Potomac Valley Radio Club Newsletter

April 2006

Visit us on the web at www.pvrc.org and www.pvrcnc.org

PVRC welcomes Jim Gulvin, W4TMO, to PVRCNC-East, George Vagner, KF7NN to the CVCC/PVRC, and Reggie Graham, KW3W, to the Central chapter.

Editor's Note
By Pete Smith N4ZR

First, an error to correct. Last month I ran a classified ad, indicating that W3BP had a bunch of big tower tackle for sale. What Bruce meant was that he has it available **for loan** to PVRCers who need it. Sorry, Bruce.

This month features some first-person reports from the contest "front," as well as advice from K7SV on low-power contesting — he's one of the best in the country at it.

From the President
By Jim Nitzberg, WX3B

This past weekend was the CQ WPX SSB Contest and I took the opportunity to enjoy the contest with the largest team in WX3B history. It was great hearing all the PVRC activity over the weekend. Band conditions were fascinating, as a new student to propagation I was amazed to hear all the European and some Asian stations call in on 20 meters up until about 11:00pm. I hope everyone enjoyed this contest – one that typically starts the "summer" season – a more relaxing pace of contests.

At our PVRC Central meeting this month our guest speaker was Fred, K3ZO and he did an excellent job of predicting some of the likely propagation we would experience in the WPX contest this past weekend.

I am pleased to formally announce a new service of the PVRC Web site that was created by Anthony, WM3T. This service is titled the PVRC Experts Database and it will contain information relevant to contesting, station building, and any other topic PVRC members contain expertise in. This idea was suggested by many PVRC members and championed by Eric, W3DQ. Several categories are already built-into the system and when members register their areas of expertise in the system they can create new ones.

This new service is located on our web site at: http://www.pvrc.org – click on the Links title and at the bottom there is a link to the Expert Exchange. When searching for an expert to contact, select the category and then view the matches in the database. If you want to narrow your search; there is a Boolean search of the description. The returned information has all of the important information for contacting the expert along with a description of what they have to offer. This system is in its infancy and it only works if you, our members volunteer, yourself as a contact in different areas where YOU are the expert, so please log into the system and select "Add an Expert" to register yourself as the expert.

This month we have a very exciting program at our Vienna, VA meeting at the Olive Garden on April 10th. Kam, N3KS and David, K3LP are giving their presentation on their Desecheo Island (KP5) DXpedition. Come and

learn what it takes to activate one of the most wanted countries in the world! David, K3LP will be stepping onto an airplane shortly after this presentation…to go on his NEXT DXpedition to VU4. N3HBX will discuss the planning, building and success with his super-station in Poolesville, MD at our May meeting at the Capitol College.

There are exciting things happening in the world of RTTY contesting. This mode continues to gain support and momentum within PVRC. Mike, K4GMH has been working with the CQ management committee and we have a good feeling that official club competition is close to being approved for the CQWW and CQ-WPX RTTY events.

73,
Jim Nitzberg WX3B

PVRC Contest and Event Calendar

PVRC Events in boldface — all dates and times are Zulu except as noted

Low Power Sprint, 0000Z-0359Z Apr 1

EA RTTY Contest, 1600Z Apr 1 to 1600Z Apr 2

JIDX CW Contest 0700Z Apr 8 to 1300Z Apr 9

CQWW WPX Contest, 0000Z May 27 to 2400Z May 28

ARRL June VHF QSO Party, 1800Z June 10 to 0300Z June 12

All Asia DX Contest (CW), 0000Z June 17 to 2400Z June 18

West Virginia QSO Party, 1600Z June 17 to 0200Z June 18

W3LPL Open House, Noon local time, June 17

ARRL Field Day, 1800Z June 24 to 2100Z June 25

2006 Hamfest Schedule

Date	Location
April 23	York, PA
May 7	Hagerstown, MD
	Warminster, PA
May 13	Fredericksburg, PA
May 28	Howard County, MD
June 4	Manassas, VA
June 10	Bloomsburg, PA
June 18	Frederick, MD
July 2	Wilkes-Barre, PA
July 4	Harrisburg, PA
July 16	Kimberton, PA
July 23	Howard County, MD
July 9	Hagerstown, MD
August 6	Berryville, VA
	Mountaintop, PA
August 13	Westminster, MD
August 20	Hanover, PA
September 9	Stroudsburg, PA
September 9-10	Gaithersburg, MD
September 25	Wrightstown, PA
October 15	Sellersville, PA
October 29	Westminster, MD

Additions/corrections are appreciated!
de Glenn, K3SWZ

The Toolbox
By Don Daso, K4ZA

Sometimes problems demand unique solutions, which is where Plato's line, "Necessity is the mother of invention," probably came from, and tower work isn't any different. This column presents one such solution, prompted by a recent job for K4KL, near Charlotte, NC.

Rick selected an 89-foot ITS crankup from Array Solutions, along with OptiBeams & M2 antennas. The approach was fairly straight forward, involving a Genie 50-foot man-lift to install a 3-inch DOM mast, along with the topmost 2M vertical, and the 30/40M and 6M Yagis. But, by then, we'd run out of daylight. We had, however, also carried the OptiBeam into position next to the tower. All hands pressed for a quick raising using the good old ginpole, but I wanted to ensure the beam itself was well away from the tower, so opted to construct the simple cantilever rig described here, and install the 5-bander another day.

Selecting some 1-inch square tubing, the main arm was welded up, using two sections; then, suitable braces were cut and welded to it, using the same stock. These were then bolted to a 6061 plate of ¼-inch aluminum. All materials came from the K4ZA collection of metal "I knew I'd find a use for one day," which seems to grow exponentially as time goes by.

The pictures show this simple device's construction, as well as an "action shot" of it being used to raise a slightly smaller OptiBeam on the Eastern Shore for K3CB. Again, the ability to keep the beam away from the motor & hardware near the ground makes raising the beam an easy task. Once the beam is at the top of the tower, I simply attach another rope (mounted to the mast, this time) and swing the beam into place for mounting.

HP versus LP in Contests
By Larry Schimelpfenig, K7SV

Several months ago N4ZR asked if I would provide some tips based on my Single Op 2 Radio (SO2R) experiences. I said I would, but better yet, I'd do a newsletter article. Well, the article kept getting put off. Recently Pete asked if I'd do an article comparing high power contesting with low power contesting, so I've decided to do two articles that relate to what Pete has asked for. This article will include an hour by hour discussion of my recent ARRL CW DX contest effort, and compare my experiences during M/M, M/2 and M/S efforts running high power and my own efforts with low power. The follow-up article will discuss my poor man's evolution to SO2R, and will give real life examples of how I benefit from a fairly inexpensive approach to SO2R.

