TAPR

PACKET STATUS REGISTER

Tucson Amateur Packet Radio Corporation

In This Issue...

President's Corner

by Lyle Johnson, WA7GXD

If you're surprised to see my name here again, you're not alone!

Andy Freeborn, N0CCZ, was TAPR President for the past two years. He brought tremendous energy and administrative experience to the office. His contributions to TAPR from an organizational sense have been of tremendous value. He was always available when needed and took an intense interest in seeing that TAPR was run properly and responsibly.

He guided us into a close support role for the MicroSat project. He kept close tabs on our financial affairs. He watched over the TAPR Office and managed it very well by remote control from Colorado Springs.

I, for one, never worried about the organization while Andy was at the helm.

He will be missed, but I am sure he will remain active and continue to contribute to TAPR. Meanwhile, he is being kept busy with the transition to the new President and Treasurer.

Order of Succession

It is not healthy for an organization to be run by the same person, or the same team, for a long period of time. It is essential that new people become involved, new ideas expressed, and that responsibility be passed on.

I agreed to fill the office of President for one year while we switch over to a new system.

The idea is to switch Presidents on an annual basis. A new Executive Vice President will be elected each year, with the understanding that (s)he will train under the President and be elected to that office the following year for a one-year stint.

If you look at the roster of officers on the back of this PSR, you'll see that Harold Price, NK6K, is the new Executive V.P. Harold has been with TAPR since 1982 and has been heavily involved in many TAPR projects, including the Beta Board and TNC-1, during which time he was 1/3 of the software team. He has also contributed greatly to the Digital Communications Experiment (DCE) aboard UoSAT/OSCAR-11 and the MicroSats. In both of these satellite projects, Harold has been a key player in the software development arena. Finally, Harold has been on the TAPR board since 1983 and has remained one of our most active Board participants.

He is currently working hard to bring PACSAT and LUSAT on-line as mailboxes in space. Towards the end of the summer, he will be able to devote more time to TAPR as our Executive Vice President.

Greg Jones, WD5IVD, is our Secretary-Treasurer. Greg brings a lot of enthusiasm to these offices as well as a track record as a do-er. Greg is an officer of the Texas Packet Radio Society (the group which brings you TEXNET) and organized the packet forum at last years Ham-Com and ARRL National Convention.

Note that Greg is not a member of the Board. It is not a requirement that a person be a board member to be an officer, or to participate and contribute.

Bob Nielsen, W6SWE, and Bob Hansen, N2GDE, edit and produce the PSR every three months. In addition, Bob Nielsen is now in charge of the software library and membership services. He is also pursuing an application to qualify PSR for Second Class mailing privileges which will save us several hundred dollars per year in postage costs.

How to Get Involved

I often get letters and phone calls asking how a person can get involved with TAPR as an active volunteer.

The problem is, it takes longer to detail how to do a task than it takes to do it. This short-range policy, however, backfires in two ways.

First, the would-be participant gets discouraged and disappears. Second, the person presently involved gets overloaded, burns out, and there is no successor.

I am very aware that I don't manage projects well because I don't communicate with willing and able volunteers in a timely manner. I will try to improve this. In fact, if you are among the many who have been frustrated regarding the packetRADIO beta test, you should have received a letter from me before you read this column. If you haven't received a letter, write the office because it means we may have misplaced your application!

What I suggest if you want to be involved is to find something that needs to be done, do it, and let us know you did it! There are plenty of tasks to be done. TAPR has a program in place to fund development. Just let us know what you propose, why it is important, how much it will cost, who will be participating, etc. We'll review it and get back to you.

What kinds of things can some of you do that will be of help and not require a lot of guidance?

One area we need assistance in is kit repair. If you are technically competent and have access to test equipment, let us know. Maybe you can fix PSK modems, or State Machines.

Maybe you are expert at modifying radios for 9600 bps operation. Perhaps you know the TNC-2 like the back of your hand and are willing to help people with memory upgrades and the like. We can keep a list and publish it in PSR as well as refer folks to you for help.

Another area is in documentation. If you have installed a State Machine on the HF port of your KAM, we want to know about it. Is your PSK modem interfaced to the latest XYZ radio for autotracking doppler shift from Micro-Sat? Which connections did you use?

Have you recently built a TAPR kit? Did you find errors in the directions, or think that an illustration would have helped in a tricky part of the assembly? Photocopy the appropriate pages and let us know.

What about "Elmering" others? If you are willing to help packet newcomers get on the air, we'd like to hear from you. We often get requests at the office for help that we just can't answer in a timely manner.

These are just a few suggestions. There are plenty of ways you can get involved in making packet just a little bit better for all of us, and help spread the load around.

Dayton

Speaking of projects, there are a couple of articles in this PSR about projects and TAPR's re-entering the kit arena. I think you may find them interesting...

Meanwhile, I hope to see you at Dayton! TAPR will be in the same double-booth space we had last year. There will be kits, disks, people to ask questions of, and general packet fraternizing. And who knows, maybe we can talk you into helping man the booth for an hour or so, so that some other volunteers can see some of the HamVention? ✦

PSK Modem Cabinets Available

The TAPR PSK modem was designed to fit in a standard Radio Shack cabinet. Of course, Radio Shack decided to discontinue this cabinet about a year ago. As a result, we have

had numerous requests to supply a cabinet for the PSK modem.

Happily, we have located a source for the same cabinet that Radio Shack marketed. It is available from the office for an additional S5 when you buy it at the time you purchase a PSK modem kit. If you already have your modem and would like to get the cabinet separately, it is also S5 but there is a S2 shipping charge in the U.S. and Canada.

Secret Projects

We have a dilemma.

When TAPR embarks on a project, we can either announce it or we can refrain from announcing it.

If we announce it, we get lots of requests from folks who want to buy it, or want more information about it, or are unhappy because it isn't already available.

Explanations that we have jobs to maintain, have families to raise, are just volunteers, etc., fail to appease. Sometimes our own enthusiasm causes us a lot of trouble when we optimistically think we'll have something ready in a month, and it winds up taking two years.

On the other hand, when we did the TNC-2, we did it out of the spotlight, and told everyone about it after it had gone through Alpha and Beta testing. We had a lot of folks pretty upset with us, as a result.

Also, if we announce, it stifles creativity because some people will stop doing a similar thing until we finish doing it at TAPR. If TAPR then falls through, it may not get done at all.

