

Packet Status Register Quarterly



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TUCSON AMATEUR PACKET RADIO CORPORATION

President's Corner

Lyle Johnson, WA7GXD

Partially as a result of the survey in the April PSRQ, there are some significant alterations taking place in your packet organization. Please read the articles in this issue very carefully!

Dues are going up (and coming down!), you will hear from us on a monthly basis starting in September, you will soon be able to obtain packet software through the TAPR office, we will be starting an on-line information exchange on one of the major databases... And packet research and development will continue to be emphasized as strongly as possible.

Packet Radio Magazine and PSRQ

The TAPR Board of Directors, on motion by Andy Freeborn, voted to merge PSRQ with Packet Radio Magazine (PRM) beginning with the September issue.

What this means is TAPR members will receive a monthly publication rather than a quarterly one. Overall, you will receive more pages of information per year, with lots of news from many regions as well as technical articles.

For those of you unfamiliar with PRM, this is a monthly magazine devoted entirely to Amateur packet radio. It is published by the Florida Amateur Digital Communications Association and edited by Gwyn Reedy, W1BEL, who has been the PSRQ editor for the past year. PRM is an outgrowth of the old FADCA>BEACON, which it replaced.

In case you already receive PRM in association with your regional packet group membership, TAPR is establishing a special membership class at a reduced dues rate (see below).

The merger with PRM was voted on only after a reasonable number of questionnaires had been tallied. When you read the results of the polling elsewhere in this PSRQ, keep in mind that many of the negative votes for the merger were accompanied by comments indicating the member was unfamiliar with PRM.

Dues Changes

As a result of integrating PSRQ into Packet Radio Magazine, our publications costs are going to rise significantly. As a result, we must increase our dues from \$12 per year to \$15 per year. For the extra \$3, however, you will get three times as many issues of PSR!

For those of you who belong to a regional packet organization which already includes PRM in its membership dues, we are going to offer a supporting membership for \$5 that does not include PRM. We sincerely hope that you will take advantage of this membership to continue to support TAPR and help us pursue the goals you have endorsed for the organization.

Only with your continued support can we maintain five years of momentum in Amateur digital communications.

PSX

At the February annual meeting, Tom Clark proposed the establishment of a software exchange under TAPR auspices, somewhat akin to the AMSAT software exchange that has proven so successful for AMSAT. An informal poll of the attendees did not indicate much support for the idea at the time, so it was shelved.

However, strong support for the idea emerged from the April poll. As a result, Tom has been asked, and has agreed, to take on this project. Watch for information on the TAPR Packet Software exchange (PSX) in subsequent PSR sections of PRM.

TAPR ON-LINE

Likewise, the poll indicated support for the idea of TAPR being officially represented on some sort of database service. This task has been assigned to Pete Eaton (with help from Scott Loftness and Tom Clark). While it is too early to announce the details of such a service, the September PSR section of PRM should have full details.

Continued >>>

R and D - NNC

The first (Alpha) NNC was delivered in late June, with several more being shipped the first week of July. Progress is being made on the modem board, and we are hoping to begin a beta testing phase soon.

R and D - JAS1

The launch of JAS-1 should be history by the time this is printed. TAPR has been working on PC board layout of a modem, based on a design by JAMSAT, to allow a TNC1 or TNC2 user to access the digital store-and-forward experiment on board this spacecraft.

Note that, if all goes on schedule, it will be October or November before even limited access to the packet system on JAS-1 is allowed. With some degree of luck, we hope to be able to have modems ready for shipment by that time.

However, it is a bit of a dilemma, since we want to test the modems on the spacecraft to verify correct operation, which can't be done until the spacecraft is operational. On the other hand, folks will want modems that are known to be effective a month before the spacecraft is operational!

Thus, be assured that the early versions of the modem may not be wonderful! Then again, they may be...

New Products

TAPR has had available since Dayton a tuning indicator kit suitable for use with any properly configured XR2211 demodulator. Of course, it works very well with the TNC 1 and TNC 2 modems.

The circuit is essentially the same as the one described by Dan Vester, KE7CZ, in the October, 1985 issue of PSRQ.

(Testimonial)

I have used this device on HF at length, and I can only say that it makes HF operation extremely simple. Without a decent tuning indicator, HF packet operation is certainly more challenging.

By the same token, driving at night without headlights is also more challenging than with lights...

TAPR also has a limited number of a new introductory video tape. This video is only 30 minutes long, so it makes a great lead-in for a club presentation.

The video is available from the TAPR office for \$10 postpaid in the U.S. It is on VHS cassette only. Duplication of the video is proceeding a bit slower than hoped, so there may be a wait of a few weeks before we can ship yours. Contact the TAPR office for details.

Commercial Innovation - KPC2400 and PK-232

Kantronics has released a new packet unit called the KPC2400. It includes, in addition to the KPC2 (which, incidentally, is NOT a TNC2 clone) standard features, the ability to operate at 2400 bps using phase shift keying.

Now, the 2400 bits-per-second operation is accomplished at 1200 baud, so this unit is legal on 10 meters. Recall that baud represents "symbols per second" and in this case two bits are encoded per symbol, so we obtain 2400 bps at 1200 baud. Our more common FSK modems encode one bit per symbol, so we obtain 1200 bps at 1200 baud.

See elsewhere in this PSRQ for a look at what operation at 2400 bps may be like compared to 1200 bps. It does offer potential for increased throughput; it does not double the throughput.

We just received our KPC2400 the other day and have not yet had an opportunity to test it. The manual includes no schematic, so I can't report on whether or not a watchdog timer has been added to the transmitter PTT line. I certainly hope one has been added, however. I understand that the KPC1 and KPC2 do not have such a watchdog timer and are thus illegal for use as unattended digipeaters.

AEA has announced the PK-232, a digital controller that operates packet, AMTOR, CW, RTTY and ASCII with any computer or terminal that has a standard RS-232 compatible serial port.

Pac-Comm has announced a plug-in board for the IBM PC that will offer two channels of HDLC communications, using the AMD 7910 modem chip. At present this is a developer's tool; when suitable software becomes available it should provide an interesting alternative for packet operation using the PC and clones.

Like the song says, "See you in September..."

9600 BPS Ready

If you are an incurable experimenter, have a Midland 13-509 or Hamtronics FM-5 or ??? available for local surgery, TAPR has what you need!

Steve Goode, K9NG, designed a 9600 bps baseband filter system that, when combined with an FSK-able transmitter, can be used for packet work at 9600 bps.

TAPR has available a PC board, state machine EPROM and several of the hard-to-find capacitors along with printed instructions to get you started. The total package cost is \$25 postpaid in the U.S.

Note that this is considered an experimental project and is not supported other than to provide the materials listed above.

Order through the TAPR office.

Harold Price. NK6K

JAS-1, the Japanese amateur radio satellite, is in orbit and on the air. It is now called Fuji-Oscar-12, or FO-12 for short. All Japanese satellites are re-named after flowers once they are in orbit, and amateur satellites usually have an Oscar number added as well. FO-12 was called JO-12 (Japan-Oscar-12) for a few days after launch until the official word came out.

FO-12 has been written up in QST, AMSAT's various journals, and in the August all-packet issue of 73, so I won't go into detail here. The short summary is that it has two transponders: a standard analog transponder (repeater), two meters up and 70cm down, called mode JA; and a digital transponder with four uplinks on two meters and one downlink on 70cm, 1200 baud AX.25, called mode JD.

The mode JA transponder is on now, the mode JD transponder will be checked out in a few weeks. To get an idea of what packet might be like on the JD transponder, I sent some packets through the JA transponder during the 5:20 - 5:40 and 7:20 - 7:40 utc passes on 8/18/86. I used a downlink frequency of about 435.890 in case anyone wonders what the funny noises were.

