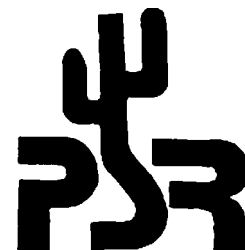# Packet Status Register

December 1986 #24

Tucson Amateur Packet Radio Corporation

President's Corner
Lyle Johnson, WA7GXD

NOTICE!

Nominations are coming in for the TAPR Board. Please hurry if you have a candidate in mind. You may make it under the wire...

END OF NOTICE!

The past month has been an extremely interesting one for me. HAM/WEST, COMDEX, AIWA, PSK and HF have been at the forefront (pretty broad front, I suppose).

HAM/WEST

The Las Vegas convention was well attended, with perhaps 2,000 attendees. There were some last minute hitches, including the programs getting delayed at the printers and not appearing until the second day. John and Jan certainly have put a lot of effort into making HAM/WEST a success.

Packet got exposure on both days, with two forums per day. Dave Pedersen, N7BHC, spoke on Packet Basics while I covered the Advanced Topics discussions. All sessions were well attended.

I personally want to thank all of you who came by, asked questions, provided comments and generally communicated (both positive and negative topics) for your inputs at this convention, as well as all the various conventions that I attend. There is nothing more valuable to me as a TAPR officer than one-on-one feedback, and conventions provide an excellent means for this to occur. Don't hesitate to corner me the next time you see me!

COMDEX

Pete Eaton, Gwyn Reedy, Andy Freeborn and I decided to hang around Las Vegas for the big COMDEX show that took place the Monday after HAM/WEST.

And I thought Dayton was a zoo!

There were about 100,000 people (plus or minus a couple dB) registered for COMDEX. In case you don't know, COMDEX is a computer show put on by manufacturers and distributors who are looking for OEMs and dealers for their products. It isn't intended as a general public affair.

If what I saw is any barometer, the IBM PC-AT clones and 80386 machines are about to take over the world! There were only a handful of 8088-based PCs, one or two Amigas, an Apple IIGS, maybe five (5, count 'em) MacIntoshes and -- surprise -- a few dozen Atari ST machines.

The booth with the greatest excitement had to be the Atari booth. They had a prominent space, partitioned it into small exhibits which were then filled by third-party software and hardware developers who are supporting the ST series. The booths were manned by a morning group and a (slightly different) afternoon group.

And you couldn't get near it.

I had to squeeze and push and generally be, shall we say "assertive", to get into a cubicle and see what was happening.

Reminded me of the early days of packet...

Speaking of packet (funny how that subject often crops up), Hank Magnuski, KA6M, early US packet pioneer, was there exhibing his company's newest PC add-in card. It lets you send and receive Facsimile (FAX) images with standard FAX machines. Uses 9600 bps modems on a standard telephone line. Anyone out there experimenting with picture transmission via packet?

AIWA

Back in the mid '60s, I owned what was then a hi-tech device. It was shaped like a briefcase, but, when you opened the cover, it was a 7-inch reel-to-reel tape recorder. If it had a white case, it was a two-track machine; black cases held a four-track unit. This battery-powered portable tape recorder was made by AIWA, a Japanese audio firm.

Earlier this year, AIWA entered into the TAPR TNC 2 OEM Agreement and began development of an Amateur packet controller.

The week of November 17th, the TAPR office was visited by three gentlemen from AIWA. They bore a prototype of the new AIWA APX-25 Packet Controller (see photo). If I had to use a single word to describe their product, it would have to be a very colliqual "slick," so I won't.

The unit looks like a piece of stereo equipment, down to the sculpted grey fr~ panel with drop-down

door. Under the door are the DIPswitches for setting baud rates on the serial and radio ports, a self-test switch for invoking audio loopback (with front-panel LED announcing that loop-back operation is in effect) and a switch for selecting the internal or an external modem.

And, when you select 300 or 1200 baud, the internal modem automatically reconfigures for Bell 103 or 202 tones.

Even the POWER switch is on the front panel!

The modem is built around the AMD 7911 "World Chip" IC (this is a variant of the 7910 chip used by Kantronics, PackeTerm and others).

There are two rather interesting additional features of the APX-25.