If we don't announce, nobody has time to get disappointed at the wait, but others get unhappy because they just bought an XYZ and would have preferred to buy ours had they only known.

Sort of a catch-22, eh?

Since each approach has its pitfalls, we may try letting you know what we are cooking up in general, but not get specific or enthusiastic until we have something to show with the covers off.

What do you think?

Minutes of the Tucson Amateur Packet Radio Corporation

Board of Directors Meeting

February 23, 1990

The meeting was called to order in Tucson, Arizona on February 23, 1990 by President Freeborn.

Directors in attendance: Andy Freeborn, N0CCW, Steve Goode, K9NG, Franklin Antonio, N6NKF, Mike Brock, WB6HHV, Don Lemley, N4PCR, Bdale Garbee, N3EUA, Skip Hansen, WB6YMH, Eric Gustafson, N7CL, Lyle Johnson, WA7GXD, Phil Kam, KA9Q. Not present: Tom Clark, W3IWI, Dave Toth, VE3GYQ, Harold Price, NK6K, Dan Morrison, KV7B. Also present at the meeting: Greg Jones, WD5IVD, Bob Hansen, N2GDE, Bob Nielsen, W6SWE.

A) Minutes of the previous meeting and electronic minutes from CompuServe were read. Franklin Antonio moved that they be accepted. Bdale Garbee seconded. Motion passed.

B) Andy Freeborn presented the President's Report and Treasurer's Report.

C) Old business:

1) packetRADIO - Pete Eaton gave an update of the project. Lyle Johnson described all of the boards and the status of construction of the alpha test units.

2) DSP project - Lyle Johnson gave an update on the project which was put on hold because of the same personnel being heavily involved in the MicroSat project. The Board decided to keep the present project inactive and investigate possible new directions for a future DSP project.

3) PS-186 project - Bdale Garbee gave an update on the PS-186. No word has been received from AEA in several months. Garbee is working on "NOS in a box" for the PS-186 and hopes to have something to show by Dayton.

4) No-code - Bdale Garbee asked if the board wanted to make any announcement on the upcoming NPRM. The board will make a decision after the NPRM is published.

D) New business:

1) Surplus parts - Bdale Garbee moved that the officers look for a buyer for surplus parts in the TAPR inventory. Eric Gustafson seconded. Motion passed.

2) Andy Freeborn moved that Heather Johnson, TAPR Office Manager, be given check signing authority. Bdale Garbee seconded. Motion passed.

3) Bob Nielsen presented a cost comparison showing that there would be a considerable savings if the domestic copies of Packet Status Register were mailed at second-class instead of first-class rates, and that TAPR needed a resolution to authorize the publication of PSR and the rate structure. Franklin Antonio so moved. Lyle Johnson seconded. Motion passed. Lyle Johnson moved that Bob Nielsen be authorized to process forms for second-class mail handling. Franklin Antonio seconded. Motion passed.

4) Bdale Garbee moved that possibly two FAX machines be purchased for the office and the president. Don Lemley seconded. Motion passed.

5) Andy Freeborn discussed a request for licensing of the TAPR PSK modem. Bdale Garbee moved that the PSK modem be licensed for $1000 plus $2.50 per unit for 5 years. Skip Hansen seconded. Motion passed.

6) Greg Jones, Vice President, Texas Packet Radio Society, asked if TAPR would like to participate in a joint hospitality room with TPRS and AMSAT again this year. Lyle Johnson so moved. Bdale Garbee seconded. Motion passed.

7) Andy Freeborn presented a list of suggested by-laws changes. Franklin Antonio, Eric Gustafson and Bdale Garbee will review the changes and report back to the board.

The board temporarily adjourned at this point and reconvened on Saturday, February 24, 1990. All of the directors previously in attendance, as well as Dan Morrison, KV7B, were present. Greg Jones, WD5IVD, was also present.

Election of officers:

President	Lyle Johnson, WA7GXD
Exec. VP	Harold Price, NK6K
Sec/Treas	Greg Jones, WD5IVD
VP for Member Services	Bob Nielsen, W6SWE

Submitted by Greg Jones, WD5IVD, Secretary/Treasurer

Non-Tech Topics

by Andy Freeborn, N0CCZ

February Annual Meeting

The 1990 TAPR annual meeting was one of the best attended meetings ever held. One of the objectives of the annual meeting, other than the formal presentations, is to afford the attendees an opportunity to gather in groups and discuss packet radio matters. The past two years we have arranged to have lunch and dinner for the attendees at the hotel. This has been very successful in keeping the attendees together and promoting the exchange of information. The inauguration of the TAPR hospitality room this year provided even more opportunity for small groups to gather. The room was in use during the meeting hours, and late into the night on both Friday and Saturday. An additional bonus was having Heather, N7DZU, there from the office with the complete line of kits, firmware, and software available.

February Election Results

The individuals elected by the membership to three-year terms on the TAPR Board of Directors are:

Tom Clark	W3IWI
Pete Eaton	WB9FLW
Don Lemley	N4PCR
Harold Price	NK6K
Dave Toth	VE3GYQ

The TAPR officers for 1990 as elected by the Board of Directors are:

President:
   Lyle Johnson, WA7GXD
Executive VP:
   Harold Price, NK6K
VP for Member Services:
   Bob Nielsen, W6SWE
Secretary/Treasurer:
   Greg Jones, WD5IVD

It's Been My Priviledge

It is rare in the life of an amateur to have the opportunity to return something to a hobby which provides so much enjoyment. Having served the past two years as President of TAPR has provided me with just that opportunity. My efforts, as a non-techie, have been in the area of management and administraion. The lifeblood of TAPR is, of course, the expertise of the technically oriented volunteer. In most cases, however, techies are more interested in techie things than they are in the mundane chores of management. Yet the management and administration of TAPR is critical to the successful continuance of TAPR's role in amateur radio.

Each year in the October-December time frame, your PSR announces that nominations for election to the Board of Directors are open. I suppose that it is due to the fact that TAPR is a technically oriented organization that it is rare that individuals step forward to support TAPR in non-technical areas. To those that may have something to contribute in these areas of TAPR management I urge you to make yourselves known.

Congratulations AMSAT

Warmest congratulations from TAPR to our sister organization AMSAT-NA on the success of the MicroSat program. The thousands of hours of time donated by volunteers to see this incredible project through to completion, in an equally incredible short period of time, is a testament to their dedication to amateur radio.