The equipment used was probably worst case, in no way was it optimized for FO-12.

TNC:

- I used a stock TAPR TNC 2 that I put together. I used the standard 1200 baud tone set on the internal modem. I ran at 1200 baud with standard parameters except for: FULLD ON, FRACK 1, DWAIT 0, PACLEN 40.

Downlink:

- An unmodified IC-451a (not known for its sensitivity). No pre-amp.
- A KLM-22C which is too sharp to point at a fast-moving satellite by hand, so I lost some dBs there on the average. Circularity was switched by hand based on ear-detected s/n.
- 60 feet of 9913 (fancy RG8) coax.
- Upper sideband.

Uplink:

- An IC-251a, either barefoot at 10 watts, or at less than one watt into a Mirage B1016 for about 12 watts out.
- 60ft of 9913 coax.
- KLM 18c. EIRP was 100 watts or less. Circularity was set at right hand all the time. The antennas were pointed by hand. Probably less than 7 moves were made.
- Lower sideband.

Doppler:

- I left the transmitter where it was, and tuned for doppler by ear, no tuning indicator was used. I have a good ear, I started college life

as a music major. On the other hand, the tuning step was 100hz, so the frequency was off most of the time.

The test:

I connected to myself through the satellite, and using the TNC parameters described above, I moved 8727 bytes of data in about 20 minutes. That works out to 58 bps, or close to standard telex speed. Taking a 2:00 a.m. guess at the maximum data you might expect to get through this type of link if you never dropped a bit, say 20 minutes x 1200 bits/sec x 1/8 characters/bit * 60 sec/min * 60% efficiency (loss due to frame overhead, bit stuffing, acks, keyup delay, etc.) = 108,000. Thus, I got 8.1% of the maximum without optimizing anything. With a 1 watt PSK downlink that is generated on the spacecraft instead of a shared analog repeated downlink, PLL steered frequency, computer pointed antennas, and a pre-amp, any one of which would give a big improvement, I think the JD transponder is really something to look forward to.

Here's hoping for a quick checkout on the digital transponder and a long life.

New TAPR Introductory

Video Available!

Many of you got your first glimpse at Amateur packet radio by viewing the now-(in)famous WB9FLW Packet Video, also known as Pete's Packet Primer. If you have seen it lately, you know it is pretty well out-of-date.

Many of you have suggested changes, including updating the material presented and shortening the running time.

TAPR is now pleased to announce that the famous writing team of WA7GXD and WB9FLW (who gave new meaning to POOP!) have written a new script and Pete coerced a local St. Louis TV station into producing a new, updated, shortened "Introduction to Packet Radio" video tape.

The new video is 30 minutes in length (compared to about an hour for the old one), and provides a fairly complete introduction to the whys and wherefores of Amateur packet radio, circa 1986.

The new video is available in limited quantities from the TAPR office for \$10 postpaid. If you know someone with a copy, you may duplicate it so long as you don't sell it or charge for seeing it.

It is also available from the ARRL lending library.

2400 BPS Packet - Some First Thoughts

Lyle Johnson, WA7GXD

Kantronics has recently announced the KPC-2400, a 2400 bits-per-second TNC.

Why 2400 bps? Is it twice as fast as 1200 bps? The answers may not be obvious, so please read on!

At first blush, running 2400 bps makes a lot of sense. It should be about twice as fast, allowing twice as many users on a given channel and generally aiding in relieving the congestion on packet during prime-time.

Let's take a closer look.

First, let's consider how fast 1200 bps really is on a typical packet channel. Make that a typical two-years-ago channel; we are going to assume light loading and close to zero retries for our first pass.

A typical keyboard message consists of about 80 characters. If no digipeaters are used, the packet overhead consists of two flags, a CRC, source and destination call signs (AX.25 Level 2 assumed), a control byte and, for the message packet, a PID byte. That makes a total of 100 bytes in the message packet and 19 bytes in the ACK.

Let's also assume that TNC defaultmings are used.

A timing diagram for this transaction would look like this:

```
DWAIT:TXD:PACKET:  dead time  :DWAIT:TXD:ACK

DWAIT   = 160 mSec
TXD     = 300 mSec
PACKET  = 670 mSec
dead time = 200 - 500 mSec
DWAIT   = 160 mSec
TXD     = 300 mSec
ACK     = 130 mSec
```

TOTAL = 1920 - 2220 mSec, or about 2 seconds to get 80 characters of data through. This corresponds to about 40 chars/sec.

If we operate with the same radios, but at 2400 bps, we have the following situation:

```
DWAIT   = 160 mSec
TXD     = 300 mSec
PACKET  = 335 mSec
dead time = 200 - 500 mSec
DWAIT   = 160 mSec
TXD     = 300 mSec
ACK     = 65 mSec
```

TOTAL = 1520 to 1820 mSec, or about 1 1/2 seconds to get 80 characters of data through. This corresponds to about 54 chars/sec. This is about 33% better.

Now, 33% is 33%. But it isn't 100%, which is what you might think if you didn't consider the channel and, more importantly, the radio characteristics.

Suppose we want to do a file transfer to another station that is in direct connect range with very good signals. Assume retries are nil and we are using typical radios. By setting MAXFRAME to 7, PACLEN to 128 and DWAIT to 0, we might see something like this.

	1200 bps	2400 bps
DWAIT	mSec 0	0
TXD	mSec 300	300
PACKET	mSec 6100	3050
deadtime	mSec 200-500	200-500
DWAIT	mSec 0	0
TXD	mSec 300	300
ACK	mSec 130	65
Total	7030-7330	3915-4215

In this case, the 2400 bps unit is 1.7 to 1.8 times as fast as the standard 1200 bps operation. This is very close to the theoretical maximum of 100% improvement.

In summary, then, the 2400 bps modem may provide as much as 80% improvement in throughput in certain circumstances and probably somewhere between 20% and 40% under more typical circumstances.

As with any benchmark, all of this should be taken with a large grain of salt.

Now, what would happen if we could get our hands on radios that turned around and stabilized in 10 mSec?

Looking again at the numbers for a typical, shared channel, DWAIT would go down to around 20 mSec and TXD would drop to 60 mSec at 1200 bps and 35 mSec at 2400 bps. The throughput on our channel would become about 60 chars/sec at 1200 bps versus 100 chars/second at 2400 bps. This makes 2400 bps almost 50% better than 1200 bps, and makes 1200 bps 50% better than it now is.

If we could get the dead time out of the system, we get about 80 chars/sec at 1200 bps and around 130 chars/sec at 2400 bps.

The TXD factor doesn't drop to the radio spec because we have to allow for transitions to be received to synchronize the HDLC decoder on the receiving end. DWAIT is simply a factor that allows a digpeater to look at the channel and grab it long enough for another station to determine that the digl is transmitting.

The "dead time" may be due to many factors. In a TNC 2 or look-alike, the RESPTIME (protocol T3 timer) defaults to 500 mSec. But the dead time allowance also includes a fudge factor to compensate for the occasional retry, noise burst, or what-have-you that may (and will!) occur on a radio channel.

I think that the above, while simplified, indicates that we need to make real progress on digital radios. TAPR and others are looking at this problem now and trying to come up with fast, inexpensive RF hardware designed specifically for packet use.

Continued >>>

HF Packet Operation

Lyle Johnson, WA7GXD

Some recent inquiries via the TAPR mailbox have expressed confusion about HF packet operating frequencies. Allow me to take this opportunity to help clear up (cause ?) some misunderstanding.

First off, if you are used to RTTY conventions, forget them! Packet is a different method of communication. Mark and/or space frequencies aren't particularly meaningful since packet presently uses NRZI (non return to zero - inverting) encoding as opposed to RTTY's use of NRZ (non return to zero) encoding. Thus, while mark and space frequencies have meaning for RTTY (and other NRZ encoding schemes), packet only concerns itself with transitions between frequencies.