A lot of my contesting over the years has been in M/M, M/2, and M/S environments from well equipped stations such as W3AU, NR4M, and K4JA. I made a few single op high power efforts from K7RI and K4CG in past years as well. All of my low power efforts have been made from my current location in Spotsylvania, VA. Without going into a lot of detail, the current station consists of an ICOM 756PROII and an ICOM 746. The antennas are a

KT36XA tribander at 65 feet and a 2 el KLM 40 meter shorty at 78 feet, both on the same tower. Trees support an 80 meter dipole at 55 feet or so and the tower provides for an N4KG style reverse fed ground plane for 80 as well. On 160 I use a tee with 55-60 feet vertical and 100 feet of flat top, fed against six quarter wave radials elevated 6-10 feet above ground. I have a 300 foot beverage running SE/NW down the driveway. I also have a 300 foot half BOG running NE/SW along the boulevard during contests. Half of it is elevated about 6 feet and the rest is supported about six inches above the ground by weeds. I'm very fortunate in that I have a great take off angle into Europe and Africa, with a 70 foot drop in the 300 feet between our home and Lee Lake. From JA through north there are about two blocks of level land between the house and where it again drops about 70 feet to Lake Wilderness. The shot to the south is about the same over Grant Lake. Land is level for miles to the west. Yeah, there is a Civil War theme to the subdivision!

The first thing I would say, regardless of your entry category in a contest — if possible, run, run, run. I find that getting a lot of Qs in the log early in the contest inspires me to keep slugging away when things slow down later. It's obvious that one's ability to run is affected by a number of factors. What constitutes a good run is also dependent on the station, propagation, and the number of stations that have already been worked on a given band. It goes without saying that runs are better with high power!

I always try to stake out a claim to a run frequency before the contest begins. When running I like to be close to the bottom of the band if possible. While it's logical to think that it's easier to hold a run frequency when running high power as opposed to low, that isn't necessarily so. Running low power, you can often slip into a space between a couple of high power guys without complaint, while your presence would be more obvious and objectionable were you running high power. I spent quite a bit of time between W3LPL and KC1XX on 20 during this contest.

Now while thinking in terms of squeezing in between a couple big boys while running low power, here's another thought. You all know that lots of folks seem to have trouble zero beating. For that reason, the broader a filter you can get by with, the better off you will be. There are several limiting factors in deciding how broad a filter to use. One of those factors is the ability of your brain to separate signals. Another factor is how much your AGC is captured by adjacent strong signals. Everyone has probably heard stories about Fred Laun, K3ZO, operating CW contests, running SSB filters. I believe Fred can do that for two reasons. The first factor is the marvelous filter he has developed between his ears. The second reason is that with really decent antennas and high power, other stations are going to give Fred with his BIG signal a wider berth in frequency than they do me with a tribander and 100 watts. That said, the low power op should still use the widest filter possible, along with receiver incremental tuning (RIT).

While thinking about some of the neat mults that responded to my CQs from the multis, I have to remind myself that in addition to bigger antennas and power, the multis typically spend much more time on each band than I do as a single op. That places them on bands working exotic stuff while I'm trying to run Europe. At sunrise it's always tough to decide between running Europe on 20 or working mults on the low bands.

SO2R low power has made contests such as the ARRL CW so much more fun because one can do both. The same can be said with SO2R high power, but there's a catch. With low power from my station I can get pretty good rate, but the runs frequently slow down enough to look for mults on other bands with the second rig. I believe that if I were running high power from home, the high band pileups at sunrise would be too intense to allow me to comfortably search mults on the low bands. Then again, there are the aces out there that manage it with HP.

Running low power I've never experienced pileups as intense as those experienced while running full power with stacks from NR4M and K4JA. As a side note, I found a productive method of controlling the crowds while operating at those stations. That was to crank up the CWspeed until things thinned a bit. In addition to crowd control, it put Qs in the log quicker!

Another consideration between high and low power operation is getting everything to work correctly and keep it all working. That's especially true with SO2R. In something like 13 years of contesting from home, the only station problem I've had is with antenna rotators.

At various locations in the past, I've used an amplifier running one or a pair of 3-500Zs. I've also had my share of RFI issues. When we built the home in Spotsylvania, I was fortunate that the HOA allowed me to put the tower/ antennas up. I made the decision then that I would limit myself to low power. In 13 years I haven't gotten the first RFI complaint. My family appreciates that as much as I do.

Here's a matrix that shows what I was doing band-wise from hour to hour during the ARRL CW. Where a discrete frequency is specified, that indicates I was running. Where bands are listed, I was doing S/P on that/those bands. Obviously if you see a discrete frequency and band(s) during the period, I was SO2Ring.

0000-0030	7041	0030-0200	7010/80	0200-0300	7009/160
0300-0500	7002/80	0500-0600	7002/160	0600-0700	7002/20/40
0700-0800	7002/160	0800-1000	7002/80	1000-1130	ZZZ
1130-1200	14002/40	1200-1300	14002/20	1300-1600	21004/20
1600-1800	14000	1800-1900	15/10	1900-2000	20/10
2000-2300	40/20/15	2300-0000	80/20	0000-0100	7017/40
0100-0300	7005/80	0300-1000	ZZZOOPS	1000-1100	7002/80
1100-1300	14003/40/80	1300-1500	21001/20/15	1500-1600	14011/15/10
1600-1700	20/10	1700-1900	15/10	1900-2000	14007
2000-2200	14001	2200-2400	80/40/20/15		

I'd venture to guess that were I running high power, I wouldn't have done things much differently. Perhaps there'd less S&Ping as a result of longer runs, and there would certainly be less second radio QSOs.

Well, those are the things that come to mind when making the comparison. While it would be part of a multiop versus single op comparison I will say that as much fun as I have doing single op from home, I really miss the camaraderie of the multi. I also like the sleep I got on the schedule that Paul, K4JA, used for his M2 efforts.

Next I'll put together something that discusses my evolution to LP SO2R and give some specific examples of how I used it in the ARRL CW test. That could be one article, or it could be two. [Stay tuned—Ed.]