The first is a built-in speaker connected to the line. It allows you to mo n i t o r the packet channel aurally (a very good idea). And there is a soft chime that is activated when a station connects to you. Not a racous alarm, but a gentle tone. Of course, the speaker/chime is enabled or disabled by one of the DIPswitches behind the little drop-front door.

The second feature is an HF tuning aid. This is a three-LED display that, with a few minutes practice, enables you to tune to within about 30 Hz of another HF packet station's signal. Not bad.

The back panel of the APX-25 is clean. There is the AC power cord (this unit isn't designed to operate from a DC source), a DB-25S RS232 serial port connector, a radio connector, and...

There is a separate set of mic and spkr jacks especially designed to interface to handie-talkies and an external modem connector (with all the right signals for interfacing to an external modem, such as the TAPR PSK modem now under development for use on FUJI - FO12).

All in all, the APX-25 is a class act.

For the time being, AIWA will only be marketing these units in Japan, but if you happen to be in Akihabara next month...
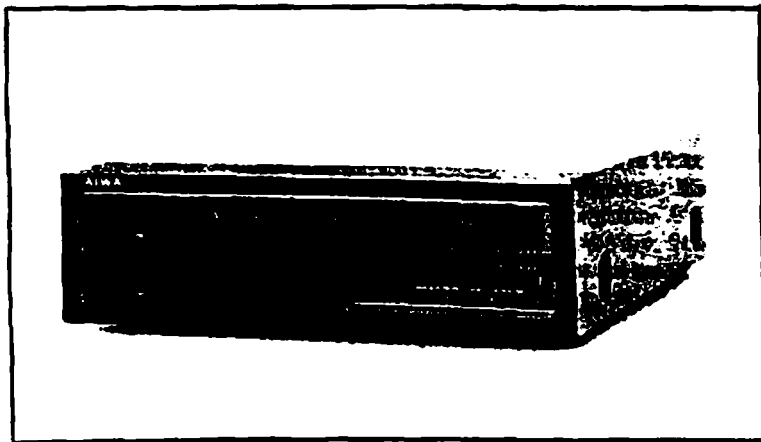
PSK MODEM

The TAPR PSK Modem project is moving along. As may be expected, the schedule has slipped a bit, but a review of the redrafted schematic was held in Tucson in early November, and board layout is taking place as this is being written. With a bit of luck (don't count on it, says the voice of experience) we should be testing some "alpha" units during the Christmas holidays. If they work, "Beta" testing will immediately follow. That targets an initial release perhaps as soon as early February.

Tom Clark, W3IWI, has been doing a terrific job of testing a prototype unit and has successfully copied packet-formatted telemetry from FUJI, as well as conducting terrestrial point-to-point testing. The weak-signal performance of this modem design appears to be very good.

This project has many of us very excited. Stay tuned!

HF

It seems that I have been writing a lot about HF packet recently. This is simply because, to me, HF is where packet is like traditional Amateur radio, as opposed to VHF operation, which is (often) more like using a telephone modem to a data base.

Don't get me wrong. I almost depend on VHF packet. The "local" PBBS is W1FJI. 'FJI is in Phoenix, about 120 miles from my home in the south end of Tucson. Unlike many of you, this local PBBS is "0" digipeat hops away.

Here in Arizona, and especially in Tucson, we do things differently. We're heretics, I guess.

Rather than put up a wide area digipeater (with the attendant problems of hidden terminals, needing to go to dual-porting, poor throughput, etc.), we put up a full-duplex repeater. It is located on a mountain peak at around 9,000 feet, and has a radius of coverage of about 140 miles.

With this system, everyone can hear everyone else pretty well, so retries are minimized. And since the repeater is in such a good location, it is useful for voice or packet emergency communications. Voice where spelling isn't important, packet where message accuracy is. We just use a 30 second timer on the machine to discourage voice use, and have the frequency coordinated as a packet channel. Simple, and it works well.

Of course, a digi is planned for co-location, so we can be ready for multiport NNCs when they become available. And of course, so we can have fun with retries, collisions, hidden terminals and...

But, as I was saying, HF is more like traditional Amateur radio. You make a QSO, you actually QSY (funny, the radios still have tuning knobs!), you chat with someone you will probably never see, maybe work some DX, and in general have a lot of fun.