Suppose you hear that HF packet operation is on 14.105 MHz. What does 14.105 MHz mean?

It isn't the mark or space frequency, it is the suppressed carrier frequency of your LSB transmitter ASSUMING YOU ARE USING TAPR STANDARD TONES FOR YOUR MODEM.

Accordingly, if I use a TAPR TNC 2 and a Kenwood TS430S in my HF packet operation, I simply set the Kenwood display to 14.105.00 MHz and, if my HF transceiver is properly calibrated (don't count on it unless you have verified it recently), I should be able to copy packet signals.

Alas, if I am using a Kantronics or Packeterm IPT or AEA PK-64, this won't cut it.

Why not?

The TAPR recommended modem tones for 200 Hz shift 300 baud operation are 1600 Hz and 1800 Hz. The "decision point" or average frequency is 1700 Hz. At 14.105.00, my signal is centered on 14.103.30 MHz.

If I am using a Kantronics TNC, 1070 Hz and 1270 Hz (Bell 103 originate) tones are used so its signals will be centered 1170 Hz below the dial setting, or at 14.103.83 MHz. This is 530 Hz higher than the TAPR unit and no communication is likely!

Hence, if you use a Kantronics TNC on HF, set your dial 530 Hz lower than the "normal" frequency.

The AEA PK-64 and PK-232 use a tone pair of 2110 Hz and 2310 Hz. This yields a center frequency of 2210 Hz and resulting in a signal centered at 14.102.79 Hz, or 510 Hz low. Like the Kantronics case, we won't communicate (and an AEA to Kantronics attempt will fare even worse, with an error of 1.04 kHz!).

If you use an AEA PK-64 or PK-232, you should set your dial 510 Hz above the "normal" frequency.

To summarize, then, the packet frequencies published for HF indicate the suppressed carrier frequency of an LSB transmitter being fed TAPR-standard audio tones. AEA PK64 and PK232 users should set their dial 510 Hz higher and Kantronics and

Packeterm users should set their dials 530 Hz lower.

Here is a tabular example:

TAPR	AEA	Kantronics
14.105.00	14.105.51	14.104.47
7.093.00	7.093.51	7.092.47

Of course, the surest way is to preset your dial, then use a tuning indicator, like the TAPR tuning indicator kit for XR2211-based modems, or the built-in AEA tuning indicator for the PK64 and PK232. For AMD 7910 "World Chip" modems, an external device independent of the modem itself is necessary. See the August, 1986 issue of 73 Magazine for a tuning indicator that may be suitable for such modems.

HF Packet Tuning Aid

Tucson Amateur Packet Radio has available for only \$25 a tuning indicator kit. This unit is patterned after the KE7CZ article in the October 1985 issue of PSRQ.

The kit comes complete with PC board, instructions, and all parts except a few common resistors. No case is included.

The TAPR HF Tuning Indicator makes tuning HF packet stations a breeze, and is highly recommended. It will work with any properly configured XR2211-based modem.

Get yours today!

2400 BPS continued from page 4

At the TAPR annual meeting in 1985, Steve Goode, K9NG, demonstrated his 9600 bps modem with some modified radios. A TXD of 20 mSec was used, and I timed a long file dump. The throughput on the channel was more than 7,700 bits per second, or over 950 chars/sec! Compared to our present "typical" 40 chars/sec, I think it is obvious that there is much to be gained AND WE HAVE THE TOOLS TO DO IT NOW! Experimental 9600 bps modems based on Steve's design are available from the TAPR office. See elsewhere in this PSRQ for details.

One area that the new Kantronics modem may prove interesting in is satellite operation. OSCAR 10 has spectrum allocated that is used for packet, but it is used very little. Our present FSK modems just have a hard time cutting through the noise and spin modulation.

PSK can do much better. If the Kantronics modem design is close to optimum, it may be useful on this or similar channels. It would be nice if the modem could be used at slower speeds (400 bits per second has been demonstrated to work very well on OSCAR 10), but it appears that the Kantronics design is specifically designed for Bell 201 style operation. The noise margin for encoding with "dibits" used on Bell 201 is a lot less than straightforward PSK, so some testing and measuring will have to be done.

Summary and Analysis of Comments on TAPR

Membership Questionnaire

Compiled by Gene Piety, KH6PP

The comments received from the 139 members who took the time to submit any can be classified into 6 different categories.

1. Congratulatory and laudatory remarks: 25% ranging all the way from a simple "Thank you TAPR" to "The greatest thing that ever happened to amateur radio".
 2. There were two rather negative comments (probably from Tucson amateurs) that can be absorbed without damage.
 3. Comments directed towards PSRQ and PRM :
 - Give us more beginners articles-down to earth stuff.
 - Give us more technical articles advanced type.
 - Do not merge with PRM unless it is of benefit to TAPR.
 - Have a table of contents in PSRQ.
 - Provide a wider margin on PSRQ so it can be punched for binder.
 - Publish more technical information.
 - Provide more international news (from Australia).
 - More technical articles in PSRQ.
 - Information on the video tape was in 73. Why not in PSRQ?
 - Get PRM to answer their mail.
 - Publish monthly
 - Expand the newsletter
 4. Comments of a general nature:
 - Establish a telephone BBS somewhere devoted only to Packet Radio.
 - Establish a database for BBS sysops only.
 - Survey was an excellent idea.
 - Get regular bulletins on every BBS in the country.
 - Publish results of the questionnaire.
 - Establish a wish list for projects.
 - Do a questionnaire every year.
 - Have a fund raising manager to get donations and grants.
 - Stay with pure R & D.
 - TAPR needs a business manager.
 5. Comments directly to TAPR:
 - WHERE THE HELL IS V4? (10%)
 - Where is the NNC?
 - Get off DRNET!
 - Don't aim too high.
 - Develop digital radios.
 - Keep advancing the state of the art.
 - Don't trust the ARRL.
 - TAPR should act as a clearing house for regional projects and grant developmental funding.
 - Don't restrict info on kits to members only.
 - TAPR needs to be more open to its members regarding financial dealings and product development.
 - Move on to spread spectrum, digital signal processing, etc.
 - Work on high speed radio equipment.
 - Always offer a small run of new products before licensing.
 - Provide for multi-year memberships.
 - Establish local representatives.
 - Keep control over modifications made to licensed products by mfgs.
 - Establish a TAPR SEAL OF APPROVAL.
 - Keep the annual meeting in Tucson.
 - Have a board meeting in Los Angeles.
 - TAPR should split into two parts. One group to do only R & D and the other to do Production.
 - Answer your mail promptly. Never mind you are just volunteers.
 - Next time you do a survey don't load the questions.
 - Publish an up-to-date list of primary and secondary sources for parts, such as chips, special capacitors, resistors etc. Be sure the sources are reliable and honest.
6. General not readily classifiable:
- Standardize pinouts and nomenclature for RS-232.
 - What comes after PACKET?
 - Initiate a national emergency only frequency plan usable at local, regional and national levels for disaster operations.
 - Also plan for back-up freq (secondary) in case primary is overloaded, as well as a tertiary frequency for practice.
 - Wonder how much trouble it is to add an outboard (kit) EPROM with a bunch of canned messages to cut down on typing time?
 - If any kind of help is needed let the membership know PRONTO.
7. EXTRA:
- Three members took the time and effort to write long, thoughtful letters that merit separate consideration and are not abstracted in the above comments.
 - A list of suggested names if Tucson Amateur Packet Radio were to find it expedient to change the name of the organization.
 - Tucson Digital Radio
 - PACKUSA
 - (Definitely not TOKYO Amateur Packet Radio)
 - AMPAC = Amateur Packet Radio Corporation
 - TAPR INTERNATIONAL
 - American Amateur Paket Radio Corporation
 - Technology for Amateur Packet Radio
 - TAPR, Inc.
 - Tech Advancement of Packet Radio
 - American Packet Radio
 - (you can do better than I can)
 - T-APR
 - (unprintable. do you people have an identity crisis?)
 - AMATEUR PACKET RADIO
 - Totally Amateur Packet Radio
 - Technical Amateur Packet Radio
 - TAPR TAPR INT'L
 - (----Have a contest---)
 - Tri-partite Amateur Packet Radio

