PM local time on any band 903 MHz and above. For coordination on those difficult long haul contacts 144.260 MHz is the suggested liaison frequency.

TID BITS

VUCC Award Checking: If you want QSL cards checked for your initial VUCC Award or an update, contact Harry, W3IIT at hbrown@voicenet.com or call 610-584-4846.

Contest Effort and LOGS. Thanks to all that participated in the big contest weekend. From my perspective, participation was up. I am not sure if that was really true, or if adding better equipment, and more bands just kept me busier. There was a good swarm of "Rats" on a feeding frenzy for the entire contest. As indicated by our contest chairman, please do NOT send logs directly to the league. Get the ".log file" onto a floppy, and over to Joe AA3GN. We will deal with the logistics of submission, after our "cross checking". Please try to be available for the wrap-up session at Joe's QTH on Saturday Feb. 12. Again, thank you for dedicating the time of an entire weekend to the effort. Hope everyone had some fun too! Ed WA3DRC.

Health and Welfare: Per Walt, WA3AQA, Ernie, W3KKN, is at Holy Redeemer Hospital his room is 3513 and the direct line is 215-938-2446. Ernie did have surgery to repair the aneurysm in his descending aorta and told Wil that he had a 19" scar to prove it. It was several years ago that Ernie first mentioned that he had a second aneurysm in the aorta, which the doctors were keeping a close watch on. He is now spending from 09:30 to 11:00 and from 13:30 to 15:30 in rehab. The aneurysm that was repaired was to the artery between the kidneys and the bladder. Ernie hopes to be released from the hospital sometime next week. He sounds good and likes to hear from his radio buddies.

The ARRL Letter, Vol 19, No 3, "The Board also elected new vice presidents. Vice President Joel Harrison, W5ZN, was elevated to First Vice President. ". Joel is an active VHF/Microwave ham and EME Operator. He is one of the operators of the WA8WZG multiop station in the January VHF Sweepstakes. Kay Craigie, WT3P was elevated to Second Vice President and Bernie Fuller, N3EFN, took over as Director of the Atlantic Division.

Path Prediction Software. FYI. Here is the URL for a company called 'TCS Consultants' that offers consulting service for link studies and other Com related paper studies. What's neat is they have some free trial software, on there web site, that does path profiles between two geographic locations; including free terrain data that is also downloadable. The software also does Fresnel zone studies to predict multi-path conditions. The software is not outrageous in cost compared to similar software from large communication companies. The software expires after a time period based on your clock setting or just download the software again the next time you need it. <http://www.tcstx.com/>. W3RJW, Ron.

CONTEST STORIES

Bill AA2UK/R! Hi guys I want to thank all for the contacts on the microwave bands it was thrilling! I worked from only three grids due to waking up with the flu Saturday AM, No real major problems with the rover only a missing ground wire on the 2 meter amp that was not discovered until I returned to FM29, would have been nice to be able to run more than 10 watts from FM28 on 2 meters. The one great thing was no TVI! I will be roving for the June contest and probably many more to come. 256 CONTACTS most on 432 and above. I was able to work many of the guys in the club from FM-28 and FN20 and FM29, I am really looking forward to helping the club in the June contest, I will need to get someone to drive to help. If you look at the set up you will notice the grey box behind/offset the dish, this contains 3.4, 5.7 and 10 GHz equipment, all DB6NT and 5 watts on all three bands. There were very few guys I could not work that I tried with on the microwave bands. I had a serious rf problem on two meters when in FM28, turned out to be a disconnected ground wire from the brick. Unfortunately I discovered it when I returned home to sleep Saturday night. Wish I could have made it to FM19 I have a great site there and I am sure I would have worked all from there. Here is the equipment run down:

6-FT-100, 100watts sq loop,
2-FT-100, 150watts W1JR 8 element Yagi,
432 MHz -FT-100, 100watts,FO-22 Yagi,
1296 MHz DB6NTxvrtr, 20watts DS 45el looper,
2.3 GHz -DB6NTxvrtr, hempt, 10watts and DS 45el. looper,
3.4 GHz -DB6NTxvrtr, hempt, 5watts and DS 45el. looper,
5.7 GHz -DB6NTxvrtr, hempt, 5watts and 2' dish LUA dual feed,
10 GHz-DB6NTxvrtr, hempt, 5watts and 2' dish.

I key the 5 and 10 GHz relays to xmit at the same time to save the preamps using the dual feed. The 3, 5 and 10 GHz box has a tvro cable feeding power, switching and a 6 position relay in the box gives me band switching in the box at 2 meters so a 12' piece of 58U feeds the TR-751 if rig used for 1296 and up. I wish I would of had the time to integrate 903, where I have a 33 el. looper, SSB xvrtr 1 watt model with a 20 watt class A brick. well next time. I did about 78K really pretty bad but I was sick and didn't go back out till 6PM Sunday. At least I didn't lactate like some of the other guys. I'll be glad to get you cards for the bands. I never ran out of guys to work anywhere I went just steam. 73 Bill, AA2UK/R.