See You at Dayton '90

We're looking forward to seeing old friends at the Dayton HamVention TAPR booth again this year. We will be in the same location, in the new building, that we occupied last year. There will be displays and demos. Expect to see all of the packet radio kits, firmware, and software that TAPR makes available. Make the TAPR booth "The Place for Packeteers to Meet." ✦

TNC-2 Version 1.1.7 Software Released

TAPR is pleased to announce that version 1.1.7 of the TNC-2 software has been released. EPROM's were available at the TAPR meeting in February. There was a problem with some of the initial EPROM's; if you do not get the checksum shown below, please contact the TAPR office regarding a replacement. This is a MAJOR revision to the TNC-2 software. All orders will include a revised TNC-2 software booklet (this is also available separately, see the enclosed order blank). The booklet contains a complete command reference, revised calibration procedures, information on the new PriACK protocol, and a list of firmware default parameters.

The initial printing of the revised software booklet has been received. Frankly, we at TAPR are a bit disappointed with the printing and binding quality; future printings WILL be improved!

The following information is extracted from the 1.1.7 software release notes (contained in Disk #14 of the TAPR software library):

The correct sign-on message for this release of TNC-2 software is:

```
Tucson Amateur Packet Radio TNC 2

AX.25 Level 2 Version 2.0
Release 1.1.7 2/11/90 - 32K RAM
Checksum $51
cmd:
```

TAPR TNC-2 Software Release 1.1.7 is a major release with numerous enhancements. Significant changes and enhancements include:

- Prioritized Acknowledgment (PriACK) protocol due to N7CL.
- Improved channel access methods (similar to "persistence").
- Better compatibility when running AX.25 V1 (T3 may be disabled).
- A filter to inhibit monitoring of NET/ROM, ROSE, TCP/IP and other networking packets.
- Improved transmit timers (time and/or character-based) along with quick-release of PTT at the end of a frame.
- Pre-frame sync of zeroes rather than flags for reduced TXDELAY (the other station can lock on to your transmissions faster).
- No dead-time between frames in a multi-frame transmission.
- Improved KISS operation in full duplex for MicroSat and other applications.
- Improved buffer-full handling over normal AX.25 practice for less channel congestion.
- Improved modem demodulator calibration facilities.

- Additional error (Health) counters.
- Finally, the locations of the default parameters in the EPROM, and their format, will be documented for those of you who prefer a custom EPROM rather than trusting bbRAM for remote site locations.

Summary of New Commands and Messages

New defaults since 1.1.6

```
CHECK     12
DWAIT     33
FRACK      8
RESPTIME   0
SCREENLN   0
TXDELAY   33
```

New commands since 1.1.6
```
ACKPRIOR  ON
ACKTIME   14
CHECKV1   OFF
DEADTIME  33
FIRMRNR   OFF
MNONAX25  OFF
RXCAL     (immediate command)
SLOTS      3
STATUS    (immediate command)
TXDELAYC   2
```

New Health counters since 1.1.6
```
ASYFRERR
ASYQOVER
RCVDRNR
RXABORT
RXLENERR
RXRESYNC
SENTRNR
```

Other changes

A "diddling" TXDELAY/TXDELAYC interval replaces the familiar "flagging" keyup time. Zeroes are sent for TXDELAY, followed by the number of flags specified in TXDELAYC.

RS-232 characters with framing errors are ignored.

DAYTIME should be much more accurate.

Protocol handling fixes, and many smaller fixes too numerous to detail.◆

Bits in the Basement

by Bdale Garbee, N3EUA

Hi! Welcome to edition four of "Bits in the Basement". I'd like to start this time by thanking everyone who took time, and responded to my plea for feedback on the column. A couple of things interested me about the responses I received. First, almost half were from outside the USA, which implies that PSR really gets around. Second, several folks provided really helpful, constructive criticism, and suggested things they would like to read about. Thanks!

Neat Stuff In Progress

A couple of months ago, since the last issue of PSR, and not long before the annual meeting in Tucson, I spent a few days cataloging the projects that I am working on, and the ones that people have assumed I was working on. It became clear to me that despite the fact that many of the things in the queue were things I really wanted to work on and see succeed, I was thrashing enough that progress wasn't being made on anything. This happened partly because I have less "free time" than I once had to devote to the hobby, and partly because of some recent time-consuming mishaps in my family. We're doing fine now, but it was clear to me that I really needed to off-load some of the responsibilities that I had assumed, so that I could focus on what was/is most important to me, and what I felt I could make the greatest contribution doing.

What I decided to do was dump everything except working on standalone packet switch code, maintaining my personal packet hardware and software development system integrity, and continuing to write material for PSR. That leaves a long list of things that I am *not* working on now. Notably, for this forum, I am *not* working on things like: getting NOS ready for a "public release," doing any kind of documentation for NOS, or working on 10 Ghz hardware. As I said in my note to the TCP-group, if there's something you thought I was working on that's important to you, now would be a good time to hop up and work on it yourself.

I've actually spent about half of my "free time" the last couple of months working on a project that is only indirectly related to packet radio. Fred Schneider, K0YUM, and I have been building PC532 systems, which are single board computers based on the National Semiconductor 32532 processor chip. The board was designed by a couple of ex-National types, and is a *really* clean design. Fred and I are both interested in dinking around with hardware for this thing, and he is hoping this will result in a neat Unix or Unix-like system for him to have at home. I've already got more than enough Unix hardware in the basement, but it's been therapeutic working on digital hardware for a change, and since the boards talk SCSI to all peripherals, this may lead us to put together some neat packet-related hardware that talks SCSI, which might be a "good thing."

If you're interested in the PC532, there's a mailing list run by Dave Rand, one of the designers. Mail him at dlr@daver.bungi.com, and ask to be added to the pc532 mailing list.

The remainder of my "free time" (that's such a weird concept - "free time" - wonder what it means?) has been devoted to working on software for the standalone packet switch hardware family that includes the PS-186, the Kantronics Data Engine, and the DRSI AIO card, all of which are based on Intel/NEC processors. I have a PS-186 and a Kantronics Data Engine in hand, and progress is being made. I don't want to say too much more about this now, except to note that the goal is to end up with ROM sets for each of the mentioned pieces of hardware that consist of "NOS in a Box", tailored for standalone packet switch use, with the ability for AX.25 users to connect to the switch and get access to at least Telnet functionality over an IP-based network.