- TAPR
- T = THE A P R
- TAPR
- TRANS-AMERICAN PACKET RADIO
- PACRAD
- APRA (amateur packet radio association)
- National Amateur Packet Radio Corp.
- Totally Awesome Packet Radio
- National Amateur Packet Radio Association
- Trans-America Packet Radio
- Amateur Packet Radio
- AMPAC (Amateur Packet Radio Corporation)
- Talisman Amateur Packet Radio
- Digital Radio Relay League

7. Same question but reduced dues:

yes	136	55
no	78	31
no answer	35	14

8. I plan on renewing membership if things remain as they are:

yes	235	94
no	5	2
no answer	9	4

9. PSRQ should merge with PRM:

yes	117	47
no	45	18
no answer	87	35

10. Should advertising in PRM be an issue in deciding to merge:

yes	64	26
no	147	59
no answer	38	15

11. Should TAPR establish a packet software exchange:

yes	222	89
no	18	7
no answer	9	4

12. Should TAPR institute a packet conference on a major database:

yes	125	50
no	86	35
no answer	38	15

13. If yes which database:

Compuserve	64	26
Source	6	2
Peoplelink	9	4
Genie	13	5
DRNET	5	2
Other	21	8
no answer	131	53

14. Access to TAPR members only:

yes	58	23
no	69	28
no answer	122	49

15. TAPR members should get a discount or credit for access:

yes	91	36
no	29	12
no answer	129	52

16. TAPR should publish on a regular basis the membership list:

yes	150	60
no	83	33
no answer	16	7

Tabulation of TAPR Membership Questionnaire

249 completed questionnaires received
 139 with comments
 110 without comments

QUESTION	TOTAL	PERCENTAGE
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1. I joined TAPR to:

receive PSRQ	13	5
support packet development	15	6
both	211	85
no answer	10	4

2. I already receive PRM:

yes	52	21
no	179	72
no answer	18	7

3. If PSRQ were to merge with PRM I would remain a TAPR member:

yes	219	88
no	11	4
no answer	19	8

4. To receive PRM with my membership I would pay higher dues of:

\$ 0.00	16
5.00	20
10.00	30
15.00	21
20.00	25
25.00	15
45.00	1
? ?	55
no answer	66

5. I view the info in PSRQ as:

important	242	97
unimportant	1	-
no answer	6	3

6. I would remain a member of TAPR if there were no newsletter:

yes	116	47
no	125	50
no answer	8	3

17. TAPR should sell the membership list to advertisers:

yes	159	64
no	82	33
no answer	8	3

18. When TAPR makes a kit it should be a complete kit:

yes	183	73
no	41	17
no answer	25	10

19. TAPR should make available in kits simple devices and accessories:

yes	205	82
no	25	10
no answer	19	8

20. Complex devices should be left to manufacturers to produce:

yes	157	63
no	66	27
no answer	28	10

21. TAPR should do R&D in packet but stay out of production:

yes	113	45
no	109	44
no answer	27	11

22. TAPR should license its technology on an EXCLUSIVE basis:

yes	16	6
no	227	91
no answer	6	3

23. TAPR should continue its present policy of NONEXCLUSIVE licensing:

yes	234	94
no	8	3
no answer	7	3

24. Tucson Amateur Packet Radio is too regional. Change the name:

yes	46	18
no	180	72
no answer	23	10

25. If the name changes should initials "TAPR" should remain:

yes	157	63
no	24	10
no answer	68	27

(37 suggestions for name changes were received)

26. TAPR is an organization whose time is past. CLOSE THE DOORS:

yes	0	0
no	247	100
no answer	2	-

27. TAPR is vital to the continued growth and future of packet radio development and should stay in existence:

yes	246	100
no	0	0
no answer	3	-

28. TAPR should be active in matters concerning packet in petitions to the FCC:

yes	234	94
no	4	2
no answer	11	4

29. TAPR should be active in matters peripherally concerning packet in petitions to the FCC:

yes	160	64
no	72	29
no answer	17	7

GOALS

A. TAPR will take an active role in participating in FCC rulemaking procedures on issues relating to packet radio. Further, TAPR will coordinate such activities with other Amateur organizations.

strongly disagree	11	4
disagree	7	3
no opinion	14	6
agree	55	22
strongly agree	157	63
no answer	5	2

B. TAPR will seek better and faster ways of providing information to the Amateur packet community.

strongly disagree	10	4
disagree	6	2
no opinion	17	7
agree	66	27
strongly agree	150	60
no answer	0	0

C. TAPR will encourage and support hardware and software projects to advance the state of the art in Amateur packet communications.

strongly disagree	15	6
disagree	0	0

Xerox 820 FAD

The venerable FADPAD PC board with instructions is still available from the TAPR office. If you have a Xerox 820 and are a confirmed hardware and software hacker, this is for you!

Software to operate this board may be available through FADCA; it is not presently available from TAPR.

The price of the FADPAD PC board is \$25 postpaid in the U.S.

NNC Project Update

Lyle Johnson, WA7GXD

The first Alpha NNC was delivered in late June to KE7CZ followed the next week by shipments to most of the other "Alpha" software developers.

The first units are experimental in nature. No "real" software has been written for them, and the hardware, while suspected of working well, hasn't proven it yet! The modem boards were not included in the first shipments; there were layout problems and they will be following soon.

The NNC has been called "The silliest thing I ever heard of" by one packeteer; others keep asking when they can get one.

While most of you probably already know what the NNC is for, bear with me while I introduce it to any newcomers that may be reading this column.

The Network Node Controller is a sort of super TNC. It has up to four radio ports (compared to 1 for a standard TNC) and two serial user ports. It also supports parallel interfaces (Centronics compatible printer port and the Small Computer Systems Interface, or SCSI, bus). It includes 64k to 256k bytes of battery-backed RAM and 32k bytes to 256k bytes of other EPROM and/or RAM memory. It uses an HD64180 processor for Z80 compatibility. It is small, rugged and made almost entirely out of CMOS parts. It can be fastened to the side of a standard 5-1/4" floppy disk drive, and an optional floppy controller board turns it into a high-performance stand-alone development system for software.

By using a Z80-compatible processor, the wide range of Z80 development tools (languages like C, debuggers, etc.) and text editors (like WordStar) become available for it. In addition, software developed for the Xerox 820 may be easily converted to run on the NNC.

So why make another Z80 system when Xerox boards are around for \$50?

The Xerox 820 is designed for an office, has lots of parts and limited memory. The NNC is much smaller, uses far less power, should be more tolerant of noise, easier to clean up for remote sites and should be much more reliable -- as well as much faster in operation.

Why not use an 8088?

The HD64180 represents similar processing power to the 8088, but at a higher level of integration. This means fewer parts, smaller boards, reduced cost and better reliability.

Why not use a Taiwanese PClone motherboard?

For the same reasons that the Xerox 820 board is not recommended for remote use. Power drain, complexity and in the case of the PClones, card edge connectors.

Remember, the NNC is not intended to be your shack computer; it is intended to sit on mountaintops (in the West), Farmer John's corn silo (Midwest), TV channel X's tower (East) or ??? You get the idea.