Eric, N7CL, has been doing lots of testing with various TNCs and modems. In this issue of PSR, he

Beginner's Corner:

Proper VHF Radio Interfacing Techniques
Eric Gustafson, N7CL

Since about 1982 I have been helping new packet stations get on the air here in the Tucson area. This has revealed 2 major problem areas for the newcomer who is putting a packet station on VHF narrow band FM. These are:

1. Excessive deviation resulting from overdriving the radio microphone input stage.

2. TNC timing parameter settings which are incompatible with the transmit/receive changeover delay time of the radio being used. Also, settings which are incompatible with the DWAIT, RESPTIME or FRACK settings in use by the other users of the packet channel.

Since there is usually plenty of help available on the air for TNC parameter setting problems, I will restrict myself to the radio interface problem here.

Lately I have been answering a lot of questions like "Gee, I can copy Jim FB on phone but not on packet...why is that?"

I have also noticed that almost every single newcomer I hear is grossly overdriving his microphone input. I thought this was just a lack of sophistication on the part of the new packeteers until I went to Dayton this year (1986).

At Dayton I had the unique opportunity to use a communications analyzer to observe signals from most of the manufacturers in the packet radio business. In one two hour period, I copied 16 different callsigns. These included my own and those of all the manufacturers who had stations on the air at the show. Only one of those signals (mine) had the deviation set anywhere near the proper levels for packet operation. In fact all but 2 were actually sending square wave tones! All of these signals were overdriving the microphone input stage enough to cause the modulating tones to be distorted by the deviation limiter in the transmitter.

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is starting a two-part (may stretch to three, we'll see) series on interfacing a radio and a TNC, then report on his "denominator" modem and describe some of the steps necessary for truly effective HF packet operation. Along the way, he will be reporting on the relative performance of several HF modem products (AEA PM-1 and PK-232, Kantronics KPC-2400 and UTU-XT, TNC 2 clone).

I think you may find the results rather surprising.

I did!

Happy packeting!

— PRM —

Since even the manufacturers apparently don't know how to interface their packet equipment to radios, I am not surprised that few of the users do!

I have written this to provide some help to newcomers to packet radio in the area of getting their new packet gear interfaced properly to their VHF narrowband FM radios.

As currently configured in the TAPR TNC and clones, modem output levels are much too high for driving microphone inputs. This is so severe that in most cases the level control in the TNC cannot be set to a nonzero level which will not overdrive the microphone amplifier stages. This was done (I believe) to allow directly driving high level 600 ohm auxiliary tone inputs or audio distribution networks. This is fine, but it doesn't represent the situation for the vast majority of packet users. Also, not enough information is presented to warn a new user that this is the case.

So, what is a reasonable deviation level to use for packet? And how does one cure this problem?

To answer the first question I must digress a bit and talk a little about one of the characteristics of NBFM. Don't panic, I'm not going to get carried away with a lot of FM theory. There are plenty of sources of information on the mode starting with the Radio Amateur's Handbook if you want to understand all the technical details.

If you have been on VHF FM for any length of time, you will have noticed that as a signal fades into the noise there are actually 2 noticeable thresholds that are crossed.

The first is the transition from absolutely no noise to a slight hiss in the background. This is the point at which the minimum amplitude excursions of the signal are no longer above the limiting threshold of the receiver. Generally, the signal is still perfectly readable (and copyable on packet) until the second threshold is reached. As the signal level falls toward the second threshold, the hiss gets a little louder but remains just a background hiss.

The second threshold is the onset of a pulse type noise or "popping" sound. This is the point at which the phase demodulator in the receiver can no longer follow the carrier frequency correctly 100% of the time. Every time the demodulator loses track of the carrier, you hear a pop in the receiver audio output. I call this "popcorn" noise. The popcorn noise threshold is the limit for copying packets. Below this threshold the AFSK demodulator (anyone's) cannot recover error-free data. However, because of the powerful signal processing algorithms used by the brain, these noise pulses are only a minor irritation to the human ear. This is usually why Jim is readable on voice but not packet.

Why all this stuff about noise thresholds?

Well, it is because the popcorn noise threshold varies when there is modulation present on the carrier. In general, the more deviation, the more signal level required to get above this threshold.

This effect is small with low values of deviation but increases dramatically above about 3 kHz deviation. In the commercially available NBFM transceivers that I have had a chance to measure, it appears to be an increase of about 5 dB when going from 3 kHz to 5 kHz deviation (assuming a properly preemphasized signal).