Hi All, I guess by now that you have realized that I wasn't around for the contest. On Friday I slipped on the ice, in avoiding falling my back went out, (I probably would have been better if I fell) I spent the whole weekend on my back. the bus was all ready to go, but after taking it out to top off the fuel tanks, Propane and diesel. Saturday morning, I realized I couldn't sit up that long, (I barely made it home!) More later at the crying towel meeting. Don, N3OZO.

Another log to scrounge up. I was tuning around on 2M and I heard WA3DRC working W3RZU on sideband. It was evident that Ed did not know who he was talking to (90% of the rats wouldn't either). I immediately called Elio, W3RZU, one of the original members of the club that is still a member. I've never worked him before myself and I've been attending meetings or been a member for 30+ years. I told Elio that we would be hounding him for his log. I heard him around afterwards too. 73, Harry, W3IIT.

The January contest from a Bay Area standpoint. Yes, I know what you mean about working some of the old Packrats. Gee, I bet I don't know half of the members. Some are still around from when I was there but like any other group people come and go. Anyway, I thought I would describe the January contest from a Bay Area standpoint. This was my first January contest since moving from NJ to CA nearly 20 years ago. Sure I had given out a few points in other contests but this time I decided to make a real effort. Not that I expected to win but I did want to make a reasonable showing. I was able to mount a 5 band effort though 6 meters was limited because I just never got the beam up. My long wire just would not tune up correctly with more then a few milliwatts. The ground lead is just much too long for 6 meter use. What I found once the contest began was a fairly high level of SSB on 2 meters which I think is partly due to the newer rigs that include all mode HF/VHF in one package. FM is really big around here. I did well on 2 meters and contacts were about 50:50 SSB/FM. 222 was FM only and I only made 10 contacts. 432 was better but the number of contacts leaned heavily in favor of FM. I purchased a Kenwood TM-541A for 1.2 GHz and was able to make a whopping 6 contacts on that band. As for 6 meters I found something very interesting. Since the long wire did not work I thought I was off of 6 for the contest. Well I did go out to the garage and use the IC-706 in the Jeep (my off road toy) and made one contact on SSB. The antenna did tune all that well, even with the automatic tuner, since it was sitting 18" away from a steel garage door and a several other metal objects. However, later on Sunday I thought about the VX-5 HT sitting on the table. I was able to make 4 more FM contacts with it, one about 40 miles away. Over all, my score will be meager but it was fun to be back into the swing of things. I think I will do this again in June. By then I will have the new tower and antenna farm up. 73, Randy NR6CA San Jose, CA.

Thanks to Bill, AA2UK for 2, 3, and 5 GHz from FM28! Wow - 9 QSO's on 5760. Worked most other 5760 contacts on SSB. Lots of fun. 2.3 and 3.4 worked great too. Most contacts there were also voice and loud - S9+. 2.3 and 3.4 GHz: 4' dish at 8 feet. 5 W. 5.7 GHz: 30" dish in dining room, facing out sliding door, at 3 feet. 10W. House at 600' No TVI here either! Sorry we missed from the other grids. Catch you next year. Hope to have things tower mounted and 10GHz by then too. Thanks for being there - I'll echo what Russ said. This helped the club score a lot. 73, Joe - AA3GN, FN20ih.

AND THE BEAT GOES ON, de K3JJZ Elliott Weisman I thought that this story would take too long at crying towel session but was worth telling. Many of you only know me as the guy who comes once a year to play auctioneer at our white elephant sale. Last you think that is the only Pack Rat activity I have ever done let me relate some history.

Licensed in 1957 and joined the Pack Rats in 1960.

Editor of Cheese-Bits 1967-1972

President 1970-1971

Leader of HK1TL South American moonbounce expedition July 1976

In the 60s I was one of the Pack-Rats antenna crews. We went out and did the antenna work for the old guys (almost all are silent keys now).

In 1982 I started to learn about computers. In 1984 I started a part time computer consulting business which proceeded to flourish so well that I essentially retired from amateur radio in 1986.

And so it was that when Gary WA2OMY came to deliver some computer printers to my QTH he looked at the dust covered station that had been inactive for 14 years. The antennas were up for 6-2-220-432 but no where near as high as they used to be (roof repair). Gary said "You know it wouldn't take too much to get you on the air for contest and the club sure could use the log. I told Gary, I don't climb any more. (Guess who know belongs to the group "old-guys"). Gary said we could take care of that.

"But you have to make enough room in here to operate." (computer parts and the like on the old operating table). He even offered to fix my old gear.

A very tempting offer. How could I not help the club?? And so I agreed.

Gary, Bruce (WA3YUE) and I'm sure others refurbished the antennas and provided me with enough loaned equipment for me to be on the contest on 3 bands.