I've been communicating regularly with our newest TAPR Director, Don Lemley, N4PCR, who demonstrated a working 68302-based packet switch design at the annual meeting. We're trying to make sure that our code at least has a similar "look and feel," and plays together well. This will result in a wide range of hardware performance and flexibility, all supporting similar

functionality for switch sites. Look for us in the packet forum at Dayton on Friday afternoon, we're hoping to have some neat stuff working to show. I am going to be in or near the TAPR booth most of the weekend (except, of course, when I'm out going broke in the flea).

TAPR 1990

I'm hoping someone else who was present will generate some sort of report on what happened at the annual meeting this year in Tucson. There are a few things I'd like to mention, though, particularly the things I heard or talked about "in the halls" that were interesting.

There were some new toys to see, including the Kantronics Data Engine, which I've talked about here before. It's a V40 CPU lashed up to an 85C30 dual-port packet chip with some RAM and ROM glued on, plus clock and watchdog circuitry. This gives a pair of packet ports, and a serial port on the V40 that can be a console for a standalone switch application, or a link to a PC or other computer when using the board as a high-performance TNC. I have an early cut of this product in the Bit Basement, and hope soon to have a more recent revision, and one of the 1200-baud modem daughter cards to play with.

Kantronics also brought along their DVR 2-2 radios to show. I picked one up to replace an ailing IC-22 on 145.01 in my shack, and though I haven't had time to run any quantitative tests on the unit yet, it is working very well in the Bit Basement. I will note that the receiver seems to lack selectivity, and would warn folks that you may not be very impressed with operation of the unit in RF-noisy environments. I'm way up in the woods, and even so, I hear some really interesting things in the speaker I plugged in to the audio out jack at N7CL's suggestion. I've read concerns about the output power being "only 2 watts," but I think it's great. I always cringe when I see mobile rigs driving rubber ducks right next to computer gear. With an outside antenna (I'm using a coat-hanger groundplane built on an SO-239 connector!), the performance is more than acceptable, and equivalent on TX to what I got from the IC-22. I will try to find time to run some tests on the

receiver, and comment next time. It's also worth noting that Phil Anderson (Mr. Kantronics) spent a few minutes pointing out to me some minor changes that are desirable if you're going to use these radios at faster than 1200 baud. Make sure to talk to the Kantronics support folks over the phone before you get too frustrated trying to set up K9NG or similar modems, they can probably save you some grief. Why this information isn't called out in the manual, I don't know. Maybe in a future printing?

Andy Demartini from DRSI had two new PC plug-in cards to show. One was a first-cut of the K3MC "Awesome I/O Card", now being referred to as the AIO. We laughed a lot about the money Andy could make selling replacement "tower cases" for PC's to go with this version of the card, which was in excess of twice the height of a normal full-length AT card. The size will, of course, be much more reasonable when the product starts shipping to customers; it was decided to do a *large* double-sided pc board instead of multi-layer technology for the first cut, so that changes could be made without excessive pain. This strategy is likely to pay off, as progress is good enough on the design testing and tweaking that there *may* be boards for sale at Dayton.

Andy also had a prototype of the DSP card that DRSI is working on, based on an 8530 and a Motorola 56001 DSP chip. The hardware, like the coming AEA 56001-based standalone DSP product, was designed by N4HY and friends, which leads me to believe that this will be a really neat product for experimenting with packet modems, etc. Andy is also currently experimenting with V.29 9600 baud fax modems similar to the PRUG design that I reported on in the last issue. If you're interested in, or working on this technology, I strongly suggest you give Andy a call at DRSI's advertised phone number, and chat with him about what you're doing.

Probably the most interesting new toy to me from PacComm is their PSK modem, which will be sold assembled and tested, and should be shipping by the time you read this. I think we all hope this will increase the number of folks who are interested in and able to

work the MicroSats, and it should fill the niche for an assembled and tested modem, and nicely complement the TAPR kit.

Outside of the manufacturer presentations, the most interesting tidbit I heard was an update on the 56kb full-duplex repeater that the Ottawa crowd has up and running. Doug Youill and Marcus Leech travelled to the meeting from Canada, and WD0FHG and I had a long chat with them about 56kb and 10Ghz hardware "by the pool" after the meeting wound down on Sunday. I'm impressed with their work, because this is the first time I've heard of a 56kb repeater in operation. They were handing out some material by VE3JF, showing how to build a bit-regeneration circuit for the WA4DSY modem design, and a group of us here in Colorado are considering duplicating their efforts.

Sunday morning, I led a loosely organized group presentation with audience participation on the technologies available, and being investigated, for the next big jump in packet performance. Those of you who were in Colorado Springs for the 8th ARRL Computer Networking Conference will recall that I spent a bunch of time on Sunday facilitating a discussion about what we might want to do next, and what the social and economic roadblocks would be to running much faster data rates on packet. This time around, we showcased efforts underway in northern California to build point-to-point packet user hardware at 900 Mhz and 1.2 Ghz, which when combined with 10Ghz inter-switch links, fast packet switches, the AIO card for users, and some experimental replacements for AX.25 and CSMA operation at the protocol level, may give the NORCAL group a 250 kbps or faster packet environment *this summer*.

N6GN is spearheading the RF work at 900 Mhz, and reports that he has a radio up and running. The next trick is to replicate the design a dozen or more times to get the initial round of user radios ready to go. Lots of other folks are involved in this effort, and it's likely that next time, or the time after, I'll devote most of a column to talking about their progress.

My thanks to Don Lemley, N4PCR, Mike Chepponis, K3MC, and Phil Karn, KA9Q for helping provide pieces of the presentation, and to everyone present for an amazingly high level of energy for early on Sunday morning (!).

Finally, we were all quite excited at the annual meeting by the attendance of three of our Japanese friends, two of whom travelled from Tokyo for the meeting, and one of whom is currently a graduate student at the University of California, San Diego. In particular, Tadayuki Tominaga, one of the editors of CQ Ham Radio, was present with camera and lots of film. If you don't know about CQ Ham Radio, it's the largest Japanese amateur magazine, sort of a cross between QST and Computer Shopper! It's huge, and monthly, and almost enough to make me want to learn how to read Kanji! This was a first for TAPR, and several of us spent a considerable amount of time talking about TAPR and packet radio in the US. A problem in communications before the meeting made this a surprise visit for us, but a very pleasant surprise indeed! One of the things they brought along was a V.29 modem unit built by a commercial TNC manufacturer in Japan that is loosely based on the PRUG design I spoke about last time... by next time, I hope to have more to say about that, too. As I have pointed out in this space before, our friends in Japan are doing some really neat things, and it would be great if we can keep a routine flow of information going both ways about projects in progress!