You can get carried away with running reduced deviation, however, and too little deviation can cause problems too. This is because the signal-to-noise ratio presented to the AFSK demodulator in the TNC is degraded as the tone level approaches the hiss noise (remember the first threshold?) level present at the receiver output. You aren't in much danger from this effect unless you are running significantly less than 2 kHz peak deviation.

The answer (finally) is to take steps to assure that you are running somewhere between 2 and 3 kHz deviation. If you are measuring deviation while modulating with a single tone, use the high (2200 Hz) tone.

The cure for the excessively high modulator output level is simply to put a resistor in series with the AFSK audio output of the TNC. I have been using this method with great success. A capacitor can be used in conjuncton with the resistor to correct the audio response of those transcievers which do not properly preemphasize the modulating audio.

I like to set the TNC audio output level to about 200 millivolts peak to peak and then select a series resistor which will assure proper drive to the radio microphone stages with this (200 mV) output level. The best place for this resistor is inside the radio between the digital audio interface connector (So? Add one to the radio!) and the microphone input stage. Alternatively, it can be placed inside the microphone connector used to bring packet AFSK tones into the radio.

Using a series resistor in this manner has the advantage of not requiring the TNC output level to be readjusted for each of several radios I use for packet. I can freely interchange TNCs and radios without having to worry about making any audio level adjustments.

It would be nice if the radio manufacturers would standardize on a reasonable external tone input level so that radio modems could all be designed for an output level that would result in proper radio operation (yes, this all applies equally well to RTTY AFSK tone data too!). I would like to take this opportunity to vote for 200 millivolts peak-to-peak! But, alas, until then the poor user will have to take steps to insure that his particular device is working properly with his particular radio. Unfortunately, in the case of NBFM transceivers this usually requires access to test equipment not readily available to the average amateur.

If you are indeed an average amateur and don't happen to have a communications analyzer laying around the shack, don't despair. There are a couple of methods you can use to at least get in the ballpark without all the fancy test equipment.

The first (and best) way is to identify someone in your local area who has had his packet station correctly adjusted using the proper equipment. Then, by monitoring your signal and his signal on an independent receiver, you can adjust the level of the AFSK tones from your TNC to minimize the difference. This is facilitated by connecting to yourself through the station you are using as a deviation standard. Then every time you send yourself a packet, you will hear your signal first and his signal second on the receiver you are monitoring with. You can adjust your deviation until your signal sounds like his, or you can use an objective comparison like an oscilloscope or audio voltmeter on the monitor receiver output to make the comparison. Be sure to carry out this test on a simplex channel as a repeater may give you a false idea of the deviation present on the reference signal.

The second method also involves using a second receiver but is potentially much less accurate. It will, however, be better than overdriving your microphone input stages. This method assumes that the transmitter you are adjusting is operating properly and is equipped with a deviation limiter which is set to near 5 kHz of deviation (this is true of most commercially available 2 meter amateur equipment). Do NOT use this method on a Regency HR-2 series transceiver!

The procedure is quite simple.

Just plug a 10 ohm resistor into the external speaker jack on the monitoring receiver (check your radio for audio ground reference. Several FT208R speakers bit the dust during TAPR's Beta TNC project by using 10 ohm resistors referenced to negative DC ground!). You will be measuring the audio voltage produced across this resistor with an A.C. voltmeter. The A.C. volt scale on most modern multimeters will be fine for this measurement.

Connect your packet transmitter to a dummy load. Then, while sending the high tone in calibrate mode, adjust the audio level from the TNC from minimum upwards until you find the point at which the monitoring receiver audio output voltage no longer increases in proportion to an increase in the TNC output level. Be sure that the monitoring receiver volume control is set to a point where the receiver audio amplifier is not distorting. Most receiver output stages can produce 2 volts R.M.S. without excessive distortion.

Now, without touching the volume control on the monitoring receiver, adjust the AFSK audio level from the TNC until the voltmeter reads 1/2 of the previous reading. This should put you in the 2.5 kHz deviation ballpark.

That's all there is to it!

- PRM -

PSX — Packet Software Exchange

IBM-PC and MS-DOS

PAK/UNPAK $5 postpaid

This is a program for sending binary files between computers. Submitted by KA9AKM.