PVRC W3AO Field Day
By Rol Anders, K3RA

This year, as for the past 8 years, a PVRC team will join with the Columbia Amateur Radio Association to operate Field Day as W3AO. It is an excellent merger of club capabilities, and the PVRC/CARA team has finished number 1 overall for the past 7 years in a row. Along the way the team has set new records for total points scored and number of transmitters fielded.

YEAR	QSO's	Points	CLASS	Overall Finish
1998	6,697	19,366	4A	2
1999	9,163	26,224	7A	1
2000	9,908	31,534*	30(39*)A	1
2001	10,143	31,760*	26A	1
2002	10,158	33,442*	38A	1
2003	7,754	27,834	51A*	1
2004	9,304	32,372	50A	1
2005	8,553	27,534	21A	1

The record for total number of QSO's has been eluding us, and not surprisingly, since it has been in place since way back in 1981--set by a Yankee Clipper team with many KW stations! However, even though we have limited ourselves to 200W, we have come within 10% of the 11,201 QSO record; and, of course, we racked up many more points in the process. We aren't likely to better the QSO record this year, but just wait until the sunspots return!

Making 9,000 to 10,000 QSO's in 24 hours surpasses any other contest QSO rates, except perhaps for the head-

quarters teams in the IARU, who are not restricted to be co-located. The W3AO average rate for the whole FD period is around 400 Q's per hour, with peak "last 10's" exceeding 1400/hour! It is really something to see the Q's flying into the networked CT logging computers. FD may not be a "contest" according to ARRL, but you sure could fool me!

Last year's FD results show PVRC leading the pack overall by a considerable margin. Here are the 2005 top five finishers:

Call	Club	Score	Class
W3AO	PVRC/CARA	27,534	21A
W4IY	Woodbridge Wireless	22,508	16A
KP2AA	Chip Margelli, K7JA, and Company	22,445	5A Battery
W6YX	Stanford University	21,796	6F
K2AA	South Jersey Radio Association	18,292	6A

I can't list all of the 96 people who helped out in last year's event, but at the risk of offending some very valuable contributors, here are some of the people who participated in 2005:

The W3LPL multi-multi team forms the core of the operator cadre, but other PVRC contesters join the team each year. As you know, FD provides an opportunity for VHF/UHF and digital aficionados as well as HF CW and SSB ops. The "Band Captains" for the various band/modes last year were:

- 160 SSB/CW AI3M
- 80 SSB KD4D, CW K2YWE
- 40 SSB K3RV, CW KE3Q
- 20 SSB W3LPL, CW K3RA
- 15 SSB K4ZA, CW N3UM
- 10 SSB AA3S , CW KA3UBJ
- Digital: N3OC, K3MM
- VHF/UHF/Microwave: ND3F, KA3EJJ, W3DIO, K3LFO
- Satellite: N3OY, N2EC, W3GJN
- APRS Demo, K3BAZ
- Traffic: WA1QAA

Fielding 20+ simultaneous stations is a real challenge, and lots of fun! Frank, W3LPL, has built us monobanders for SSB and CW on 20, 15, and 10. KE3Q provides a pair of Cushcraft 40 meter beams and a tribander for Digital. We also have a pair of dipoles each for 40, 80 and 160. Besides the tribander, the digital team had a third LPL-designed-and-built 20 meter monobander and a dipole for 40. All these antennas will be back for 2006, along with an 80 meter dipole for Digital. Frank also loans us about a mile (literally) of

coax from his beverage farm which he takes down every spring.

Also, entering the 21A category entails setting up a dozen or so 50-foot AB577 "Rocket Launcher" towers starting at 2 pm on the Friday before FD. Jim, N3KTV, is "homo erectus" in charge of safely getting all this aluminum and copper into the air within a 1000 foot circle, while avoiding band/mode-to-band/mode interference. He does a great job with yeoman support from the hardworking team.

The view when all is in place is pretty impressive as you can see in the photo. Of course, any hardworking team needs fuel, and with my wife, Audrey, doing the "catering", we surely eat well. If there were bonus points for the best menu, I think we would be on top in that category also!

None of this runs without basic utilities. KC3VO has provided the generator with full UPS backup for many years--last year aided by CARA's KC3TO. Thanks to W8AJR of CARA, we even had an air conditioned tent furnished by Gary Cagel of CDI, who markets these fantastic tents to various government emergency preparedness organizations. N3OYF did a superb job with the hardware and software to deploy the essential network of 12 computers running CT.

There are many unique ham radio opportunities afforded by FD. For instance, Field Day provides us an opportunity to entertain County and State officials and show them ham radio in action. In 2005 we had visitors from the Howard County Council, the MD State Legislature, the MD State Office of Homeland Security, and the Red Cross. Also, the "Get On The Air" station is a great training opportunity for new hams and young people. Plus, we have the opportunity to earn bonus points by demonstrating FSTV, SSTV, APRS, and other "non-traditional modes". Finally, we have had coverage for the event in several local newspapers.

The honor roll of PVRC'ers/locals we worked multiple times last year is as follows:

K1RZ	24
K3QII	20
W3ZZ	19
K8ISK	11
K3Z0	10
N3TO	10
K3UOD	8
W3IUU	7
WA1LWS	6
K3LNZ	3
W3CCI	3

We also worked KT3RR (2D) on 18 band/modes. His was the only station we worked on CW and SSB 160 through 10. And thanks to Adam, N3SLN, who worked us on many microwave+ bands.

FD this year is June 24-25 and plans are to return to our Howard County, Maryland, location of the past 2 years on the grounds of the Folly Quarter Middle School and Triadelphia Ridge Elementary School just east of Route 32 at the intersection of Triadelphia and Folly Quarter Roads. This location is just minutes from W3LPL. If you are interested in helping us make it 8 first place finishes in a row, please contact Rol, K3RA (roland.anders@comcast.net). If you can't make it to the site, be sure and look for W3AO on the air.

Propagation in the Russian DX Test
By Fred Laun, K3ZO
[Any time Fred thinks propagation is noteworthy, it is! — Ed.]

I had 916 QSOs and 851,133 points in the RDXC, high-power all bands mixed category. For those following "space weather" it should have come as no surprise that conditions for the RDXC were "strange". As the contest began the K index was 5. It varied between 3 and 6 for the remainder of the contest. Meanwhile the Solar Flux re-

mained at almost rock bottom at 72 through the whole period. The absolute lowest the Solar Flux can get is around 66 or 67, so we were barely above that level.