Terakoya

In the last issue, in my report on our trip to Japan, I spent a lot of time talking about the hardware PRUG is using and developing. This time around I'd like to wax poetic about the software that has come out of Japan recently for use with the KA9Q TCP/IP package. The software is called Terakoya. If you've had any exposure to USENET and USENET news, the best way I can describe the Terakoya system is to explain that it's an implementation of a news reader, writer, and transport utilities designed to work in conjunction with the KA9Q TCP/IP package. If that doesn't mean anything to you, imagine a large publicly readable bul-

letin board system, with messages separated by categories of interest. All postings are public, there is no concept of a private message.

Terakoya brings fun back to packet radio! The TCP/IP system overcomes the stress-inducing frustration of trying to read bulletins and discussions over the air, by having the traffic delivered direct to your machine in the background when you're not around. The Soroban piece of Terakoya processes incoming traffic to insert articles received into a database on your hard disk, and picks up messages you have posted locally and prepares them for delivery to your "Terakoya neighbors." Two utilities called KAKI and YOMIP allow you to write and read material in your database, and they interact in such a way that it's easy to reply to an existing message.

In the wired-network world, USENET news is an amazing phenomena, bringing together diverse people who discuss everything from gay rights, to bugs in crusty old versions of Unix, to baseball, to, of all things, ham radio! In Japan, there are amateur-radio-only newsgroups discussing software bugs and fixes, good new restaurants in Tokyo, books, and a host of other topics. It was neat to see packet radio being used to discuss topics other than packet radio! And as an application, Terakoya has helped to attract a large contigent of younger hams into packet in Japan... the group involved in the restaurant discussion even gets together for dinner every so often, at one of the restaurants they've discussed.

If you're interested in giving Terakoya a try, I'd suggest that you, or someone near you, be familiar with the USENET news system, and how it works. The software as it exists now is quite functional (I've been feeding KOYUM and several folks "downstream" of him, several groups over packet for some time now with minimal hassles), but poorly documented. Dai, JK1LOT, and his friends have done a neat job with the software; and Kenji, JJ1BDX, has cleaned up the documents some for me, and answered lots of questions, but it still isn't ready for mass consumption. The software is available from the machine col.hp.com [15.255.240.16] on the

Internet, in the ka9q/jk1lot subdirectory. After Dayton, I'll try to find time to clean up the documentation and get a master floppy to TAPR for distribution, unless someone else beats me to it.

Until next time... feedback is always appreciated, and I'm reachable as bdale@col.hp.com on the Internet, or as N3EUA @ KA0WIE on packet. ✦

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packetRADIO Update

by Deep Inductor

This project has taken longer than we thought. On the other hand, it's better to do a good job and take longer than to rush it and regret it!

By the time you read this PSR, those of you on the Beta list should have received a letter in the mail from the TAPR Office explaining in greater detail what is presented below.

NOTE: IF YOU THINK YOUR NAME IS ON THE BETA LIST AND YOU HAVEN'T RECEIVED THE LETTER, OR IF AFTER READING THIS ARTICLE YOU THINK YOU MIGHT WANT TO PARTICIPATE, PLEASE WRITE THE OFFICE AND LET US KNOW!

The packetRADIO consists of six (6) PC boards. As of this writing, all of the boards have been laid out for the initial ALPHA level radios.

Board 1 - Local Oscillator

This is a four-channel crystal controlled oscillator and multiplier. It is on a separate board so that a synthesizer can easily be substituted. This board has been built and is functional. It includes provisions for ovens on the crystals for remote-site operation.

Board 2 - Exciter

This board contains the 15 Mhz oscillator/multiplier (FM'ed for transmit), a balanced mixer to accept L.O. energy and mix it with the 45 MHz signal from the multiplier, and an amplifier to generate the drive needed for the P.A. stage. The Exciter board has been fabricated and as of late March it is undergoing initial construction and testing.

Board 3 - P.A.

This is the 25-watt nominal output 2-meter power amplifier. The board

layout is done and the bare PC boards are due March 30th.

Board 4 - Receiver

This is the most complex board of the system. It has been laid out and a first article constructed. A couple of circuit areas are still being tweaked. This is a dual conversion (45 MHz and 10.7 MHz IF) receiver designed for reliable use in a high-RF area (like a mountaintop repeater installation). It has a helical resonator front-end, distributed phase-linear filters, AFC and the 9600 bps slicer (first section of the demodulator) and the 1200 bps demodulator.

Board 5 - Digital/Modulator

This board has been laid out and constructed. It provides the signals to modulate the exciter for both 1200 bps and 9600 bps operation. It also contains the control circuitry, front panel controls, modem disconnect for use with an external TNC, and 9600 bps demodulator/clock recovery after the "slicer" in the receiver.

Board 6 - Internal TNC

This is a slightly enhanced TNC-2 design on a 4-layer board (for minimum noise). This board has been laid out, constructed and tested.

At Dayton, you will either see the constructed radios with the "hoods open" or else the board set in whatever stage it happens to be when we leave for Dayton.

Please be patient, this radio will be worth the wait! ✦

Dayton HamVention

Once again TAPR will have a booth at Dayton (542 & 543). Come by and see some of the projects that folks have been working on. You will also be able to purchase software, kits, and of course memberships. If nothing else, stop by and say Hi.

As in years past, the Packet Forum will be Friday afternoon. This is your chance to hear the movers and shakers. Also keep Saturday evening free for the annual Packet dinner at McNasties (stop by the booth for directions).

See ya there! ✦

DSP Project Update

by Lyle Johnson, WA7GXD

The TAPR/AMSAT Joint DSP Project is moving forward very rapidly after a long hiatus due to commitments by the team members to the MicroSat project.

If you recall, the original design was to be a stand-alone unit with provision for dual TMS320C15 processors. That was in 1988.

It is now 1990 and we have taken a fresh look at the system. As a result, the DSP-1 has changed dramatically.