Behind The Scenes
Lyle Johnson, WA7GXD

The new TAPR Packet Video was released this summer and it has been very well received by the Amateur packet community. Over 100 copies have been distributed by TAPR alone, not to mention the many tapes that have been "cloned" from purchased copies.

(And, yes, you are welcome to copy the video so long as you don't sell the copy!)

Ever tried to make a home movie? If so, you can appreciate the kind of work that went into this production.

The actual taping of "Packet Radio" only took one evening (Pete, the "talking head," had it easy!); from taping to final duplication of the tape took well over a month! (Of course, the taping had to be squeezed in between the 10 P.M. News and the night shift who needed the gear for station business.)

THE VOLUNTEERS

Four Amateurs, who are professionals in the TV broadcasting industry, spent that month making the final product look first class.

Jim Wellinghoff, KO5BH, was the Producer and Director of "Packet Radio." Gil Ludwig, WA0YCY, was the Technical Director. Kent Lissa, WB0ODX, handled the Audio while Phil Grason, WB0TBH, did the Electronic Graphics.

Jim coordinated the whole affair, and ensured that it was done in a competent and professional manner.

GRAPHICS

All the graphics (and slides) were digitized in a computer! Phil spent hours digitizing crude sketches and sloppy, handmade slides into professional graphics. The action scenes (the bouncing ball leaping from antenna to antenna) was a trick, too! It looks easy when you see it, but doing it (and getting it to go the right direction when you want it to) is another! All this work had to be double checked, tweeked and them "still stored" into memory.

Think we're finished? Not by a long shot! The next trick was to get these graphic images superimposed on the talking head at the right time! No simple feat. first the video levels had to be matched (using some oscilloscopes that would make you drool), then the 1 inch master tape was run back-and-forth to get the EXACT spot to "splice" the graphics in.

Sound simple? Try it some time!

PUTTING IT ALL TOGETHER

In the master control room, Gil oversaw the "melting" of the images, fading of the slide scenes, etc. This was accomplished using an array of panels that look like they belong on the Bridge of the starship "Enterprise."

Since the equipment to do all this is scattered throughout several rooms, communication had to be done via intercom and remote screens. Queues did not alway work right the first time (or the second), and sometimes it got real frustrating, but Jim, Gil, Phil and Kent kept their cool through it all.

KSDK (Channel 5), the St. Louis NBC affiliate station where the work was done was most generous with the use of their facility. Gil, Jim, Phil and Kent enthusiastically donated their time (all after hours, sometimes real late and on weekends) to put "Packet Radio" together.

From the first outline of the Script to "in the can," Jim, KO5BH, had a can-do attitude as Director. He coordinated the use of the studio with the station, and pulled the rest of the talented crew together to pull the whole thing off.

GETTING IT TO YOU

Once the master tape was made, we needed to find a means of duplicating the VHS cassettes en masse, and at low cost. Enter Mike Phillips, WB6RHW, Staff Manager AT&T, Aurora, CO, who arranged the professional duplicating facilities and cranked out nearly 200 VHS copies of this production for TAPR to distribute!

TAPR is fortunate to have folks that are willing to donate this kind of time to a common goal. The unfortunate part is that they seldom get the recognition they deserve. Next time you watch the tape, play close attention to the credits at the end; there you will find the real artists that put the new "Packet Radio" video tape together.

"Packet Radio" is available from the TAPR office for $10 postpaid. See the ptice list elsewhere in this PSR for ordering information.
- PRM -

Renewal Reminder

Please check your mailing label on the front cover of this issue of PRM. If you are a TAPR member, the label will look something like this:

    WA7GXD Exp: 02-87
    Lyle Johnson
    5971 S. Aldorn Dr.
    Tucson, AZ 85706

If you have no Amateur call in our records, the callsign part of the address label will be blank.