And so I worked some of you for the first time in a Jan contest and I was amazed at the response from some of the old-timers when they heard my call. Such things as "Welcome back", "Nice to hear you again", "Where have YOU been". As I was working on fixing up my small contribution to the effort I had to think back to the days when I was one of the guys that helped others get on. (Especially K3EOD who could make a rig break down just by looking at it).

And so you younger guys who are no running the club (and very well I might add) rest assured that you are indeed carrying on the Pack-Rat tradition that I first experienced more than 40 years ago.

Rover Tales: K1DS & N1XKT. Our first opportunity to rove together as a family was planned six months ago when the dean informed Leon that he would be eligible for graduation in December. It took a slightly different arrangement in the station wagon this year to accommodate both of us and all the gear, as we were trying to have 9 bands going (and actually did!).

The wagon continues to leak oil from a bad manifold to block gasket, but not enough to have retired it for this one last contest. Leon used the wagon at school, and for some vacationing over the holidays--somehow the speedometer and odometer are only part-time functional now, the gas gauge is stuck in the full position, the cruise-control hasn't worked in a while, and the last valid odometer reading was 151K. It dripped through 12 quarts of oil over the past 6 months.

I must take this opportunity to thank so many who helped us get our gear improved and repaired. Len, N3NGE helped weld a new mount hinge on the base plate. John, KB3XG assembled a 10G preamp and helped install it, Ron, W3RJW for that replacement relay, and Bruce, WA2OMY for helping troubleshoot the 2m amp and installing the new TR relay. Dave, W3KM changed the xtal in the 2304 rig, allowed us to test new rover software, and Phil, WA1NUF helped with advice on cabling and operating.

During the week prior to the contest we readied all the equipment, connectors and cables, antennas, supports, rotor, purchased an additional 12V battery, a new automatic charger, and printed up extra log forms (hopeful). Finally got in touch with the ranger at Sandy Hook, with permission to operate there, but alas, the wind and weather deterred us from that site in FN30. The night prior to the contest we loaded the roof rack onto the wagon, got the antennas arranged on the rover mast, got all the gear ready to be packed in the next morning. Considering that this was Leon's first rover experience, I was hoping to make it a positive one: good on-the-air activity, free from struggle, free from equipment failure, and free from the deep freeze that often comes with the January VHF SS.

The XYL warned, "Remember how you always say that you're never going to do this January thing?" and I reply, "But it's the Packrats...." Believe it or not, she was happy to see me buy a '94 Ford F-150 van, just a week prior to the event, so that it will be permanently furnished for future contesting.

OK--so it's me in the front to start, with the FT736, 4 bricks and the batteries, Leon in the back, with the TS700 IF for 903, 1296, 2304 and 10G and laser communicator in the far back, awaiting opportunity. Considering the weather, we cut back on operating times and travel. Operating time needed to be restricted due to an obligation to be in Virginia for business on Sunday evening. After reading the misadventures of other rovers through their postings on the reflectors, I was sure we made the right choices. The drama will be reserved for the "Crying Towel" and the scores for the log collation event, but suffice it to say that this was mostly a mission accomplished, and Leon really got into it, "I'm sitting in the front seat dad!"

SWAP SHOP

(send all ads to the editor)

FOR SALE: CALLSIGN HISTORY. Name and address of each holder since 1912. Cost \$15 plus SASE for printed CERTIFICATE. Wanted CallBooks before 1970 and QST's before 1940 will buy or trade. Also looking for 1x2 Ham Radio License Plates for my collection. Ron Allen W3OR, PO Box 73, Bethel, De. 19931-0073 or call 302-875-1100.

W3HFY's Estate Sale. Many items listed in the January issue of Cheesebits from Hal, W3HFY's shack are still available and are being offered for sale by Hal's daughter-in-law, Lynn Grace. The price on each item is negotiable. Lynn's phone number is 610-259-0231 (NOTE CORRECTED PHONE NUMBER).

THEY NEVER TOLD ME NOT TO - PART 1

an innocent is seduced by centimeter waves By: Laura Halliday VE7LDH

Abstract

Microwave communications on Phase 3D promise unprecedented performance and ease of use, but to the vast majority of radio amateurs, microwaves are totally mysterious—even irrelevant.

This paper is the story of how one amateur learned a bit about microwaves, from 1296 MHz to 10.5 GHz, with the help of new and used components, classic designs, straightforward application of modern components, and, for good measure, the occasional stupid design.

Introduction: Why microwaves?

Are microwaves the future of amateur radio? I'd sure like it if they were—just think of what you could do with them. *Really* high-speed data. Local chit-chat with high-quality audio and nifty control capability. Applications nobody has thought of yet. Heck, those AMSAT folks are even launching a satellite with microwave capability.