Hopefully, there will be some serious packet application software (networking, including AX.25 Level Three switches and datagram TCP/IP switches) running on the NNCs in a few months and Beta test can begin.

Stay tuned!

TAPR Announces New

Membership Dues Rate!

Since 1981, TAPR has had only one change of dues (that was from \$25 to \$12). Well, the times they are a changin' and the dues are too!

Largely because of the merger of PSRQ with PRM, to bring you direct information from TAPR on a monthly basis rather than every three months, our costs to support membership services have risen. The new dues rate, which is effective immediately, is as follows:

Standard Membership:	\$15/year in US and Canada
Associate Membership:	\$ 5/year worldwide

A Standard Membership includes a year's subscription to Packet Radio Magazine (PRM), with a section set aside as the Packet Status Register (PSR).

If you live overseas and want Air Mail delivery of PRM, add \$10 to annual dues.

The Associate Membership does not include any newsletter or magazine at all. It is intended for folks whose regional packet organization already provides PRM. However, since all PRM subscribers will now be getting PSR, TAPR recommends that non-TAPR members become Associate Members to help support TAPR and packet radio.

PSR Index

Andy Freeborn, NOCCZ, has compiled a handy annotated index to all the previous PACKET STATUS REGISTER issues. This is the last independent issue of PSRQ and a fitting place to tie together the history of this fine publication. The early issues were rich in reports of technical experimentation and many interesting articles in the earlier issues are worth referencing from time to time. The index on the following six pages is printed sideways to allow easy referencing of the annotations without resorting to 'fine print.'

ISSUE/PAGE	AUTHOR	TITLE	ANNOTATION	prepared by NOCCZ
PSR #1. JULY 1982				
1/1	KV7D	WELCOME TO THE FIRST ISSUE OF PSR	Margaret Morrison (then KC7MA), editor of PSR, announces it.	
1/1	KV7D	TAPR GENERAL MEETING	Next meeting July 17, 1982 in Scottsdale AZ..	
1/2	KD2S	PRESIDENT'S CORNER	Den Connors discusses the role expected to be played by TAPR.	
1/2	WA7PXW	SOFTWARE UPDATE	Marc Chamberlin describes FORTH programming for new TNC.	
1/3	WA7GXD	HARDWARE HAPPENINGS	First TAPR TNC packets transmitted on June 9 and June 18 1982.	
1/4	KV7B	BETA TEST STATUS	Dan Morrison (then KB3UC) is overall Beta test coordinator for TAPR.	
1/5	KT7D	MICROWAVE NEWS	Mike Parker discusses L band linear amplifiers.	
1/6	WA7GXD	TECH/NOTES	CWID in the Alpha TNC. New component products are discussed.	
1/7	KD2S	FIRST TAPR PACKET QSO	Lyle Johnson, WA7GXD, initiates first TAPR TNC packet QSO with KD2S.	
PSR #2. OCTOBER 1982				
2/1	KV7D	FIRST ANNUAL MEETING ANNOUNCED	To be held in Tucson on February 5 1983. TAPR membership now 180.	
2/1	KV7D	NEW "STANDARD" PROTOCOL	Amateur reps meet and agree on common packet radio protocol.	
2/2	WA7GXD/KV7D	TECH NOTES	Filtering problems, KV7's B & D solve with high tech MF10.	
2/2	WA7GXD	NEW PRODUCTS	Several samples of new chips received for evaluation.	
2/3	KV7D	NEW DIGITAL RULES	New FCC rules permit use of certain digital codes by amateurs.	
2/3	WB9FLW	CORRESPONDENCE	Pete Eaton describes SLAPR, the St Louis packet group.	
2/4	KD2S/W3IWI	PROPOSED AMATEUR DIGITAL SATELLITE	W3IWI proposes new PACSAT satellite at AMSAT general meeting.	
2/5	WA7GXD	HARDWARE HAPPENINGS	Modem-radio interface problems discussed. CWID circuitry working well.	
2/5	KV7B	BETA COORDINATORS	Twenty two Beta test coordinators listed.	
2/6	KV7D	ALPHA/BETA REPORT	Alpha test essentially complete. Beta board described.	
2/6	KV7B/KD2S	BETA TEST	Portions of a letter sent to all Beta test coordinators.	
2/7	KV7D	BOARD OF DIRECTORS ELECTION	Excerpt from Bylaws concerning board membership and election.	
PSR #3. DECEMBER 1982				
3/1	TAPR STAFF	ANNOUNCEMENTS AND INFORMATION	HF SSB net. 2nd Networking conf. KOPFX working on custom enclosure.	
3/2	WA7GXD	TECH NOTES	Beta test to start. Filtering problem. New products.	
3/3	WA7GXD	B L A C K T H U R S D A Y	Beta PC boards are defective. TAPR presses on, bloodied but unbowed.	
3/4	NK6K	A MID-SUMMER NIGHT'S PROTOCOL	Harold Price chronicles the earliest days of the AX.25 protocol.	
3/5	NOADI	BETA TEST MANUAL	Chuck Green discusses the forthcoming Beta test manual.	
3/6	KD2S	PACSAT PROJECT	More details on the planned spaceborne "flying mailbox".	
3/7	WA7GXD	HARDWARE HAPPENINGS	A discussion of the Beta effort from a hardware standpoint.	
3/8	WB9FLW	ST. LOUIS AND THE BETA TEST	A blow-by-blow account of how Pete got wrapped up in TAPR Beta test.	
3/9	KV7D	SOFTWARE UPDATE	Every design goal achieved (this is not a paper TNC).	
PSR #4. MARCH 1983				
4/1	TAPR STAFF	ANNUAL MEETING	A report and election results of the first annual TAPR meeting.	
4/2	WA7GXD	THE PRESIDENT'S CORNER	Stresses the need for widespread participation to get the job done.	
4/3	KV7D	SOFTWARE UPDATE	Software changes/fixes in the mill at an early stage.	
4/3	NK6K	STANDARDS (sigh)	Programmers problems. The impossible we do right now!	
4/4	WA7GXD	PROPOSED HARDWARE MODIFICATIONS	A collection of suggestions for the next TNC go around.	
4/5	TAPR STAFF	FEEDBACK	Letters/messages from WB9FLW, WDOETZ, KR9H, KD9S, NODVS, WAOKGU, WDOCZI.	
4/5	NK6K	LOS ANGELES	Getting the new Beta boards on the air in Southern California.	