If this issue of PRM is your last, your label will proclaim that fact, as in the following example:

    WA7GXD Exp: 12-86 LAST ISSUE!
    Lyle Johnson
    5971 S. Aldorn Dr.
    Tucson, AZ 85706

HF Modem Performance
Eric Gustafson, N7CL

There has been much discussion about the performance of modems, specifically demodulators, for use at 300 baud on the high frequency amateur bands. Most of the performance claims that have reached me have been anecdotal in nature. There is a very good reason for this. Modem performance under the conditions experienced on the typical H.F. amateur band is extremely difficult to accurately quantify by laboratory measurement. This is due to the large number of variables (noise of various kinds, multipath, QRM, tuning error, etc.) that would have to be accounted for to make a meaningful measurement. This coupled with the expense of the equipment required to do the bit error rate testing places this kind of measurement out of the range of the average amateur. Fortunately, the average amateur isn't particularly interested in an absolute quantitative measurement anyhow. What he IS interested in is which of the several types of commercially available modems works best at HIS (or HER) shack on HIS radio hooked up to HIS antenna in HIS neighborhood noise environment. For this he only needs a means to make a valid RELATIVE performance measurement.

To facilitate this type of measurement I have been doing some work on H.F. with a version of the familiar XR2211 demodulator. This is a slightly improved version of the demodulator found in all of the TAPR TNCs and clones. In fact, the testing I have been doing on the air has been done on a modified TNC-2 clone. The schematic diagram of the "reference" demodulator is shown.

The test methodology is very simple. (Ten paces, turn and fire!) Two TNCs, one with the "reference" demodulator are fed the same audio from the same radio at the same time. Each TNC is hooked to its own computer which has an open buffer to store all the data monitored by the TNC. When the largest buffer reaches a reasonable size (15 to 20k), the test run is terminated and the buffer sizes are compared. By simply dividing the number of characters captured by the demodulator under investigation by the number of characters captured by the "reference" demodulator, a number representing a kind of "figure of merit" is obtained for the target demodulator. It is for this reason that I like to call the "reference" demodulator the DENOMINATOR demodulator.

All the test equipment needed to do this type of comparison is readily available to the average packeteer who has a packeteer friend who is willing to uproot his TNC and computer for this purpose.
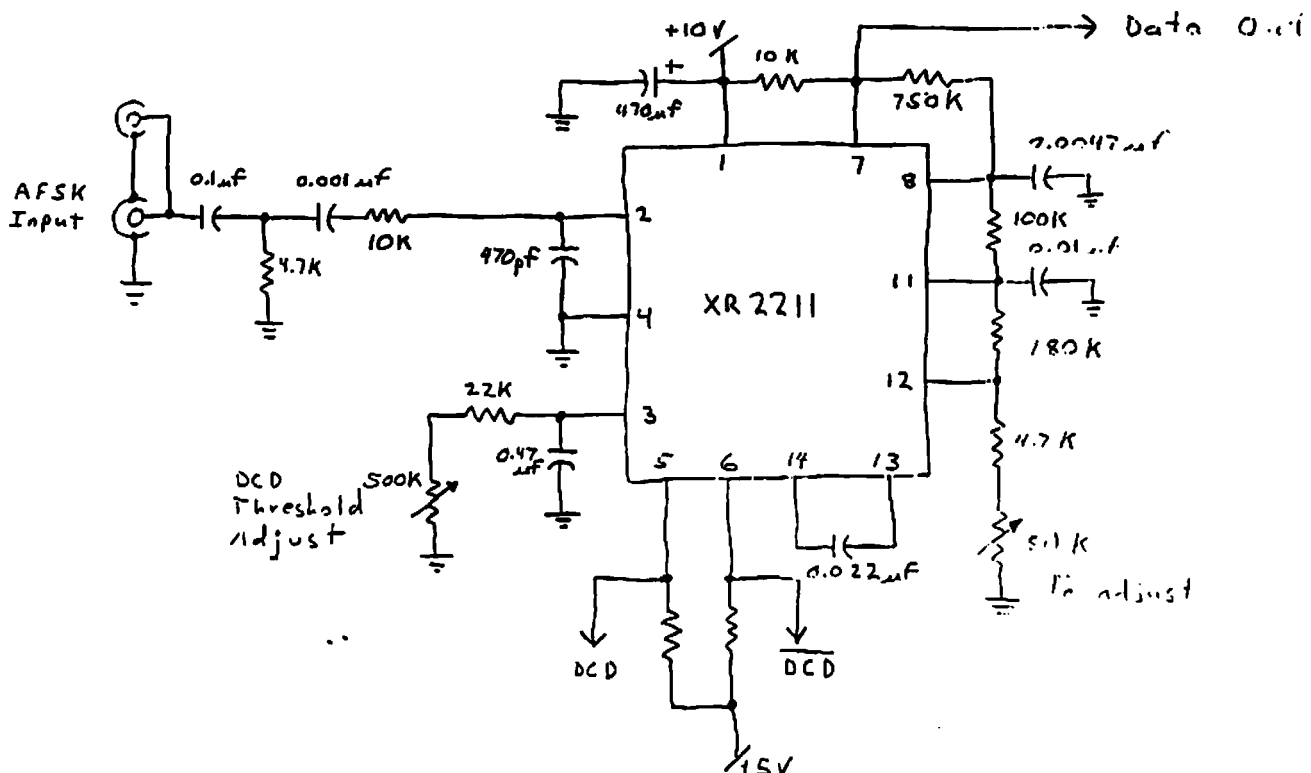
I will be writing about the results of testing several different types of demodulators under the conditions present at MY shack in a future issue. I will also be looking forward to results reported by others who are interested enough to duplicate this type of comparison.