The system now being designed (and we hope to have boards at Dayton - if we don't, we'll have plots of the board artwork or of the schematics) will plug into an expansion slot of an IBM PC or AT or compatible. This is in conformance with the so-called ISA bus. In a nutshell, the "DSP-1 PC" will:

a) fit in an 8-bit or 16-bit ISA slot. If in a 16-bit slot, it will configure itself to do 16-bit transfers to/from the host PC.

b) use a TMS320C25 processor. This is a second generation processor that is significantly more powerful than the earlier TMS320 parts. It is source-code compatible for software, so the work done so far on the project will easily migrate to the new platform.

c) have 6k-words of memory as default, with expansion to 128k words. This is an area where the 'C25 shines over the earlier parts that could only access 4k words total.

d) run at a clock speed of 32 MHz. This is 8 MIPs. Other versions of the 'C25 are available to go up to 50 MHz (12.5 MIPs). The board layout will attempt to accommodate the faster parts.

e) include a phase-adjustable sample clock for the analog I/O section. This is a significant enhancement and not available on any other DSP board that we know of.

f) utilize an 8-bit analog I/O section. This provides up to about 44 dB of dynamic range. This is enough for

radio-based modems. Provision for more bits in the I/O section will be available via an expansion connector.

g) include an 8530-based serial I/O section for packet and other digital modes. This DSP platform is designed for communications, and the communications hardware will be included!

h) map into a 16-bit section of the PC I/O space. There will be no memory-mapped section to conflict with VGA or EMS or Ethernet cards!

i) utilize a single-wait-state method of allowing the PC to access the DSP memory and auto-increment or auto-decrement a memory pointer.

j) include a 16-bit handshaking I/O port between the DSP and the PC.

Sounds like a lot, but the schematics are over 95% percent complete as this is being written. The schematics should result in a board layout commencing the first week of April.

Naturally, everyone wants to know the price, but that won't be known until the first units are working. The intent is to provide this to the Amateur community at a price that will make you shake your head in disbelief. We want this technology to enter the Amateur world at a level which anyone can afford, not keep it in the domain of the wealthy technocrats!

Watch this space - or twist our arm at Dayton! ✦

TCP/IP for Atari ST

Mike Curtis, WD6EHR, has PE1CHL's implementation of the KA9Q NET (TCP/IP) software available for the Atari ST computer. To obtain a copy, send two double-sided or three single-sided disks with a self-addressed stamped disk mailer to:

Mike Curtis WD6EHR
7921 Wilkinson Ave
North Hollywood, CA 91605-2210

Notes From the TAPR Office

by Heather Johnson, N7DZU

First, I want to thank all of you for making this such an enjoyable job. You're great!

The only time that I get perturbed (other than with myself) is when I get calls from good folk DEMANDING attention from someone other than myself here at TAPR. Not everyone seems aware that TAPR still is a completely VOLUNTEER outfit! I am the only person on TAPR's payroll. The engineers who design, test, create, fix, etc., do it entirely on a freewill basis... Of course, they reap experience and exposure, but also exhaustion!

There is a way to help them, and you both.

If you have some technical problem with something that you have purchased from TAPR, your gripe may be perfectly legitimate! There have been some bugs sent out from here, and if you never mentioned them, they would still be there!

When building a TAPR kit, keep a notepad by you and jot down any problems you experience, any wording or description of a step that you do not think is clear, and any fix that you have come up with. Please send us a copy of these and they will be appreciated when we go to update documentation, etc.

If your unit still doesn't want to function after you've gone over your solder joints carefully, and called the neighbor Ham and consulted with him as to what may be the problem, THEN jot a note to us. Detail what measures you have taken to solve the problem, and please include info. on what gear you are interfacing with, etc. Whatever you do, don't give up, or attic the kit! If you call me, expect me to refer you to the aforementioned procedure as our volunteers prefer your notes to my usually insufficient, sketchy telephone notes.

Messages from others:
"Looking for PK80's. Contact WA3AAD @ K3MTK."

"I am anxious to get on Packet and need software that is compatible with the Apple III." Channel any help for this fellow through the office. Thanks.

Improvements made to the office:
1. The office phone number has changed! Last year, the office location physically moved, but we retained the old phone number to reduce confusion, as it had only been in place a short time. The calls are being forwarded by the phone company (for 11 cents a call!). To save this expense, we have decided at this time to use the new number "officially." It is (602) 749-9479. The old number will still be forwarded temporarily, but please use this new number from now on.

2. We have a copy machine with all of the advantages that having one brings.

3. A FAX has been added. It is attached to our phone line, so simply push the send button when you get through to us, don't wait for the message on the answer machine to finish.

4. Office hours have been extended from 30 to 40 hours a week, to enable me to process orders more expeditiously. However, the telephone hours remain the same: Tuesday through Friday, 10 A.M. to 3 P.M. The answering machine is left on at all other times so that you can leave an order at your convenience.

5. Many of you complained that you couldn't locate a cabinet for your PSK kit. To solve this we now have available a cabinet for $5. If ordering only the cabinet please add $2 for s&h.

6. We will be at Dayton with plenty of kits.

Looking forward to seeing you at Dayton, or hearing from you by mail or phone!

73s,

Heather, N7DZU

Office Summer Hours

The TAPR Office will be closed from July 17th through August 3rd, 1990.

Heather is going to join me and our four oldest sons in Europe during this three-week period for a well-deserved vacation.

So, if you want to order something or renew your membership or wish to contact the office for any reason during this time, please write rather than call, and please allow six to eight weeks for a reply. This will give us a chance to catch up on the backlog.

Remember,
THE TAPR OFFICE WILL BE CLOSED JULY 17, 1990 THROUGH AUGUST 3, 1990.

TAPR FAX

The TAPR office now has a FAX machine tied to the incoming voice line. Since this line is multiplexed with the answering machine and the voice handset, you need to tell your FAX machine to start the sending sequence after you dial and hear the phone answer at the TAPR office. You don't need to wait until the recording is finished.

The TAPR FAX is a Group 2 and Group 3 compatible machine.

If you have a FAX machine and wish to send an inquiry or an order, just follow these simple steps:

1) Dial (602) 749-9479.

2) Listen to the line.

3) As soon as the phone stops ringing, press the SEND button on your FAX.

4) The TAPR FAX will immediately respond to your FAX tones and accept your FAX.

Motorola MITREK Modifications and Interfacing to the K9NG Modem

By Mark S. Schroeder, WB7QGN and Joe Oliver, WB7BNI

For the past couple of years the Maricopa County Repeater Group has had a lot of luck using the K9NG modem with the Motorola MITREK radio. I am providing modification instructions for interfacing these two items using the VHF Low Band radio as a model. This can easily be converted to be used on all other MITREK

radios. The MITREK was chosen because of its size, low power consumption, availability, reliability, and speed.