But few amateurs have any experience above 450 MHz. For microwaves to be useful, people need the same sort of easygoing familiarity that most hams have with 2m FM, or 20m SSB. The only way to achieve this is to try it and see. Play with microwaves. Put things together. Enjoy the fact that they work, or figure out why they don't. Break them. Fix them. Modify them. Understand them. Absolutely standard amateur radio, in other words, except that the wavelengths are measured in centimeters, and not tens of meters. I set myself this learning experience, as a piece of personal research, and this is a report of some of the trouble I've caused.

This paper has several sections: getting information, getting parts, wideband 10 GHz equipment, no-tune transverters, simple applications of modern components, and a summary of the lessons I've learned.

Getting information

Information is key to any activity, and amateur microwave communication is no different. The main sources of information on microwaves are reference books, conference proceedings, specialized books, magazines, the Internet, and Elmers. Only by accessing most (if not all) of these sources can you find the information you need.

Reference books: These are often professional books, and sometimes out of date. They can be expensive. They are written for professionals, and the technical level may intimidate some amateurs.

Conference proceedings: These include the excellent *Microwave Update*, regional conferences like the Central States VHF Society, and collections like *DUBUS*. They are an accessible source of information, written by amateurs for an amateur audience. In the past these have been highly specialized documents, going out of print quickly. Perhaps it's time for some reprints. Or for a collection of articles. This information is too good to waste!

Specialized books: These include publications like the RSGB's *Microwave Handbook* [ATUR—All The Usual References—please see the *References* section of this paper] and the ARRL's *VHF/Microwave Projects Manual* [ATUR]. These books, while sometimes expensive, are necessary background material. **Magazines:** General amateur radio magazines have little microwave content, with the exception of the *Above and Beyond* column in *73 Amateur Radio Today*, written by WB6IGP. The RSGB publish the *Microwave Newsletter*, and have a *Microwaves* column in *Radio Communication* written by G3PFR, editor of the RSGB's *Microwave Handbook*. More specialized magazines include *DUBUS* and *UKW Berichte*, which may be more familiar in its English edition *VHF Communications*. The professional magazines like *Microwaves and RF* are fascinating and highly educational. They are also ultimately heartbreaking when you consider the price tag of the test equipment in the ads.

The Internet: The net is growing explosively, and it is particularly useful to a far-flung lot like amateur microwave enthusiasts. Useful resources include the Ham-Microwave mailing list, various web sites, and so on. Since the addresses change from time to time, please do a search to find current information.

Elmers: While this has been a traditional way of sharing information, microwave radio amateurs are so rare that I mention in-person Elmering for completeness only. Elmering via the Internet (see above) can be very effective, however.

Getting parts

Amateurs have been complaining about the availability of components for decades. I am mystified by this: parts are easier to get than ever before, and offer unprecedented performance and convenience. They aren't even very expensive after allowing for inflation. The issue appears to be that electronic components are no longer sold in every shop: other than Radio Shack, only major cities have comprehensive electronic component dealers. In practice, all this means is that I buy components by telephone, and wait a few days for a parcel to arrive. In all my amateur radio work, *one* parcel has gone missing, and when I notified the supplier, they shipped a replacement that day, no questions asked.

I have never had any difficulty purchasing components from suppliers in other countries. The worst Canada Post have ever done to me is charge me GST, plus their handling fee, which tends to be greater than the tax I'm paying on the shipment. This is sometimes the only convenient way to obtain "European" components, like BF961 transistors (a very nice VHF dual-gate MOSFET). Different countries have their own peculiarities: suppliers in the United Kingdom tend to take every credit card known to commerce; Visa was until recently called "Carte Bleue" in France; suppliers that take American Express (outside of the U.K. and U.S.A.) are extremely rare.

If you travel, try visiting some of the local firms. To me, Paris is a city of amazing electronics stores!

I have tried to avoid an excessive dependence on surplus equipment. The supply is at best erratic. It may be drying up. Few areas have any decent surplus dealers, though I have visited some brilliant shops in places like Silicon Valley, Dallas and Orlando.

Bands and modes

My microwave experiments have had two goals in mind: to learn something about microwaves, and to have equipment ready for Phase 3D. These goals coincide with 1296 MHz and 2304 MHz no-tune equipment that can be easily retuned to 1269 and 2400 MHz. These goals do *not* coincide with 10 GHz Gunn-based equipment—which has no application to Phase 3D communications, but which is an excellent way to get started with microwaves. Some choices have been based on equipment availability—like the two C band Frequency West brick oscillators that I purchased at a swap meet. They will eventually become the LOs of 3456 MHz equipment. I have not attempted S or C band uplink equipment. The techniques are specialized, and the components (barring good luck at surplus dealers) are expensive. For the moment I will stick to 435 and 1269 MHz uplinks, where uplink power is inexpensive and idiot-proof. My terrestrial microwave work involves tens of milliwatts, which is plenty for what I want it to do.

I have no preference on the modes I use. Some have satellite applications. Some don't. This is not an issue on the lower bands (*e.g.* 2m FM vs. SSB); why should it be so on microwaves? "Appropriate modes" will change with the passage of time. Professionals use many modes, including wide-band FM and PSK. So can we: with satellites that look increasingly like bent-pipe repeaters, why not (other than power budget concerns) use any mode that will fit in the satellite's passband?