ISSUE/PAGE	AUTHOR	TITLE	ANNOTATION	prepared by NOCCZ
4/6	WD9DBJ	CHICAGO	Dick Gulbrandsen describes receipt of first TNC's in Chicago area.	
4/6	WA7GXD	HARDWARE HAPPENINGS	All Beta TNC's shipped. Some radio problems are popping up.	
4/7	TAPR STAFF	THANKS	TAPR extends its thanks to several commercial firms for their help.	
4/7	KV7B	BETA TEST STATUS	141 out of 171 Beta boards shipped. Reports coming in from testers.	
PSR #5. MAY 1983				
5/1	KV7D	TAPR AND LOCAL/REGIONAL PACKET CLUBS	Club affiliation with TAPR, mutually beneficial. Plus short items.	
5/2	WA7GXD	THE PRESIDENT'S CORNER	Packet at Dayton '83. New TNC kits planned for Beta testing.	
5/3	KV7D/NK6K	SOFTWARE UPDATE	Work begins on Ver 3. Space problems encountered. Changes listed.	
5/4	WA7GXD	HARDWARE HAPPENINGS	Hardware team meets. Revisions announced for production kits.	
5/5	KV7B	BETA TEST STATUS	Feedback from the Beta test sites is discussed.	
PSR #6. JULY 1983				
6/1	TAPR STAFF	NEWS NOTES	Ham Radio cover. Software approach. No more CWID. MAPR edits PSR, etc.	
6/2	WA7GXD	THE PRESIDENT'S CORNER	Planning for high speed terrestrial linking begins.	
6/3	WA7GXD	TNC KITS	TAPR to produce TNC kits. Distribution & availability announced.	
6/3	WA0TTW	PACTivities	Pat Snyder, PSR editor, discusses packet activity in Twin Cities area.	
6/4	KDOBY	HARDWARE HAPPENINGS	Clay Bartholow talks about audio input sensitivity & new TNC hardware.	
PSR #7. OCTOBER 1983				
7/1	TAPR STAFF	NEWS NOTES	Revised board. Prototype kits built. TAPR BOD nominations.	
7/2	WA7GXD	PRESIDENT'S CORNER	Oscar. Magazine articles of note. TNC Rev 2. TAPR growth.	
7/3	TAPR STAFF	ANAHEIM	A discussion of activities at Sept. SW Div Convention.	
7/3	NK6K	BORING	Packet QSO's get boring. much work needed to perfect the system.	
PSR #8. NOVEMBER 1983				
8/1	TAPR STAFF	NEWS NOTES	An HF BBS. Packet Pete video. PACSAT. KE3D reports from South Africa	
8/2	WA7GXD	PRESIDENT'S CORNER	Kit assembly test completed. Cabinets. EPROM kits. Kudos to KOPFX.	
8/3	WB6UUT	BBS CONNECTION	Lynn Taylor describes the development and operation of a packet BBS.	
8/4	NK6K	SATELLITE SPACE	TAPR members in PACSAT work. OSCAR 10. Bug in Ver 2.1.	
8/5	TAPR STAFF	JAMSAT	A description of JAS-1. Planned for 1986 launch.	
8/6	KA9Q	PACSAT MODEM PROJECT	Phil Karn gives a tutorial & progress report on modem design project.	
8/8	W3IWI	A0-10 PACKETS	Tom Clark describes some packet firsts via A0-10.	
8/8	WA7GXD	BOARD ELECTIONS	Nominees announced: W3IWI, W1HDX, WB9FLW, KV7D, NK6K, WA0TTW, WB6UUT.	
8/9	NOCRN	REV.2 REVIEW	Paul Barnett reviews the assembly of the new TAPR TNC kit.	
8/9	TAPR STAFF	PACKET BIBLIOGRAPHY	Noteworthy articles in Amateur press.	
PSR #9. JANUARY 1984				
9/1	TAPR STAFF	NEWS NOTES	Annual meeting. Write don't call. Death of Vic Clark, W4KFC.	
9/2	WA7GXD	PRESIDENT'S CORNER	Packet on the move. Ranks swell. Information deluge. Much yet to do.	
9/3	KV7D	BETA UPDATES	Beta 3.1 available. Protocol upgrades. User interface upgrades.	
9/4	NOADI	THANK YOU	Manual editor identifies 'movers and shakers' who get the job done.	
9/4	NOADI	THE STORK?	The proud parents watch their first 100 kits go out warehouse door.	

ISSUE/PAGE	AUTHOR	TITLE	ANNOTATION	prepared by NOCCZ
9/5	WA7GXD	REV.II TYPOS	Some corrections to the manual.	
9/5	TAPR STAFF	PART PRICES	A replacement parts list with part numbers and prices.	
9/6	KV7B & D	HF PACKETS	Team Morrison describe the re-configured MF-10 for HF and satellite.	
9/6	KDOBY	1700 HZ CALIBRATE	A procedure for setting the 1700 Hz center frequency on Beta TNC's.	
9/7	WA7GXD	HARDWARE HAPPENINGS	A look at new kit TNC. Some Beta mods. New TNC design versus Beta.	

PSR #10. MARCH 1984

10/1	TAPR STAFF	NEWS NOTES	UoSAT-B launched. JASNET.BAS program. 3rd networking conference.
10/2	WA7GXD	PRESIDENT'S CORNER	New BOD. Cabinet status. Beta upgrade. The DCE project. Conventions
10/3	WORPK	CENTRAL IOWA BBS	Ralph Wallio describes the CITS BBS. costs. system features.
10/5	WA0TTW	BBS WATCH	A discussion of the needs, considerations and outlook for BBS's.
10/7	K5JB	COMPARISON SHOPPING	Joe Buswell compares the TAPR TNC and the GLB PK1.
10/11	WB8TKL	VIC-20 TERMINAL	Jay Nugent describes how to operate from a VIC-20.
10/12	K9NG	TNC CALIBRATION	Steve Goode on setting deviation for all TNC's within a LAN.
10/12	W3IWI	GDC MODEM	Modifications and switch settings for the General DataCom 202A modem.
10/13	KA9Q	PACSAT TRACKING	A method of detecting subtle orbit changes when using low thrust.
10/14	G3YJO	UoSAT-2 STATUS	Successful launch then leads to apprehension for UO-11.
10/15	W6EJJ	BIG EARS	Jay Holladay tells of EME antennas listening for UO-11.
10/15	KA9Q	Uo-B TELEMETRY	Telemetry was within limits. No clues to the problem.
10/16	NK6K	GET AWAY SPECIAL	A GAS experiment. Helping an El Paso high school.
10/16	KA6M	SATELLITE INTERCONNECTION	Hank Magnuski tells of mixed satellite and ground station contacts.
10/17	TAPR STAFF	BOARD MINUTES	Details of the 4 Feb. 1984 BOD meeting.
10/19	TAPR STAFF	ACKnowledgements	Letters and messages from the packet community.
10/22	W9TD	HF LINKS	Gary Kaatz tells about initial successes with HF packeteering.

PSR #11 JUNE 1984

11/1	TAPR STAFF	NEWS NOTES	Cabinets. Glossy brochures. Dayton Tech Achievement Award to TAPR.
11/2	WA7GXD	PRESIDENT'S CORNER	Dayton. Award. Possible approaches to linking.
11/3	G3YJO	UOSAT-2 STATUS	After exhaustive efforts, command re-established.
11/3	NOCRN	FROM THE EDITORS	All the news that fits, we print.
11/4	WA7GXD	KIT OSCILLATOR PROBLEM	Oscillator failures reported, fixes recommended.
11/4	NK6K	BINARY FILE TRANSFER	How to run binary data thru the TNC.
11/5	WA7GXD	PETE EATON RESIGNS	Outstanding accomplishments listed by TAPR President.
11/6	W3IWI	OSCAR-10 LINKING	West coast BBS worked from Clarksville MD via satellite.
11/7	W3IWI	HF LINKING	A report on HF packet gateway activity.
11/8	WA7GXD	3rd ARRL COMPUTER NETWORKING CONF.	A report on the activities at the Trenton conference.
11/9	NK6K	CA BBS ACTIVITY	West coast activity picking up. list of BBS users.
11/9	WB6HHV	MESSAGE HEADERS	Mike Brock tackles the standardization of message headers.
11/10	WA7GXD	TNC MODEM TUNING INDICATOR	Description of a simple tuning indicator for use on non-FM modes.
11/12	WA7GXD	MODEM SENSITIVITY MODIFICATIONS	Performance improved about 2 db under weak signal conditions.
11/13	K9NG	MODEM MODIFICATION TESTS	Details of results of tests on modem modification.
11/14	K9NG	BER PERFORMANCE OF TAPR TNC MODEM	Bit Error Rate test results presented.
11/16	K9NG	MODEM COMPARISON	Comparing the BER of the Beta to the new TNC.
11/16	WA1GRC	DEVIATION ADJUSTMENT	A simple method of setting deviation from Gary Field.
11/17	K4GFG	TAPR MODEM MEASUREMENTS	Radio and TNC audio response curves discussed by Tom Kneisel.
11/18	K5JB	DAYTON REPORT	Joe Buswell talks about the different TNC's seen at Dayton.