Since the first systems, we have modified 40+ radios for a variety of systems and applications. This mod is so reliable that I have never had any radio that I ever modified not work the first time I turned it on.

As is all things, there is a possibility that I have left out some information, or put down the wrong pin numbers. So please contact me if you are having any problems with this modification. Preferably by mail or by getting information put on the W1FJI mailbox in the Phoenix area.

Mark S. Schroeder
1113 N. Gibson
Gilbert, AZ 85234
602-926-3650

The systems currently in place that we have a part in, are three VHF packet repeaters (two regenerative) and various 145.01 digipeaters all tied together or accessed by NET/ROM nodes and tied on a high speed backbone.

We are in the process of removing a 50 MHz node in a residential area to replace it with a UHF node.

Modification #1: Upgrade TNC to 32K memory if it isn't already.

Modification #2 K9NG Modem

1. Cut runs between pins 7 & 8 and 9 & 10 on J2.

2. Add 1 uF tantalum cap across emitter and collector of Q6 (+ on emitter).

Modification #3 Interconnect to Motorola MITREK

1. Hole drilled into right side of radio. This hole will allow the 5 wire cable to be run into the radio and connect to the main circuit board. Best location for this hole is between the interconnect board and the front of the case. Run the cable through the hole and down into the bottom of the main circuit board.

2. Five wire (or six) cable put in and soldered to the following locations on the radio:

Modem	Radio
pin 1	to a location between R1006 and Q1008 (9.1v PTT)
pin 2	to pin 11 and 12 of P10 (interconnect board plug) (GND)
pin 3	to pin 4 of F1 (channel element) (MOD)
pin 4	to pin 17 of P10 (interconnect board plug) (+12 Vdc)
pin 5	no connection on radio
pin 6	to a location between R453 and pin 1 of U403 (DISC)

3. Cut the run between F1 and F2 MOD. This isolates the microphone circuit from the channel element.

4. JU3 - C. This is located on the interconnect board.

Adjustment

Only transmit deviation levels need to be set.

Go to calibrate mode in software (1.1.7) and set deviation to +/- 3 kHz. NO MORE.

Receive levels cannot be adjusted...and do not have to be.

Notes on the use of this modem and system

We have found after a couple of years of testing that these work at 9600 bps pretty reliably for short distances (less than 100 miles). The packets seem to work 11 out of 12 times for distances greater than 100 miles. By kicking the data rate down from 9600 to 4800 you get 99 out of 100 or so for 100+ mile distances. Again, this is assuming that you have a radio site and a good path to start with.

We have installed these on both 50 MHz and UHF. The 50 MHz units work very well, when kept out of residential areas. UHF units are recommended for this application. The 50 MHz units are susceptible to interference so they are best when put on mountain tops or high towers.

Cable to replace accessory package for the MITREK

With the 9600 bps radio, if you would like to save even more power consumption and space, you can build up a cable to eliminate the accessories for the radio.

Order the following parts from Motorola:

1) 09-80169C01   female connector
1) 15-82075D04   connector housing
1) 15-80275D05   connector housing
1) 01-80701T52   knob
1) 02-7019   50 pack nut
1) 03-135198   screw
1) 04-11722   washer for knob

On the female connector, connect the following wires:

pin 17	heavy duty ground wire
pin 6	22-24 AWG wire shorted to pin 17
pin 7	22-24 AWG wire shorted to pin 17
pin 19	A + heavy duty (fused) wire to +12 VDC
pin 4	Switched A+ (fused) wire to +12 VDC

Basically, you have three wires coming out of the connector, two for +12 VDC and one for ground.✦

TAPR and the Amateur Marketplace

by Lyle Johnson, WA7GXD

If you read the DSP Project Update elsewhere in this issue, you may get the idea that TAPR will be making and selling kits like we did in the heyday of the TNC-1 and TNC-2.

If you got that idea, you're probably right.

With all the problems of kitting, support and so forth, why should TAPR jump in the marketplace again?

There are a few reasons.

The first has to do with what I'll call social responsibility and the second with revenue. Lest I seem like I'm dodging an issue, the second is closely tied to the first.

In 1985, TAPR sold out its stock of TNC-1's in deference to Heathkit's entry into the marketplace with a TNC-1 clone (licensed for a total sum of

$500). We just felt we couldn't compete.

At the same time, we launched the TNC-2 as a low cost, full-featured TNC. We licensed it for $5,000 plus a stepped royalty of $5, dropping to $3 per unit produced. The royalty stream had a two-year timer, after which it dropped to zero.

During 1986 through 1988, TAPR survived primarily on the license fees and royalties generated by the TNC-2. During this time we designed and built a small number of NNC's (Network Node Controllers). We collaborated with our friends in JAMSAT and produced the PSK modem. TNC-2 support continued through the efforts of Howie Goldstein, N2WX, who has tirelessly updated and refined the TNC-2 firmware. We started on a joint project with AMSAT to produce a DSP-based modem for amateur digital communications (including satellite applications). And, a number of TAPR volunteers switched hats and worked very hard on the MicroSat project.

In late 1988 and early 1989, TAPR introduced a number of small kits to enhance existing products. The DCD State Machine and XR2211 Upgrades, based on design work by Eric Gustafson, N7CL, along with the PK-232 modem disconnect kit, have pretty much kept TAPR going during the past year.

We have also seen a couple of other trends.

The first is that Heathkit, long time pioneer and producer of Amateur kits, is turning away from kits and becoming an importer of wired and tested Amateur gear with the Heath label. If you want to build even a small part of your station with your own two hands, it is getting harder and harder to do. In a small way, TAPR kits help keep alive this facet of our hobby.

The other trend we notice is that the various packet manufacturers seem content to sell their goods in the Amateur marketplace but appear to be unwilling to re-invest in it. Let me illustrate with a comparison.

When a logging company comes in and cuts down trees, it should plant seedlings so there will still be a forest, and, in the future, more logs to harvest. Logging companies seemed to conveniently overlook this, so the government passed a law and now they have to replant the areas they log.