Actually the sharp rise in the K index may have helped 15 meters, which was open reasonably well to Southern Europe for a while Saturday morning. Under very quiet conditions, this time of year when the Sun has reached the midpoint in its travel from the Tropic of Capricorn to the Tropic of Cancer, the MUF in the Northern Hemisphere actually begins to be inhibited by the strengthening of the Sun's rays on the Ionosphere. But a geomagnetic disturbance upsets the functioning of the Earth's magnetic field and for a few hours after the first upward spike of the K index, the increased geomagnetic activity can actually increase the MUF on certain paths, such as that to Southern Europe and Northern Africa. Note that at 0300 GMT Saturday the K index stood at zero, so that the fact that by 1200 GMT the K index had risen to 5 constituted quite a dramatic increase in geomagnetic activity. Ergo quite a strong opening to Southern Europe on 15.

The heightened geomagnetic activity also did not hinder the conditions on 20 to Western Europe for a while. Signals from Western Europe on 20 were still quite robust at 2100 UTC. There were also Aurora-propagated signals from OH, UA1 and UA9 at that hour.The persistent high level of the K index had begun to affect the conditions on the 40 meter band by the time the band opened to Europe for us Saturday evening. The signals from most of Russia were weak and watery even at 2200 UTC whereas a day earlier at the same time of day they had been excellent. Those of us with 40 meter beams could reduce the deleterious effects of this situation somewhat by beaming Southeast, and catching side-scatter from the Russian signals as they propagated southward, a path that is always enhanced on 40 meters for the first several hours of an ionospheric disturbance. Thus I worked UA9MC and RU1A with my beam on ZS; rotating my beam while listening to them confirmed that the ZS heading was where their signals peaked up. One problem when calling stations who are loud on this path is that sometimes, when they hear a USA station calling, they rotate their beam to the direct path when they should have left it where it was. Beaming Southeast is not a perfect solution to the problem as there is frequently a lot of multipath present and the resulting echo makes some signals hard to copy even if they are strong.

Beaming direct path to Europe on 40 produced a reasonable number of Western Europeans responding to my CQ's, but the Aurora backscatter from my own signal would assault my ears for an instant each time I stood by.All week long leading up to the contest I had been having a ball working stations in Europe on 75 phone in the DX window, where my 3-el 80 meter beam has been tuned for maximum F/B ratio. By the time I got there on Saturday night, however, the high K index had had its effect. LZ1JY, for one example, was 10 db weaker than he had been the night before. I did work a couple of UA3's but the signals were hard to pull through. Meanwhile I was getting called by PY's and LU's off the back corner of the beam as the North - South path had been enhanced by the disturbance. There was reasonable activity from Western Europe on the CW end of 80 meters which is what kept me going.

Following European sunrise the pickings became very slim on all bands. 20 was stone cold dead and 40 and 80 were open but not to the places where the contest activity was highest. Interestingly enough though, I worked ON5KQ on 40 at 1045 GMT, the only European I could hear on the band at that hour. The Southwest Grey Line path on 40 produced a couple of UA0's and JA's around sunrise but there wasn't much contest activity at all, perhaps inhibited by the intermittent presence of the new Chinese OTH radar, which I could hear quite clearly when it was on. I guess the Chinese have decided they want no more surprises from US P-3's patrolling the South China Sea.By the time sunrise arrived Sunday morning the dampening effect of the geomagnetic disturbance on the ionosphere as it affected 20 meters was clearly evident. There was plenty of daylight here by the time the first 20 meter signal from Europe rose above the noise at 1115 GMT. Surprisingly enough, that signal was OH0Z; I would have expected an Italian or an EA to be the first one through. The band didn't really open wide until a scant 10 minutes before the contest ended at 1200 GMT. I managed to put UA3BS and RZ3AA in the log just before the end.

Conditions could have been better, but for a propagation junkie like me, they were just fine!

ARRL DX CW (SOLP) from FS5UQ
By Dave Collingham, K3LP

The ARRL DX CW 2006 contest had many new challenges. Although the (20, 10 and 160 meter bands presented new frustrations for me this year, I was able to improve my overall score in this competition compared to my prior Low Power contest DX-peditions (J6/K3LP, J6R, etc.). [FS5UQ's claimed score stands second in the world in SOLP—not too shabby—Ed.]

First of all, my 20 meter QSOs on both Saturday and Sunday mornings were few in coming. There was a second operator (FS/KN5G) on the island operating single op 20 meters, but the guys on Aruba seem, each year, not to be impacted by this type of issue. It's not uncommon for stateside to be pointing toward Europe and not hearing the Caribbean until almost 10:30AM. It just seemed slower than normal. I was down about 300-400 QSOs on this band at the end of the contest. I kept myself busy operating 40 and 80 meters to fill the void, until I got 15 meters going at a decent rate.

The 40' light weight aluminum crank-up tower cable was damaged (rusted beyond use) with a rotator that would not rotate and could not be fixed until the aluminum tower could be lowered. I pointed the beam at the midwest and operated the contest with the log periodic beam in a fixed position both days. It's unclear how much my results were impacted by lacking some antenna gain by not using a mono-band beam and losing the antenna directivity (i.e. no antenna rotation).

Ten (10) meters yielded zero activity for me until Sunday afternoon around 1800 GMT, when I finally made my first QSO on this band. I had a 2 hour opening that provided 179 QSOs and 35 multipliers, and believe me, I was grateful to have what came my way.

My 160 meter QSO and multiplier totals were both up this year, but I was still pained by not being able to get the north and northwest coast (OR, WA, VE7, VE6, VE5, UT, NV, ID) and northern mid-west multipliers (MT, ND, SD, WY, VE4) on this band. My 350' beverage was working fine and I seemed to work everything I could hear as I moved them from 40 or 80 meters to 160 meters. I just didn't get the proper openings. I tried at sunrise, during the middle of night and 1 hour before their sunrise, each time moving the needed multipliers, knowing the call sign, but just couldn't hear them, therefore not working the multiplier. This was a real bummer!

I was able to exceed my last year "J6R" QSO and multiplier accomplishments on 80, 40 and 15 meters. I was very happy with the results on these bands.

W3ARS (Clint) and I put up a two element wire beam for 40 meters that worked with great results from the 1,400 hill top location.

I used two IC-746 PROs in a SO2R configuration. These radios were excellent for operating the CW contest and the rig's size made it desirable for taking on my DXpedition. The IC-746 PROs are a must on my future DX-peditions. I really liked the CW filters and numerous features bundled into this rig's medium sized package. I'm hooked on the IC-746 PRO after being disappointed by using other rigs in the past.