10 GHz: the easy band

My first microwave communications were in this band. I set an initial budget of 100 dollars for two stations (to make sure that I would have somebody to talk to), and came in substantially under budget. Here's how I did it.

Getting going

My first real microwave gear came from the usual source: a swap meet. I noticed a box full of ex-intruder alarm Gunn diode oscillators, with detector diodes in their feed horns. I bought two units as cheaply as I could and happily carted them home.

My primary reference for 10 GHz wide-band equipment remains *Practical Transmitters for Novices* [Case95], a book aimed at U.K. Novice licensees, who have access to a segment in this band. Following the instructions in the book I verified that the Gunn oscillators both worked, and estimated their operating frequency. This turned out to be approximately 10.6 GHz, typical for Doppler intruder alarms. I retuned one unit to 10.2 GHz by adjusting the its tuning cavity, and after convincing myself that it was on the correct frequency, adjusted the other one to 10.3 GHz.

My "test equipment" makes the accuracy of these figures debatable, but the 100 MHz difference between them is accurate, since they are operating like Gunnplexers, where the Gunn oscillator that you transmit with does double duty as the receive LO. I chose an IF of 100 MHz to make use of available FM transistor radios, but IF breakthrough caused me to change my IF to 90 MHz. The modulator is trivial, adding a few millivolts of audio to the well-regulated Gunn diode power supply. For good measure I added an MMIC preamplifier to the receive side, using a MAR-6, a MAR-3, a 7808, and some components salvaged from junk cellular telephones. I laid out a little microstripline PC board with a ruler, drafting tape and guesswork. It works fine.

Does it work?

Of course! The audio quality rivals FM broadcast, and with small dishes or horns, these units can work any non-obstructed terrestrial path. Since very little of the circuitry is frequency-sensitive, the choice of modulation is open. I want to try X band ATV!

What now?

I'm starting to experiment with more elaborate receive equipment. Among other things, the Gunn unit detector diodes are grossly overdriven, limiting their performance. Also, low-noise preamplifiers are not possible. I purchased a pair of converted Ku band TVRO LNBs from a source in England. They have GaAsFET front ends, with noise temperatures in the 80 to 100 K range. They are already converted to 10 GHz with 9.0 GHz LOs, for an L band IF of 1000 to 1500 MHz. They are intended for use with a surplus satellite television receiver, but for experimental purposes I tacked together a very simple converter with some Mini-Circuits components from my junkbox: a MAR-6 preamplifier, a TUF-5 mixer and a POS-535 VCO. I didn't have anything in my junkbox that would oscillate at 1100 MHz, but knew that the diode mixer would respond on the 3rd harmonic of its LO. So I tuned the oscillator to 366.66 MHz, converting 10.2 GHz signals first to 1200 MHz in the LNB, and then to 100 MHz in my little converter. I initially christened this the Stupid Converter, because it cuts so many design corners, but still works. Sort of. Others have suggested the Geoduck Converter, because the input coax (a cut-down CATV cable) is white, and looks like a geoduck's foot.

One day I may move to a more benign IF like 70 MHz, popular in professional circles. While I may modify a faithful transistor radio, it may be easier to build a simple FM receiver. The only way to do this today is with subsystem ICs, an approach that does not seem to be well covered in the amateur literature. Other than the datasheets for the ICs them-selves, the only useful references I've found on the subject all seem to come from Europe, for example, [Bajcik92], [Bajcik94] and [Lemmens96]. Others report success with even simpler receivers, like X band super regenerative receivers [Jamet97]. I wouldn't mind better frequency stability, and know a number of ways of achieving it (injection locking, AFC, etc.).

My X band setup is less than optimal, but *does* work, it worked the first try, and, stupid though it may be, it's a place to start. A system that works, however inefficiently, can always be a tool for testing and evaluating systems that work better.

No tune on 1296, 2304 and 2400

A really good idea

It seems so simple: by designing filters for 50 ohm input and output impedances, and interconnecting them with 50 ohm mixers and MMIC amplifiers, you can assemble systems out of building blocks that have very little reason not to work. But it took several developments to happen: hairpin filters on PC boards that can be etched precisely. Those 50 ohm MMICs, at a price amateurs can afford. And somebody to pull it all together.