ISSUE/PAGE AUTHOR TITLE ANNOTATION prepared by NOCCZ

PSR #12, SEPTEMBER 1984

12/1	TAPR STAFF	NEWS NOTES	Dec. 2 TRN. 220 Mhz endangered. BOD nominations open. Packet on CBS.
12/2	WA7GXD	PRESIDENT'S CORNER	TAPR opens office. TINC LINC. K9NG working on 9600 bps modem.
12/3	WA7GXD	PACKETING IN THE FAST LANE	Experimenting with high-speed. 19.2 kb with 2xclock speed on TNC.
12/4	NK6K	SOFTWARE BUG PATCH	RETRY counter & AX25 OFF mode patched. Now ver 3.3.
12/4	NK6K	SOFTWARE BUGS	Asks for bug reports. Lists known bugs.
12/6	WB4JFI	VADCG UPGRADE	Terry Fox describes Vancouver daughter board.
12/6	WA7GXD	RS-232 PROBLEMS	Flow control problem. Different chip makers, different results.
12/7	WB6HHV	CROSSBAND DIGIPEATER	How 2 meter/220 MHz digipeating was implemented.
12/8	K1HTV	METEOR SCATTER CONNECTIONS	Richard Zwirko describes first meteor scatter packet QSO.
12/10	NK6K	23CM BANDPLANNING IN CA	A paper describing the digital mode's point of view on higher freqs.
12/12	NK6K	TAPR's FUTURE	What about level 3? Will TAPR keep selling kits?
12/14	TAPR STAFF	PACTivities	TSARC meeting. Oahu group meets. RMPRA activity. MRC & JA3 news.
12/16	W3GEY	A FUEL FOR THOUGHT	Jan King on water electrolysis/steam propulsion for satellite use.
12/18	WB6UUT	THOUGHTS ON LEVEL THREE	Two routing algorithms discussed. A catalyst for further discussion.
12/20	TAPR STAFF	SATELLITE COORDINATION	Describes activities of international amateur satellite group meeting
12/21	TAPR STAFF	HAMS IN SPACE	Space Amateurs selected. To carry amateur gear on space flights.
12/21	TAPR STAFF	JAS-1 UPDATE	A discussion of components, tests, problems, schedules.
12/22	W4UCH	PACKET - A SOFTWARE APPROACH	Bob Richardson, the development and background of the software appch.
12/23	N6IIU	TAPR-SUPPLIER OF TNC's TO 84 OLYMPICS	Ted Harris tells how packet was used at Olympic soccer events.

PSR #13, JANUARY 1985

13/1	TAPR STAFF	NEWS NOTES	Minnesota, Florida, Georgia news. Annual meeting info.
13/2	WA7GXD	PRESIDENT'S CORNER	Digital Committee on AX.25 level 2 mods. CITS conference.
13/3	WB6CYT	A PROPOSED NETWORK...PACKET RADIO...	Brian Kantor proposes a packet interconnection system.
13/7	TAPR STAFF	BOARD OF DIRECTORS ELECTION	Nominees are: NOCRN, WB6HHV, NOCCZ, WB6VMH, KD4NL, W9TD, KV7B, WDOETZ.

PSR #14, MARCH 1985

14/1	TAPR STAFF	NEWS NOTES	Dayton. Digipeater paths. GRAPES. SACPAC. Alabama. HF. New York.
14/2	WA7GXD	PRESIDENT'S CORNER	Election results. RMPRA DC PS. Heath HD 4040. 9600 BPS modem. network.
14/3	WB8TKL	PACGRAMS	A proposal for a uniform packet message format.
14/6	W6GERB	THE DC TNC	Bob Gobrick, RMPRA members innovate an inexpensive TNC DC supply.
14/7	KA9CAR	TEACHING OLD DOGS	John Dewey on adapting the Varitronics IC2F Deluxe to packet use.
14/8	K9BL	DAYTON EVENTS	Bob Neben provides Dayton packet speaker schedule.

PSR #15, MAY 1985

15/1	TAPR STAFF	STOP PRESS: IMPORTANT INFORMATION	Membership. Office problems. New TAPR TNC. New PSR
15/2	WA7GXD	PRESIDENT'S CORNER	TNC close-out, why? Heath cabinets. New PSR. TNC-2. TAPR HF net.
15/4	EDITORS	THE PACKET RADIO REVOLUTION CONTINUES	The new TNC-2 announced and described.
15/5	EDITORS	TAPR NEEDS YOUR HELP TODAY!	TAPR asks member help in updating member database.
15/5	EDITORS	THE BUCK STOPS HERE	Administrative office problems, actions to solve them.
15/6	EDITORS	HOW TO ORDER A TNC 2	A plan for fair distribution of a limited number of TNC's.
15/7	WB6FSK	COMMODORE 64 AS A PACKET TERMINAL	Steve Hall provides aid for the C64 users going into packet.
15/8	EDITORS	NOVRAM HINTS	How to correct a forgetful NOVRAM.
15/10	EDITORS	TNC-1 MANUALS AVAILABLE	Complete information on the TNC-1 and packet radio in general.