I changed my sleep schedule this year. I slept three hours (starting 1.5 hours before sunrise) on Saturday morning and had no sleep on Sunday. Having no sleep on Sunday just didn't work for me. By the last two hours of the contest, where I needed to be focused to get the 250-300 Hour QSO rate, I had difficulty maintaining the rate over 225. I just wanted to go to sleep – the brain to hand and keyboard actions just didn't want to play full blast anymore. Next year, I'll change my sleep schedule again, until I get it right.

Around The Club
Meeting Minutes from the Regions

PVRC Central Meeting, Temple Hills, MD, March 13— Hosted by Mark, KD4D, Guest Presenter: Fred, K3ZO
Meeting Minutes by Jim Nitzberg, WX3B

In Attendance: Reggie, KW3W (New Member!), Fred K3ZO, Mike N3CA, Barry WR3Z, Steve WM3O, Todd WB2ZAB, Jim WX3B, Tom W3TOM, Dave WR3L, Bill W3AZ, Mark KD4D, Bob KI3O, Gene W3ZZ and Rich KE3Q

PVRC Club Business/Announcements
I am pleased to announce we have a new member, by unanimous vote: Reggie, KW3W has joined our club. This was Reggie's second meeting and we look forward to having him participate in club contests. Welcome, Reggie! Dave, WR3L gave away numerous gifts of nice 2006 calendars and screwdrivers to the group. He also encouraged members to try the new, improved wr3l.net telnet cluster - which is working better than ever.

Jim, WX3B made an announcement from Team Desecheo, K3LP and N3KS. John, W3ADC and about 7 others spent most of the past weekend sorting and completing the QSL cards for the KP5 operation. About 80% of the QSL requests have been answered and mailed and it is anticipated that the remaining 20% will be completed by April. For those of you that want KP5 confirmed, please send your QSL request, individually, with a Self Addressed Envelope containing postage to W3ADC's address on qrz.com. Please consider a donation to team KP5.

Mark, KD4D reminded the group about the next "Temple Hills" Central Meeting in May. It is going to be at the Capitol College - and the guest Speaker is our very own John Evans, N3HBX. His presentation will detail the construction of the new N3HBX Super-station in Poolesville, MD. Mark will begin sending reminder emails of this event as it gets closer.

Mark also reminded the group that it is the end of the era for us at our current location because our meeting place (the Church) is no longer available. We are giving serious consideration to the Bowie, MD area for our alternating Central meetings, and this will give us the opportunity to consolidate our dinner and presentations back into one building.

[The discussion of WPX SSB that follows may be found in the Extended Content section on the web page]

Fred, we thank you all very much for the propagation forecast and lesson and we look forward to hearing great PVRC activity in the upcoming WPX Contest!

Jim Nitzberg, WX3B

Central Virginia Contest Club/PVRC met March 14. Those present: Jerry K4KJL, Marie K4KML, Bruce WD4LBR, Sheila K4WNW, George KF7NN, Sandy, JB N4NQY, Jonathan W4HZ, Bob NK4H, Ed NW4V, Duke W1ZA, Sejo N3UA, A.C. W4HJ, Dennis N4DEN, Walt K2WK, Phil KI4DX, Bob W4MYA, Ronnie WU4G, Jim K4PUA.

The regular monthly meeting was called to order at 7:04 PM by President Ed, NW4V. Members introduced themselves. Jim Kelly, K4PUA, attended for the first time. He recently upgraded to Extra.

Ed announced the winner of the club's yearly band entity competition. Sejo, N3UA won both plaques--one for the largest number of new band entities and one for the highest percentage of the number of band entities needed. Sejo had 920 new band entities and 27% of entities needed. Sejo reported that he had worked very hard to accomplish this win. Well done, Sejo!

The Virginia QSO Party is this weekend beginning 1800 Z Saturday. Bob, W4MYA, will be hosting a multi-

multi operation. Kyle will be roving.

WPX SSB is the weekend of March 25. Email Bob, W4MYA, if you can work. A photo of Roy, WK4Y, is in this month's QST on page 111.

Dennis, N4DEN, reported that the RF cluster is running. Equipment is coming back from repair. A motion made by Phil, KI4DX, to purchase a UPS, not to exceed $50 was carried. A motion made by J. B., N4NQY to purchase a gift certificate for $100 for Mark, N2QT, in appreciation for repairing our equipment also carried.

A membership roster was distributed; it will be cleaned up, removing any member who has not paid dues for more than a year. Thanks Dennis. George, KF7NN, and Sandy were voted into membership.

Ed, NW4V, asked if anyone was interested in serving as president. The point was made that there were actually only six business meetings since one month is a Christmas social, one month is the picnic, and we do not meet formally during the summer. There was a proposal and discussion about having a meeting facilitator rotating on a monthly basis. There was also discussion and a consensus among members present that we should hold meetings through the summer.

Jerry, K4KJL, agreed to assume the presidency. Jon, W4HZ, made a motion, seconded by J.B., N4NQY, to nominate Jerry, K4KJL for president. Motion carried.

J.B., N4NQY, made a motion to have a monthly meeting facilitator and for the president to have a sign-up sheet for the same, available at the April meeting, with vacant months filled by members in call sign order from the roster. Motion seconded by AC, W4HJ, and carried unanimously.

Bob, N4KH, was nominated for treasurer, by W4HZ.
Marie, K4KML, was nominated for secretary.

The club picnic will be held on May 13 at the river place of AC's cousin. Email Bob, W4MYA, with the number of persons attending. AC and Jerry will bring grills. AC will purchase meats and condiments. Members will bring a dish to share and their own drinks.

Dennis, N4DEN, proposed a change of restaurant location. Bennigan's was suggested.

The meeting adjourned at 8:40 PM. Respectfully submitted, Marie Long, K4KML, secretary

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The **Northwest Region** met at the City Buffet in Frederick, MD on 21 March 2006. In attendance were: N3HBX, W3YOZ, K3WC, NE3H, N8II, N4MM, N3VOP, WF1L, W2YE, N3CA, WN3R, K4VV, K3NA, N3UM, W3EKT, K2PLF, W3LJ, W3ZZ, K3OQ, K3LP, K3MM, W8ZA and W3LL.

Regrets:
KC3EK, Glenn hoped to be here with the early pictures of Marty's W3SO Altoona station.
W3IDT, Bob has a bad sore throat and feeling generally "achy". He hopes he's not catching Miriam's strep from the ARRL DX weekend. Bob wishes to convey their public thanks to W8ZA for being a great host once again for the ARRL DX, and to W3TEF, K8OQL, and W8ZA for nursing Miriam through her weekend with strep.