Part 2 will continue in the March 2000 issue of Cheesebits

- February 2000 Pack Rats Cheesebits Pg. 7 -

More TID BITS

VHF Radio Clubs with Web Pages	
Mt. Airy VHF Radio Club	http://www.ij.net/packrats
Central States VHF Society	http://www.csvhfs.org/
Delmarva VHF and Microwave Society	http://www.qsl.net/dvms_k8gp/
East Coast VHF Society	http://www.ecvhfs.org/
Mt. Greylock Expeditionary Force	http://www.mgef.org
Midwest VHF-UHF Society	http://www.ceitron.com.mv.us.mv.us.html
North East Weak Signal Group	http://uhavax.hartford.edu/~newsvhf/welcome.html
North Texas Microwave Society	http://www.ntms.org/
Rochester VHF Group	http://vhfgroup.rochesterny.org
Northern Lights Radio Society	http://www.tc.umn.edu/nlhome/m374/husby002/nlrs.htm
Rocky Mountain VHF+	http://www.qsl.net/rmvhf/
Six Meter International Radio Club	http://www.smirk.org
San Bernardino Microwave society	http://www.ham-radio.com/sbms/
Southeastern VHF Society	http://www.svhfs.org/svhfs/
Western States VHF Society	http://www.wswss.org

W2RTB/B FN12. As of 1900Z, 29 JAN, W2RTB/B located 30 mi. south of Rochester, NY is active again on 144.276, 222.059 and 432.306 MHz, 10-12 watts out all 3 bands into M2 EGGBEATERS. Was unable to get the 1296.285 operating feed-line vswr. Also the TIC-2 memory keyer doesn't seem to like to remain at stable speed in the <10 F temp. May stabilize as temp in the dog-house at tower base warms up--now that "juice" has been restored to the box. How about some reports like to hear where it's getting heard. Did not turn on the 50.069 MHz bcn. Already have FOUR beacons operating within 250 mi of Rochester +/- 1 KHz, that I can hear very well from my QTH at 300 ft BELOW AVERAGE TERRAIN, they just keep coming. After 10 + years active that freq. you'd think it would be "grand-father'd" freq. heh-heh, 73 AI K2SPO, beacon meister, W2RTB/B FN13.

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February 2000

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MICROWAVE UPDATE 1999 PROCEEDINGS

The conference was held October 22-24, 1999, in Plano, Texas. Proceedings are available from Down East (908) 996-3584; cost is \$20, plus \$6.- shipping This is a big book, 1.2" thick and weighs over 3 lbs. Tnx to Gerd, WB8IFM, of the Midwest VHF/ UHF Society Inc.

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Preliminary January VHF Sweepstakes Results

(Tx North East Weak Signal Group)

Call	Grid	CL	Total Points	Band QSOs/Grids										
				6m	2m	222	432	903	1.2G	2.3G	3.4G	5.7G	10G	LAS
AF1T	FN43	S	64,954	97/25	130/21	49/14	61/15	14/6	21/6	7/3	1/1	-	5/3	-
K0XP	FN42	L	12,850	-	109/24	20/10	54/16	-	-	-	-	-	-	-
K1DY	FN54	H	43,442	70/31	112/30	36/18	36/14	8/6	12/8	-	-	-	-	-
K1FO	FN31	H	48,150	107/28	215/27	-	160/20	-	-	-	-	-	-	-
K1GX	FN31	H	140,672	115/28	214/32	75/18	100/18	29/11	48/12	9/6	4/2	1/1	-	-
K1JT	FN20	S	77,738	236/43	213/20	83/15	106/16	-	-	-	-	-	-	-
K1LPS	FN34	S	15,870	31/13	63/25	27/14	29/12	4/3	2/2	-	-	-	-	-
K1RZ	FM19	H	218,946	146/48	231/38	65/24	106/29	35/14	44/16	16/10	-	-	5/3	-
K1TEO	FN31	H	465,535	358/68	407/51	120/33	170/35	44/17	59/20	16/5	11/5	-	1/1	-
K1TR	FN42	H	4,704	25/8	44/10	13/6	26/8	-	-	-	-	-	-	-
K1WVX	FN31	H	4,901	39/12	50/9	10/3	18/3	-	6/2	-	-	-	-	-