ISSUE/PAGE	AUTHOR	TITLE	ANNOTATION	prepared by NOCCZ
PSR #16, JULY 1985				
16/1	WA7GXD	PRESIDENT'S CORNER	W1BEL new PSR editor. TAPR people, talents, limitations. 'Call-In'day.	
16/2	W1BEL	EDITOR'S COLUMN	Gwyn Reedy describes contents. Status of TAPR projects. TNC-1 & 4.0.	
16/3	WA7GXD	THE TAPR TNC-2 - WHY?	Why the TNC-2 was needed as a follow-on to the TNC-1.	
16/3	N2WX	AN OVERVIEW OF TNC-2 SOFTWARE	Howard Goldstein, the author, describes his TNC-2 software.	
16/4	AD7I	AN OVERVIEW OF TNC-2 HARDWARE	Paul Newland, designer, describes the TNC-2 hardware.	
16/5	KOPFX	2764 EPROM PROGRAMMER FOR THE TNC-1	The information needed to construct the programmer.	
16/8	KA9CAR	HF OPS WITH THE TAPR/HEATH/AEA TNC	Change from wide to narrow tones with a flip of the switch.	
16/9	W3IWI	BULLETIN BOARDS/HOSTS/GATEWAYS/GLUE	A 9 month historical perspective of packet BBS's.	
16/10	N4ZQ/KB4LLO	PACKET MADE EASY	A review of the Kantronics KPC.	
16/11	N5EG	AN INTRODUCTION TO NETWORKS	T.C. McDermott describes the what & why of networks.	
16/15	KE3Z	THE TWO PORT DIGIPEATER	Jon Bloom explains the problem & how this machine solves it.	
16/18	WBORUS	ANOTHER VIEW OF LINKING/2 PORT DIGIS	Jerald Morris takes a different approach to SSID number decoding.	
16/19	WB8WGA	TAPR TNC MODIFIFICATIONS FOR 12v USE	Robert Ball uses a Power-General DC/DC converter for +/- 12v.	
PSR #17, OCTOBER 1985				
17/1	WA7GXD	PRESIDENT'S CORNER	Some packet history. TNC-1. TNC-2. Ver 4.0. WA8DED code. NNC. 9600 bps	
17/2	TAPR STAFF	TNC-2 MANUAL MISPRINTS	Corrections to TNC-2 manual.	
17/3	EDITOR	EDITOR'S COLUMN	Future of Amateur radio. Profile of a "doer". Historic firsts	
17/4	TAPR STAFF	TNC-2 OEM PACKAGE AVAILABILITY	TAPR TNC-2 OEM kit available for industry.	
17/5	W3IWI	BBS NEWS AND VIEWS	Questions/answers on RLI system. The Xerox 820. BBS computers.	
17/7	FROM QEX	5th ARRL AMATEUR NETWORKING CONF.	To be held 7-9 March in Orlando. Papers sought.	
17/8	TAPR STAFF	EPROM PROGRAMMING ADAPTER	Limited supply of kits available at TAPR.	
17/8	TAPR STAFF	MODIFICATIONS TO THE TNC-2	Modifications for TNC-2 Rev 1 to Rev 2.	
17/11	WA7GXD	THE TAPR NETWORK NODE CONTROLLER	Why it is needed, how it evolved and what it will look like.	
17/12	W3IWI	TNC-2 PUSH-TO-TALK INDICATOR	The power LED will serve double duty. How to do it.	
17/13	TAPR STAFF	BOARD OF DIRECTORS NOMINATIONS	A call for nominations.	
17/13	TAPR STAFF	AEA AND HEATH TNC OWNERS	Manuals in limited supply but still available.	
17/13	TAPR STAFF	ANNUAL MEETING ANNOUNCEMENT	Next annual meeting in Tucson on February 8 1986.	
17/14	WB2OSZ	A DIGITAL TUNING INDICATOR FOR HF PKT	John Langner departs from the analog approach. Uses digital approach.	
17/15	TAPR STAFF	PK 80 UNIVERSAL PACKET CONTROLLER	AEA announces its version of TNC-2 in assembled form.	
17/16	WB6UUT	A REVIEW OF THE WA8DED TNC FIRMWARE	A description of how Ron Raikes new TNC system operates.	
17/17	WA8DED	AX.25 VER 2 MULTI-CHANNEL FIRMWARE	A command description of the various features of the new firmware.	
17/19	N2DSY	THE RATS NETWORK INFORMATION BULLETIN	Plans for the Radio Amateur Telecommunications Society RATSNET.	
17/21	KE7CZ	TNC MODEM TUNING INDICATOR #2	Dan Vester provides information for another type HF tuning indicator.	
17/24	TAPR STAFF	9600 BPS MODEM KITS	Semi-kits available at TAPR.	
17/24	N2FVN	TNC-2 RADIO HOOKUP TIP	How to hook up to a Kenwood TH-21.	
17/25	K8KA	HAMTRONICS FM-5 SHIELDING	Jeff Ward describes WB1DNL's shielding modifications to FM-5.	
17/26	WB6UUT	SWITCH SELECTABLE FIRMWARE FOR TNC-1	Using the "bank select" feature for either TAPR or WA8DED firmware.	
17/26	N5EG	AN INTRODUCTION TO NETWORKS	A continuation of the article begun in the July 1985 PSR.	
17/27	WA4FIB	USING THE MACINTOSH WITH THE TNC-2	Jack Brindle describes using CTS instead of Xon/Xoff for the Mac.	
PSR #18 - JANUARY 1986				
18/1	WA7GXD	PRESIDENT'S CORNER	Looking back on 1985...and ahead to 1986.	
18/1	W3IWI/WA8YBT	SAREX 2-PACKET RADIO FROM THE SHUTTLE	The story of putting together a packet station for use in space.	
18/4	WA7GXD	USING THE RF DCD FEATURE OF THE TNC-2	Putting the TNC DCD feature to work for you on voice channels.	

ISSUE/PAGE	AUTHOR	TITLE	ANNOTATION	prepared by NOCCZ
18/5	TAPR STAFF	NCC DEVELOPMENT AND TESTING	The current status and need for Alpha and Beta testers.	
18/6	TAPR STAFF	IMPORTANT: TO ALL TNC-2 OWNERS	A couple of potential problems and their suggested fixes.	
18/6	TAPR STAFF	TAPR ANNUAL MEETING	Meeting set for Feb. 8 1986 is announced.	
18/6	TAPR STAFF	TAPR TNC-1 MANUAL SALE	Closeout of the final few copies remaining.	
18/7	KA9Q	TCP PROGRAMERS MANUAL	"advance information" to implementers considering writing applications	
18/8	WA7GXD	BEGINNERS'S CORNER	Using the IBM PCjr on Packet.	
18/10	WA7GXD	BEGINNERS'S CORNER	Interfacing the Commodore 64 and VIC 20 computers.	
18/11	N7CL	TS-430S RX IF MOD FOR PROPER AGC	Eric Gustafson tells of rapid turnaround problem and the fix.	
18/13	W3IWI	BBS NEWS AND VIEWS	Explosive growth. Real networking. IBM-PC efforts. Software distr.	
18/15	TAPR STAFF	NEW PRODUCTS FROM TAPR	Tuning indicator. LSC-10.	
18/16	NK6K	DEPT. OF PROGNOSTICAION:FUN W/NUMBERS	How many TNC's are there? (And how many will there be?).	
18/17	KA9Q	ENGINEERING A PACKET SWITCH	How much memory is likely to be needed in a packet switch?	
18/17	TAPR STAFF	REPLACEMENT PARTS PRICE LIST TNC-2	TAPR offers a "convenience" parts service.	
18/18	TAPR STAFF	PACKET CHANNEL CONGESTION	A series of suggestions to help reduce the channel load.	
18/19	W5YR	TNC64: PACKET TERM PROGRAM FOR C-64	George Baker describes program distributed by Texas PR Society.	
18/20	N5EG	AN INTRODUCTION TO NETWORKS	Part three in a series of articles. Earlier ones in Jul. & Oct. 1985	
18/22	STONER	PUBLIC DIGITAL RADIO SERVICE PETITION	A proposal to FCC to create new radio class & allocate spectrum.	
18/25	TAPR STAFF	TNC-2 UPGRADE INFORMATION	CMOS components available at TAPR.	
18/25	TAPR STAFF	PACKET ADAPTER	Highly touted ALJ-1000 leads to development of LSC-10.	
18/26	W3IWI	PTT MOD FOR TNC-2: CORRECTIONS	An amendment to the earlier mod description.	
18/26	TAPR STAFF	NOTICE TO TNC-2 OWNERS	Radio Shack Mod 1-4 users, handshaking protocols, HF operation.	
18/26	KA9Q	AMATEUR PSYCHOLOGY - FOOD FOR THOUGHT	Let the amateur pay for networking in his own shack.	
18/26	EDITOR	EDITOR'S COLUMN	Kind words for new PSRQ. Kudos to writers. Packet Radio Magazine.	
18/27	TAPR STAFF	DIRECTOR CANDIDATES	Nominees are: Mark Baker, K9NG, W3VS, WA7GXD, N7CL, W1BEL.	

PSR #19. APRIL 1986

19/1	WA7GXD	PRESIDENT'S CORNER	TAPR income curtailed.Overhead cost cutting. Pressing on with R&D.
19/1	WA7GXD	TAPR GOALS - 1986	Board of Directors sets three goals. Some immediate action.
19/2	WB9FLW/WA7GXD	ELIMINATING POOP FROM PACKET	Much POOP found on packet channels. Offensive?
19/5	W3IWI	BBS NEWS 'N VIEWS	IBM-PC BBS. Xerox 820. FCC 85-105. networking/forwarding. DoubleDos.
19/7	NK6K	TAPR & THE FCC - PR DOCKET 85-105	A TAPR petition to the FCC to reconsider PR 85-105.
19/10	TAPR STAFF	MINUTES OF THE TAPR BOARD MEETING	The Feb. 9 1986 Board of Director meeting minutes.
19/12	TAPR STAFF	PROJECT PROPOSAL GUIDE	A guide for preparing a project proposal for TAPR.
19/13	WA7GXD	BEGINNER'S CORNER: STATE MACHINES	The beginning of a series on what a state machine is & how it works.
19/15	KV7B/N7CL	NOTICE TO ALL TAPR/CLONE HF USERS	Improving demodulation to near optimal performance.

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