K8OQL, Jerry cancelled-out on driving to Frederick today because of potentially bad weather. Some snow there this afternoon with more to follow according to the Weatherman. Jerry likes to avoid icy/snow conditions on U.S. Route 50 between Winchester, VA, and his house especially after dark. He was planning on bringing W8OHT (formerly W3HVG), to the meeting. W8OHT lives 15 mi. north of Jerry on State Rt. 28 at Ft. Ashby, WV. W4AU, John won't be able to make the NW meeting tonight. He has a Town Council budget meeting that takes precedence. John had an eventful time in the Virginia QSO Party this weekend. Things started off on the wrong foot when one end of his 40-meter double-extended Zepp came tumbling down 15 minutes before the QP started.

He tied off that end at 6' rather than at 45' and hoped for the best; the best wasn't in the cards but it worked. Next, John's 80-meter dipole developed a short in the coax lead-in, a problem that he solved by flashlight in the cold wind at 9:30 Saturday night. Other than those incidents and the fact that the higher bands were lousy, things went well. John ended up with 639 Q's, divided about 60/40 CW and fone. If you have to be a hero to make 100 Q's on 75 meters on a Saturday night, then he's a hero! Gotta love them pig farmers... Sorry to miss the camaraderie and the good food.

NW Business:.W3LL - NW recommended the addition of the Makrothen RTTY contest to the list of 5M contests. This recommendation was rejected by the Officers and Board of Trustees.

W3LL - NW conducted a poll to determine the percentage of those members present who have entered an RTTY contest. The result was 12 of 22 or 55% having entered an RTTY contest. There is a dearth of RTTY contests supporting club competition. The 5M award program lists only two RTTY contests out of twenty. Those two are the WAE RTTY and RTTY Roundup. Only four of the twenty-seven recognized international RTTY contests have some form of club competition category. In an attempt to alleviate this dearth of RTTY club competition and to enhance our position in adding RTTY events to the 5M program, Mike K4GMH requested that a club competition category be added to both the CQ WW RTTY and CQ WW WPX RTTY contests.

The result was encouraging. Club competition would be added to the CQ WW RTTY contest this year and the CQ WPX RTTY contest next year contingent upon:

1. PVRC managing the plaque program for that category in both contests with an annual estimated cash outlay of $60.
2. Mike agreed to manage the plaque program provided PVRC add both contests to the 5M award program.

The next step is to write Jim WX3B an email with some depth to it, describing the opportunity, the value added to PVRC by increasing the club's commitment to RTTY, the trends in RTTY contesting (i.e. more contesters, with CW being dropped, digital interest rising, easy access to digital modes with inexpensive computers & good software), and some statistics, if possible from the past several years of PVRC participation in both the CQWW and CQ-WPX RTTY contests. A second poll was conducted to determine how many would participate in both the CQWW RTTY AND CQ WPX RTTY contests if they were included in the 5M award program. The result was 16 of 22 or a 73% participation level. Remember, only 55% of those present ever participated in any RTTY contest. This represents a significant potential increase in level of participation.

[Station Activities may be found in the Extended Content section on the web site—Ed.]

The meeting was adjourned at 8:30 PM.The next NW Region meeting is scheduled for Tuesday, 18 April 2006.

PVRCNC-East was graced with a strong turnout and an excellent program during our February gathering. General discussion about recently completed and upcoming contests, antenna planning, new rigs, and an assortment of other radio related topics were bantered about. The 15 in attendance were: W0UCE, Jack; K2AV, Guy; KA1ARB, Rob; N4CW, Bert; WA2JFK, Jim; K4CIA, Bill; NX9T, Jeff; N4TL, Tom; K4CZ, Barry; W4KAZ, Keith; AD4L, Pete; K4QPL, Jim; N4YDU, Nate; W4MY, Marty; and K3KO, Brian.

K4QPL welcomed the group and outlined the evenings agenda. WA2JFK was identified as having now attended the requisite two meetings and after a quick nomination from N4CW and a second by K4CIA, was unanimously voted in for membership. Welcome Jim!

K2AV presented a brief score analysis of the recent CQ160CW contest which vividly demonstrated the importance of working as many of the high-point EU stations (not just multipliers) as possible.

W0UCE conducted the regular "Paper Contest." This month's contest required members providing some basic advice to a new ham or newly active old timer who were looking for the two most important tips/recommendations to be able to hear and work "the weak ones" in contests. Members provided a wide range of suggestions which all

made plenty of sense. Winning this month's prize (screw driver set) was CW stalwart, N4YDU.

Jack, W0UCE, presented a very interesting and educational program entitled, "Tips for Working Weak Ones." This program can be accessed via the PVRC website or via direct email to Jack.

The program schedule for the next two months is as follows:
March: K4QPL- Getting started in SO2R
April: AD4L- Software Defined Radios

Member Reports:
KA1ARB: Rob enjoyed operating in the NAQP and CQ160CW. His makeshift inverted L which hung over part of his HF yagi worked quite well. AD4L: Pete and his daughter operated in Kids Day. He is preparing for the April meeting program on software defined radios, has put up a new 40/80m wire, and is planning a 160m L. N4CW: Bert operated fast and furious with Jack, W0UCE, in the CQ160CW. He has dabbled in most of the other smaller contests recently as well.

WA2JFK: Jim jumped in the NAQP and played in Kids Day with his daughter. Recently put up an attic dipole so is "on the air" from his own shack on a casual basis. Serious contesting will likely continue to occur at N4CW. K4CIA: After working the "locals" in the CQ160CW, Bill landed the "7X." He has completed the K9AY loop project and has picked up a new Kenwood 480 as an secondary radio.

NX9T: Jeff played in NAQP, CQ160CW, and operated Kids Day with his boys. Planning to jump in the SSB Sprint this coming weekend as well as operate in upcoming DX contests. W4MY: Marty is keeping an eye on a new tuner. While his wife, KC4HDI, was unable to attend this evening, the two hope to operate together in the YL/OM contest coming up soon. K4QPL: Jim has been very busy with travel and work the last several weeks, and as a result has not been able to operate much. He has big plans for operating this month at N4AF.

N4YDU: Nate is still reveling in his new QTH (former home of N4PY that came complete with antenna farm!). He operated some in NAQP and CQ160CW and is looking forward to testing his new station in several of the up-coming contests! N4TL: Tom entered the VHF contest, and while activity was pretty slow, grabbed every possible Q the bands would produce! Excited that he finally received his long awaited "YK" card after multiple attempts, international mail tracking efforts, etc.