Call	Grid	CL	Total		Band QSOs/Grids									
			Points	6m	2m	222	432	903	1.2G	2.3G	3.4G	5.7G	10G	LAS
K2SMN	FN20	H	152,421	206/44	231/34	79/22	85/22	30/9	49/10	-	-	-	-	-
K2TER	ROV	R	108,135	107/18	178/20	69/8	114/11	24/4	31/6	18/4	11/4	8/4	3/2	3/3
K2UOP	FM09	H	52,200	77/28	103/33	37/19	44/17	9/7	10/8	4/4	-	-	-	-
K3DNE	FM19	H	145,768	124/34	207/36	70/24	102/25	33/15	38/18	-	-	-	-	-
K4RTS	FM08	S	19,596	31/13	61/17	24/12	30/13	9/6	12/8	-	-	-	-	-
K5MA	FN41	S	70599	159/34	192/25	67/20	107/22	-	-	-	-	-	-	-
K8EB	EN73	L	81,389	162/56	175/49	35/21	66/25	-	-	-	-	-	-	-
K8TQK	EM89	H	116,982	146/60	143/55	40/28	59/33	10/7	13/8	3/3	-	-	-	-
K9KL	EN64	H	71,632	172/64	118/42	27/16	42/18	-	14/8	-	-	-	-	-
K9RQ	EN61	S	4,635	18/11	53/24	-	16/10	-	-	-	-	-	-	-
K9YR	EN52	S	16,864	67/24	79/20	21/6	42/12	-	-	-	-	-	-	-
KA1ZE	FN21	H	147,555	86/22	177/32	70/25	77/20	30/10	40/13	18/6	12/5	2/2	-	-
KA9WBT	EN62	R	11,340	33/8	65/12	15/5	30/7	-	16/7	-	-	-	-	-
KB0QGT	ROV	R	7,527	22/5	47/11	32/8	30/7	-	-	-	-	-	-	-
KB0VUK	EN34	H	25,245	42/18	73/35	23/10	38/15	-	15/7	-	-	-	-	-
KB2WVG	FN30	S	3,663	61/22	32/9	-	9/2	-	-	-	-	-	-	-
KB8NNE	EN83	H	8,789	-	159/37	6/5	8/5	-	-	-	-	-	-	-
KC6TEU	CM98	H	31,289	51/11	152/24	27/9	57/14	-	24/9	-	-	-	-	-
KC6ZWT	CM98	H	13631	-	121/22	31/6	67/15	-	-	-	-	-	-	-
KC8CSD	EN81	S	7,370	36/23	46/14	9/9	17/9	-	-	-	-	-	-	-
KE8FD	EM89	H	122,562	95/45	170/64	45/33	66/36	9/7	16/9	4/4	-	-	-	-
KF6LT	ROV	R	10,296	48/11	76/13	20/6	35/8	-	-	-	-	-	-	-
KF9US	ROV	R	18,148	34/5	91/15	35/8	55/10	5/3	6/4	-	-	-	-	-
KG4BMH	EM76	H	3,589	-	97/37	-	-	-	-	-	-	-	-	-
N0HJZ	EN34	S	104,550	211/70	148/39	48/14	83/20	-	19/7	-	-	-	-	-
N0LL	EM09	H	24,531	43/30	72/37	21/19	24/21	-	4/4	-	-	-	-	-
N0VSB	DM79	H	32,054	80/34	77/23	24/17	42/14	-	13/6	-	-	-	-	-
N1DPM	FN32	S	126,060	113/35	134/26	64/18	82/20	32/11	34/12	13/7	6/3	-	-	-
N1RWY	FN54	H	22,796	78/34	84/23	25/12	31/12	-	1/1	-	-	-	-	-
N1ZZN	FN42	S	2,205	40/9	47/8	-	9/4	-	-	-	-	-	-	-
N3VBG	FM19	H	13,740	127/39	102/21	-	-	-	-	-	-	-	-	-
N3XJX	FN10	H	28,730	82/31	90/24	39/16	44/14	-	-	-	-	-	-	-
N3ZTZ	FM19	H	16,640	173/44	81/20	-	1/1	-	-	-	-	-	-	-
N5XU	EM10	L	9,225	44/11	75/14	18/8	35/8	-	-	-	-	-	-	-
NC1I	FN32	H	55,209	33/11	190/25	-	247/41	-	-	-	-	-	-	-
NG4C	FM16	H	31,104	137/61	67/21	17/11	25/15	-	-	-	-	-	-	-
VE3TMG	EN82	S	13,303	86/28	85/18	-	40/7	-	-	-	-	-	-	-
W0ZQ	EN34	H	65,856	68/20	142/38	47/20	76/18	13/9	20/7	-	-	-	-	-
W1AIM	FN34	H	34,440	79/33	125/38	24/13	28/16	1/1	4/4	-	-	-	-	-
W1COT	FN31	H	25,086	32/11	119/32	35/14	45/14	-	7/3	-	-	-	-	-
W1FN	FN33	U	15,624	69/16	114/21	22/9	22/8	-	2/2	-	-	-	-	-
W1NWE	FN32	S	5,264	-	66/13	21/8	22/5	-	9/2	-	-	-	-	-
W1PM	FN41	S	49,329	99/27	94/16	52/13	57/12	18/9	21/10	-	-	-	-	-
W1QK	FN31	L	83,600	244/29	310/31	66/16	97/19	-	-	-	-	-	-	-
W1VHF	FN41	L	47,902	304/56	119/18	-	61/11	-	3/1	-	-	-	-	-
W2GKR	FN31	H	8,580	75/32	81/23	-	-	-	-	-	-	-	-	-
W2KV	FN20	L	18,767	-	383/49	-	-	-	-	-	-	-	-	-
W3EME	FM19	S	16,100	-	350/46	-	-	-	-	-	-	-	-	-
W3EP	FN31	H	36,855	267/64	138/27	-	-	-	-	-	-	-	-	-
W6TOI	DM04	U	102,506	146/20	228/26	71/17	129/21	10/9	30/11	-	-	-	3/3	-
W9JN	EN54	H	2,772	18/10	21/11	8/7	11/8	-	-	-	-	-	-	-
WA1HOG	FN42	S	35,328	84/19	122/18	22/5	67/15	12/6	20/6	-	-	-	-	-
WA2FGK	FN21	H	304,196	177/51	315/71	74/28	113/30	33/15	39/17	15/9	9/5	-	-	-
WA2ONK	FN20	H	53,270	28/4	161/19	71/16	65/15	35/8	40/8	-	-	-	-	-
WA2VUN	FN20	H	37,762	171/35	151/21	35/11	43/12	-	-	-	-	-	-	-
WA2ZFH	FN30	H	20,451	25/6	80/15	50/13	50/11	-	24/6	-	-	-	-	-
WB2WIH	EL96	H	27,440	243/46	69/13	10/4	30/7	-	-	-	-	-	-	-
WG2E	FN22	H	26,048	352/74	-	-	-	-	-	-	-	-	-	-
WZ1V	FN31	H	165,738	139/24	210/39	84/22	120/21	35/12	48/13	9/5	5/2	-	-	-