Watch this space...

73 de Eric, N7CL

– PRM –

XR2211 AFSK Demodulator for 300 Bauds, 200 Hz Shift

TAPR Annual Meeting

Tucson Amateur Packet Radio will be holding its annual meeting during the weekend of February 21 and 22, 1987.

Your Board of Directors plans to meet all day on Friday, the 20th.

Friday night activites will include the traditonal Pizza gathering, followed by racing at the Malibu Grand Prix.

Saturday, the Theatre Royale at the Embassy Suites Airport Inn (formerly Granada Royale) is reserved from 9 AM through 5 PM. The day's activities will include presentations from packeteers from various areas on numerous subjects. As in previous years, a catered lunch will be served.

Saturday night, we will gather at the Triple-C Chuckwagon Ranch for an old-fashioned western meal and entertainment.

Sunday morning the Theatre Royale is again reserved from 9 AM until 1 PM. This is to allow more and better presentations during the meeting.

The early afternoon adjournment should provide ample time for folks to drive home or catch a plane from Tucson International Airport.

More details will be published as the big weekend approaches. If you want to speak, please write to the TAPR office and let us know so we can begin planning early.

See you in February!

NOTE: Since the Board will meet on Friday, all voting must be done by mail. No ballots will be accepted at the annual meeting, so those of you accustomed to procrastinating until then will be find yourselves disenfranchised! Please vote in a timely manner, using the ballot that will be found in your January PSR.

- PRM -

New TNC-2 Software

Howie Goldstein, N2WX, is at it again! He has prepared a new release of software for the TNC 2 to utilize the new 32k byte RAM chips. This results in bigger buffers.

The price of the new CMOS RAMs has dropped from $120 last year to $20 today!

TAPR has the new chips in stock and expects to have the 1.1.4 software release available for shipment this month. As this is written, the software is being tested, and it is looking good!

See the price list in this PSR section for details.

- PRM -

TAPR Price List

The following price list is current for December, 1986.

Memberships (including renewals):

Associate (no PSR/PRM)
        $5.00/year
Full (PSR/PRM included)
        $15.00/year in the US
        $18.00/year in Canada
        $25.00/year elsewhere

Accessories:

HF Tuning Indicator Kit
        $25.00 postpaid in the US
        (see October 1985 PSR for circuit)
FUJI/OSCAR 12 PSK Modem
        To Be Announced
9600 baud Modem Semi-Kit *
        $25.00 postpaid in the US
        (see K9NG article in 4th ARRL Proceedings)
N2WX FADPAD Xerox 820 Adapter *
        $25.00 postpaid in the US
        (PC board and data only)
LSC-10 Coffee Mug
        $5.00 (only at Hamfests!)
        (and the Annual Meeting...)

*   These products are for experimenters and are
        neither complete nor supported by TAPR.

Education:

Introduction to Packet Video
        $10.00 postpaid in the US
        (available in VHS format only)

TNC 2 Software/Hardware:

TNC 2 Software Upgrades
        1.1.3   uses 16k RAM
        1.1.4   requires 32k RAM chip(currentlyin
                                                testing)
        $12 postpaid
Reprogram your EPROM
        $2 plus postapid return mailer
32k byte RAM chip, low power, 150 nSec
        $20 postpaid

OEM Packages:

TNC 1 OEM package
        $500 one-time charge
TNC 2 OEM package
        $5,000 one-time charge plus royalties

In addition, we stock spare parts for TNC 1 and TNC 2 units. Call or write for your specific requirements.