K4CZ: Barry's big news is that he purchased 50 feet of Rohn 25 and a C4. Installation has been approved by the XYL! He also participated in the RTTY roundup and enjoyed his first real "run" on 75m during the NAQP!
W4KAZ: Keith has a great time in NAQP and reports that he was able to "run" some on 75m and all went well.

W0UCE: Jack reported that during the NAQPCW his PW1 failed but that in the CQ160CW he and N4CW doubled their score from last year! On a more casual basis, Jack participated in Kids Day.
K2AV: Guy advised that he has been primarily focused on helping W0UCE get back on the air after his intensive lightening strike.
K3KO: Brian (Welcome back!) indicated that he has been working his IC706 and SB1000 pretty hard. He also mentioned that he recently received a 25 million endorsement for the "5 million" award.

We look forward to another great gathering in March! Don't miss out...mark your calendars now for March 2 and come join us and learn about SO2R. Until then, good luck in the contests! Keep the rate high, the multiplier count up, and dig out plenty of those "weak ones."

73, Jeff NX9T

PVRC-NC East enjoyed a solid turnout and an excellent program during our March gathering. Our meeting conditions were a little rougher this time due to "our room" being double booked and being forced to meet in the public area with lots of QRM. We appreciate the patience of our chapter members as we dealt with the unexpected challenge. Efforts will be made to ensure that this situation does not recur.

The 13 in attendance were: W0UCE, Jack; N4CW, Bert; N4TMO, Jim; K4CIA, Bill; NX9T, Jeff; N4TL, Tom; W4KAZ, Keith; K4QPL, Jim; W4MY, Marty; K1ZW, Larry; NT4D, Jay; NT4Q, Jerry; and first time attendee and soon to be regular, N1LN, Bruce. K4QPL welcomed the group and outlined the evenings agenda. WA2JFK introduced himself with his new moniker, N4TMO. Congrats Jim! W0UCE conducted the regular "Paper Contest." This months contest was in "Sprint" fashion requiring both speed and accuracy. K4CIA firmly established himself as the "king" after winning his third paper contest. Bill, being the gentleman that he is, donated his prize (a protractor set) to W4TM's daughter who has been looking for just such an instrument.

Jim, K4QPL, presented a very interesting and informative program entitled, "Single Op, Two Radios...What, Why, When, Where, and How." Jim was challenged to present the program under difficult circumstances due to our meeting room issue, but, he came through with a superb summary of SO2R and all left with added insight and understanding of what it takes to play SO2R and why it is so appealing to many who are seeking that extra advantage. This program will ultimately be accessed via the PVRC website but can be obtained directly in either powerpoint or Adobe PDF format directly from Jim. The program schedule for next month is: April: AD4L- Software Defined Radios

Member Reports: N1LN: Bruce made his first, of what promised to be many, appearances at PVRC. He is moving to 10 acres near Chapel Hill in May and will be building a significant station consisting of multiple towers and several stacks. Welcome Bruce! One meeting is "in the log," one more to go and you are in with the premier contesting club! N4CW: Bert's contesting efforts have been limited by family obligations lately, but he plans to operate some this weekend with W4TMO during the ARRL DX SSB. W4TMO: Jim (formerly known as WA2JFK), operated some during ARRL DX CW and plans to be on with N4CW during the ARRL DX SSB. K1ZW: Larry joined us after being away a few months due to health issues. Welcome Back! He is recovering now after a hip replacement and has begun putting up some new antennas. Larry plans to operate during the ARRL DX SSB.

K4CIA: Bill is celebrating 51 years as a ham radio operator. Congrats! He got on during the ARRL DX CW and operated QRP..had a grand time. Recent DX snag was the YJ0 on 160m. NX9T: Jeff got in on during the ARRL DX CW for a few hours, had a terrific time while in the CQ 160SSB, and played for a couple hours in the NC QSO party. He reported that he enjoyed chasing 3Y0X all over the bands. Jeff plans to be on during the ARRL DX SSB and WPX. Described how propagation was horrible for the February SSB Sprint. W4MY: Marty congratulated W0UCE for a fine job during the recent ARRL DX CW test. He reported that he operated mobile (10 counties) during the NC QSO party. Meeting day was his birthday...Happy Birthday Marty! The good news is that Marty has started a new job. The bad news is that his job will likely keep him away from meetings for the next several months. He assured the group that he will be in contests and will stay in touch.
K4QPL: Jim described how the NY4A effort during the ARRL DX CW was a huge success. The crew is holding on to the number 3 spot in NA- M2. Jim played some in the NC QSO party and hopes to get on some for the ARRL DX SSB. N4TL: Tom entered the ARRL DX CW and plans to be during the ARRL DX SSB. He reported that he worked the 3Y0X on several bands and modes. W4KAZ: Keith has not been able to be on the air much lately due to a "bug" that went through the family. Hopes to be on some during the ARRL DX SSB. W0UCE: Jack reported that he and Dan, N3ND, had a great time during the ARRL DX CW. They are planning on making this an annual event. He was also quite pleased to announce that the insurance check finally arrived following the significant lightening damage he incurred a few months ago.

NT4D: Jay reported that he operated some during the ARRL DX CW and plans to operate MS during the ARRL DX SSB with Jerry, NT4Q. NT4Q: Jerry is looking forward to operating with NT4D during the ARRL DX SSB. He indicated that he is in the final stages of getting items together to put his tower up. Reports via Email: K4CZ: Barry reports working 408 contacts in the CQ WPX RTTY test recently. This is a new all time personal best for him. Way to go Barry!!! He also worked the ARRL DX CW and NAQP RTTY contests as well as bagging the

3Y0X after fighting his way through the pileups. Barry is planning to get on during the ARRL DX SSB. After this weekend, Barry states that he will be lessening his operating time so that he can get serious about getting his tower and C4 up in the air! KA1ARB: Rob advised that work commitments will hinder his ability to attend meetings for the next few months. Nonetheless, he is planning to operate this weekend during the ARRL DX SSB with a ham friend in New Hampshire.

We look forward to another great gathering in April! Don't miss out...mark your calendars now for April 6 and come join us and learn about Software Defined Radios.