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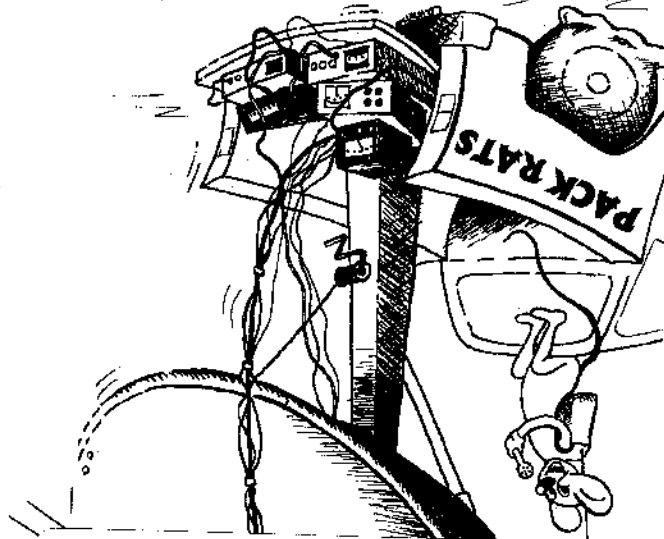
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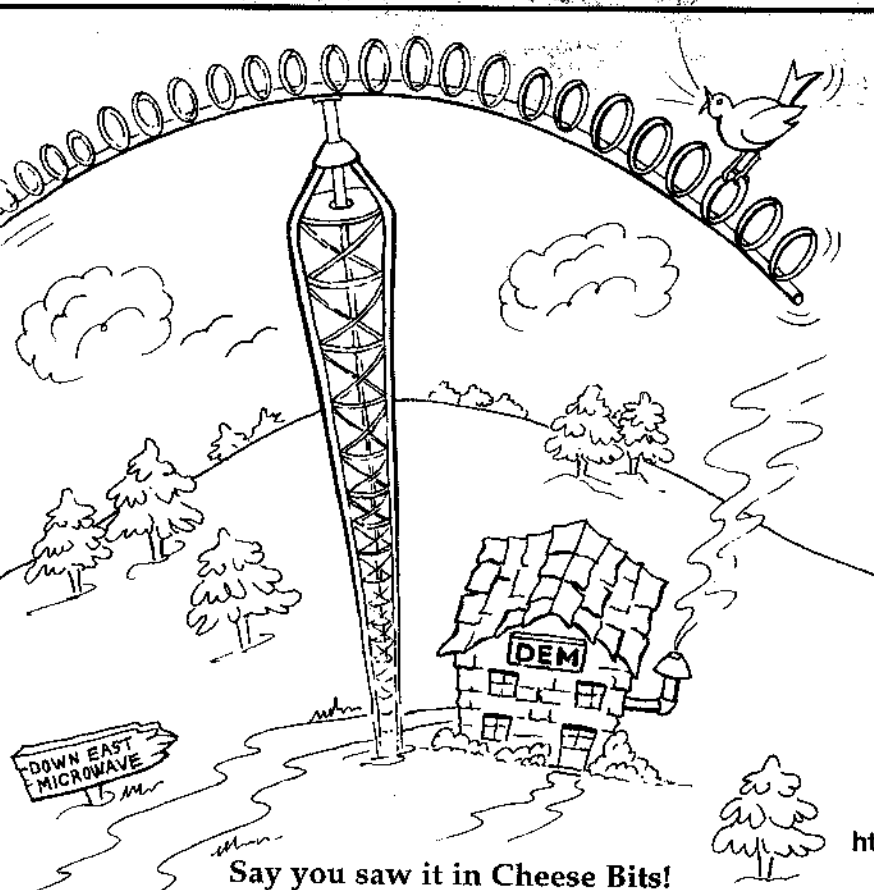
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