***TNC 1 owners - we again have the WD1935 and XD2212 ICs in stock.
                                        - PRM -

NOMINATIONS ARE STILL OPEN (but just barely)...

It is that time of year again. Now that your TV screen is clear of the usual mud-slinging, acrimonious poltical advertising, it is time to consider something really important. I am referring to your TAPR Board of Directors.

As you probably know (but some of you newer members may not), TAPR is governed by a fifteen-member (15 -count 'em! That's more than General Motors!) Board of Directors. Each Director serves a term of three (3) years, and, due to staggered terms, one-third of the Board, or five (5) Directors, are elected every year.

The current Directors' terms expire as follows:

Mike Brock, WB6HHV		Feb 1988
Tom Clark, W3IWI	*	Feb 1987
Pete Eaton, WB9FLW	*	Feb 1987
Andy Freeborn, NOCCZ		Feb 1988
Steve Goode, K9NG		Feb 1989
Eric Gustafson, N7CL		Feb 1989
Skip Hansen, WB6YMH		Feb 1988
Lyle Johnson, WA7GXD		Feb 1989
Scott Loftesness, W3VS		Feb 1989
Dan Morrison, KV7B		Feb 1988
Margaret Morrison, KV7D	*	Feb 1987
Harold Price, NK6K	*	Feb 1987
Bill Reed, WD0ETZ		Feb 1988
Gwyn Reedy, W1BEL		Feb 1989
Pat Snyder, WA0TTW	*	Feb 1987

Any member of TAPR may nominate any member for the Board.

To place a name in nomination, just send a letter to the TAPR office with the name of the person you wish to nominate (including yourself, if you like). It would be helpful if you would also provide us with your nominees telephone number and any qualifications you think your nominee has for the office.

We will then get in touch with him (or her) and obtain the person's direct consent to run. At that time we will ask for a statement from the nominee for publication in PSR. (We won't print your picture, so don't let that stop you!)

"What is required of a Director?" you ask.

A Director is expected to attend the Board of Director's meeting and TAPR Annual Meeting in February of every year in which he (or she) holds office. The meetings are held in Tucson, and TAPR does not reimburse expenses for this trip. This means, depending on where you live, a commitment of a few hundred dollars per year.

The Board of Directors reviews the previous year, establishes goals, elects the Officers, and generally guides the organization.

Deadline for Nominations   December 15th, 1986
List of candidates and ballot   January 1987

So, submit the name of someone you think will do a good job and get it in to the TAPR office today!

- PRM -

Job Opening At TAPR

One of the signs of a healthy organization is the injection of new blood into the leadership of a group. TAPR, like any other collection of folks, needs new people and ideas to stay successful.

I made it known to the TAPR BoD this last summer that I would not seek relection as an Officer. Since becoming involved with TAPR in the Fall of 1981 I've had a great time, but it is time for others to take the helm. Make no mistake, the whole experience has been rewarding. Hopefully, someone from the group will come forward. If you thrive on challenges and want to make a contribution to our hobby, please let the TAPR Board of Directors know of your interest.

As for myself I hope to stay involved by working on new projects. I've made a lot of very close friends over the last 5 years. It will be interesting to see what happens in Packet Radio during the next half-a-decade!

See you on the Network!   Pete, WB9FLW

- PRM -

NEW OFFICE HOURS

The TAPR Office is once again open four days a week.

Office Manager Cris Kurz has decided her new daughter can be entrusted to her mother for a few hours a day (aren't grandparents wonderful?), and is now back to work.

Office hours are Tuesday through Friday, 8 AM until 4:30 PM Mountain Standard Time.

The best time for 'phone calls is after 1 PM.

NOTE: If you watch TV, Mountain Time is the one they never mention...

- PRM -

RENEWAL continued from page 11

In the old days, we would still send you an issue or two of PSR and hope you noticed you had expired. Nowadays, membership services are subsidized (which means we charge too little!), and PRM is a lot more expensive to publish than PSR, so we won't send any extra issues your way.

We are getting a program going to send you a reminder postcard, but that hasn't been completed yet.

If your membership is due to expire, please renew now. It only takes us a day or two to get your renewal processed, but we can't process it if you don't send it!

- PRM -