73, Jeff NX9T

Briefly Noted

I ran across this today and immediately thought this would be a good technology to power tools, rotators and other accessories at the base of remote towers: http://www.thinkgeek.com/stuff/41/wec.shtml [AD3F]

It seems that besides the 80000+ QSO's in the logs the expedition on Peter Island can count among its achievments an important scientific discovery. >Prominent zoologists who examined the photographs and videos posted on the website of the expedition came to the conclusion that the penguin depicted on them is a new, sofar unknown species. Probably it will be named with the>scientific denomination Pygoscelsis 3Y0X and there are rumors about a future expedition for 2007 which, besides a new radio-activation of the island will have among its targets the capture of a specimen, for its detailed study. Stay tuned, will be back with additional information! [N2YO]

5M Award Scores
Complied by Anthony Brooks, WM3T

ARRL DX CW

Call	Class	Q's	Mults	Score
W3LPL	MM	6247	554	10,377,528
NY4A	M2	4934	487	7,183,737
W4RM	M2	3994	461	5,507,106
KT3Y	MS	3582	433	4,651,719
N4RV	M2	3255	446	4,349,838
K3LP	DX	3676	301	3,319,428
(OP OF FS5UQ)				
K0DQ	SOHP	2668	407	3,256,407
(W4RX HOST)				
K3ZO	SOHP	2810	380	3,202,400
N2YO	SOHP	2669	378	3,025,512
(W3BP HOST)				
NN3W	SOA	2208	446	2,954,304
(N3HBX HOST)				
W0UCE	MS	2179	394	2,566,122
K7SV	SOLP	1929	376	2,174,784
N3AM	SOA	1805	371	2,008,965
W3EF	SOLP	1806	341	1,847,538
K3DI	M2	1576	388	1,830,972
N4ZR	SOLP	1550	340	1,581,000
N4YDU	SOLP	1491	342	1,525,662
W3GG	SOA	1401	339	1,424,817
WX3B	MM	1130	343	1,160,712
K3SV	SOA	1211	308	1,118,964
K4MA	SOA	1000	325	975,000
K3WA	SOA	1105	262	868,530
NS3T	SOLP	874	298	781,356

ARRL DX SSB

Call	Class	Q's	Mults	Score
W4YE	SOHP	860	283	730,140
W9GE	SOA	737	303	669,933
WA8WV	SOLP	800	247	590,577
W6AAN	SOHP	611	318	582,894
K4FPF	SOLP	730	263	575,970
NY3A	SOHP20	1702	110	561,660
K4EU	SOHP20	1693	110	558,360
(NR4M HOST)				
K4VV	SOA	609	278	506,238
W3IUU	SOLP	714	221	474,708
W3DQ	SOHP	649	223	433,512
W3AZ	SOHP	589	225	396,225
W3LJ	MS	548	231	378,378
ND3F	SOA	437	279	363,258
(OP OF N3IQ)				
N3KS	SOHP	699	172	359,652
W0YR	SOLP	662	180	357,480
K4TX	SOHP	573	204	350,676
NE3H	SOA	551	202	332,088
W4RQ	SOLP	477	216	309,096
N8OHT	SOA	517	194	300,312
W9GE	SOA	491	194	285,762
K1KO	SOA	419	219	275,283
K3KO	SOA	353	228	241,452
KI3O	SOLP	412	192	237,312\

N4VA	SOA	403	192	232,128
N3ST	SOHP	462	165	228,690
WA4PGM	SOQRP	412	185	228,660
K2YWE	SOLP20	399	191	228,054
(OP OF K3AU)				
W3BW	SOA	302	238	215,628
K4CZ	SOA	374	186	208,692
K4CIA	SOQ	306	190	174,420
K3STX	SOA	321	176	169,488
N4MM	SOHP	303	180	163,620
NX9T	SOA	285	177	151,335
K4FJ	SOHP15	543	911	148,239
N3XL	SOLP	320	137	131,520
N3UM	SOHP	428	91	116,844
K4GMH	SOHP40	536	71	113,742
NT4D	SOA	240	140	100,800
W3DAD	SOHP	259	123	95,571
WF3J	SOHP40	354	82	86,838
W2CDO	SOA40	328	83	81,672
W4ZV	SOHP160	357	71	76,041
K3OQ	M1			73,566
K1SE	SOLP20	215	73	47,085
N4TL	SOHP	151	103	46,659
K4FTO	SOLP	151	85	38,250
WB4MSG	SOHP40	172	61	31,476
AF4UU	SOLP	139	69	28,773
K3UA	SOLP15	127	63	24,003
AA4KD	SOLP	111	68	22,644
KZ1A	SOLP40	103	47	14,523
N4NW	SOHP	92	51	14,076
W4ZYT	SOHP20	100	44	13,200
N8II	SOHP80	91	45	12,150
K8OQL	SOHP160	62	39	7,137
W4HJ	SOHP160	40	31	3,720
ND3D	SOQRP20	37	26	2,886

Total Logs: 82
Total Club Score: 81,291,722
2005 Results:

	Logs	Score
CW	73	74,044,747
SSB	64	43,239,264
Total	137	137,284,011

Multi-Op Operators

WX3B	WX3B, N3SB, N3ST, ND3D, N3CA
W3LPL	W3LPL, K1HTV, NI1N, ND3A, AI3M, N3OC, K3RA, K3RV, WR3Z, KD4D, K4ZA, K4ZW
N4RV	N4RV, K2PLF, KT4W
K3DI	W4EE, K3DI
W0UCE	W0UCE, N3ND
NY4A	N4AF, K4QPL, K2AV, W2CS
W3LJ	K3NCO, W3LJ, W3IDT, KE3OM
W4RM	W4RM, W4NF, W7IY, K4GM, K4EC, K5VG, K4IA
KT3Y	KT3Y, K3EST, K4SO
K3OQ	K3OQ, W3RFC, WA3OFF

The Reference Page Has Moved

Because it changes so little from month to month, we've decided to move the reference page to www.pvrc.org/refe.htm. That should be more convenient for most readers because there are many links in that page pointing to e-mail addresses, etc. We'll probably publish one here semi-annually, or I'll be glad to send one, on request.

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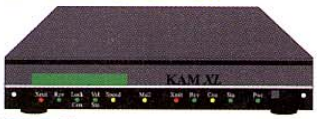

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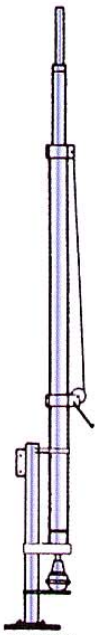

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510 Lawrence Exp. #102, 94085
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