When TAPR entered the packet arena, there wasn't much available. So, we pioneered with the Beta board, and followed it with the TNC-1. After demonstrating that the market existed, we licensed the TNC-1 for a song ($500) to encourage traditional manufacturers to enter the fray by reducing their cost to participate to nearly zero. This attracted AEA, Heathkit, and Kantronics.

We developed the TNC-2 and licensed it for peanuts ($5,000 for a development effort worth many times that amount) and "taxed" the commercial vendors through a short-term royalty. This brought in AIWA, MFJ, Pac-Comm, TASCO and others.

We were then able to exit the marketplace and keep doing development effort in areas to benefit the Amateur community as a whole, which includes the commercial interests which manufacture the products we consume.

When AMSAT decided to develop the MicroSats, they dumped everything they had in it. TAPR jumped in as well, and we donated over $20,000 to the MicroSat effort as a direct gift. With total assets of just over $100,000, that is a significant chunk of cash for us.

Well, AMSAT is still recovering from the expense of the MicroSats.

Question (this is addressed to any packet manufacturer who cares to respond): How many dollars did commercial vendors in the Amateur marketplace contribute to AMSAT for this yeoman effort? (I am aware of a couple of radios being donated by some major manufacturers for command stations, but I am speaking of cash infusion.)

I don't have numbers, but I suspect the answer is very close to $ZERO.

TAPR is busy developing radios and DSP engines to be licensed to anyone who cares to pay the nominal fees to improve, manufacture, and sell them.

Question: How many (tax-deductible) dollars have the commercial interests in our hobby contributed to TAPR in the past year?

Answer: $ZERO.

Looking around, I see a lot of logging has occurred, but the hills seem mighty barren...✦

TAPR Meeting Notes

The TAPR Annual Meeting was held in Tucson at the Best Western Inn at the Airport on Saturday and Sunday, February 24 and 25, 1990. There were approximately 100 people in attendance, including representatives from Canada and Japan.

The meeting opened with welcoming remarks by the outgoing president, Andy Freeborn, N0CCZ.

Doug Loughmiller, KO5I, of AMSAT, presented a description of the MicroSat project, complete with many slides showing the satellites and the launch headquarters in Kourou, French Guiana.

Lyle Johnson, WA7GXD, described the 1.1.7 revision to the TAPR TNC-2 firmware and Pri-ACK, what it does and why.

Steve Hall, WM6P, described a project for improved HF packet communications, including the use of polarization diversity to reduce fading effects.

Phil Karn, KA9Q, gave us an update on the latest goings-on in the world of TCP/IP.

Bdale Garbee, N3EUA, described some of the high-speed networking he has been working with.

Franklin Antonio, N6NKF, described what he termed his "communications vehicle" which was in the parking lot for viewing during the lunch break which followed. Franklin's car has a commercial satellite terminal which he used to communicate with San Diego during the demonstration.

Also during lunch, there was a video consisting of a short WWII-era film on using direction finding techniques to chase down some very nasty spies (the original fox-hunt?). It

wasn't intended to be humorous at the time it was made, but definitely appears so today!

Fried Heyn, WA6WZO, ARRL Southwestern Division Director, gave an update on ARRL Southwestern Division activities, and Jon Bloom, KE3Z, of the ARRL, presented some "Notes from Newington."

Harry Ridenour, N0CCW, of Texas Packet Radio Society, presented an update on the status of the TexNet packet switching network.

Jay Nugent, WB8TKL, gave a presentation on GL Net, a TexNet installation in the Great Lakes region.

Mark Schroeder, WB7QGN, described some very simple modifications to Motorola MITREK radios for interfacing to a TNC, as used in the Southern California-Arizona packet backbone system.

A presentation on the 56 kbps full duplex repeater in Ottawa, Canada was given by Doug Yuill, VE3OCU.

Peter Eaton, WB9FLW, presented the status of the packetRADIO project.

The TAPR DCD modification kits and other related items were discussed by Lyle Johnson, WA7GXD.

Andy Dimartini, KC2FF of DRSI had prototypes of two new products, the K3MC "Awesome I/O Card", and a DSP card using the Motorola 56001 chip.

Gwyn Reedy, WA1BEL, of Pac-Comm described his latest hardware, which was on display at the meeting. The PSK modem and the HandiPacket portable packet controller got a lot of attention at the PacComm table.

Phil Anderson, W0XI, from Kantronics described the new DVR 2-2 (digital/voice radio) and also the de56 Data Engine, which is based on the NEC V40 processor chip.

Andy Freeborn, N0CCZ, closed the Saturday session with the TAPR Financial Report.

The Sunday session, led by Bdale Garbee, was somewhat less formal and focused on some of the Northern California developments in high-speed packet equipment for the upper UHF and microwave bands.

Overall, the meeting was a great success, and TAPR would like to thank all those who gave presentations.◆

TAPR Software Library

In addition to supplying various kits and firmware, TAPR maintains a library of packet radio-related computer software. Disks are currently available in 5-1/4 in. MS-DOS format for $2.00 each, including mailing (slightly more for foreign orders).

In the future, 3-1/2 in. disks and possibly formats for other computers will be added. The current library listing contains 25 entries, of which four are two-disk packages. Additions to the software library are always welcome, however we do request that they be submitted either by, or with the expressed permission of, the author. TAPR attempts to provide the latest versions of all software; updates are appreciated. TAPR reserves the right to screen any submissions and restrict the library content as necessary. Both freeware and shareware are acceptable.

The following is a brief description of the current listings in the TAPR software library:

1. APLINK - A concurrent AMTOR MBO and packet BBS system by Victor D. Poor, W5SMM. Requires either an AMT-1 or PK-232 for AMTOR operation.

2. BB - A multiconnect packet mailbox program by Roy Engehausen, AA4RE. Requires the use of AEA host mode TNC or G8BPQ switch software for operation.

3. C-BBS - Packet BBS program written in C language (source code included). Originally written by Hank Oredson, W0RLI, current version by K3RLI and AG3F.

4. EZPAC11 - A menu-driven NTS message formatter by Mike Imel. Disk also contains a copy of WA7MBL's YAPP terminal program.

5. MONAX - A program for monitoring a packet radio channel and gathering system statistics. Described in a paper (included on the disk) presented in the 6th ARRL Computer Networking Conference by Harold Price, NK6K and Skip Hansen, WB6YMH.

6. PACKET-SHAREWARE - Packet terminal program for AEA PK87, PK88 and PK232 host mode by Lynn W. Taylor, WB6UUT.

7. PBBS lists - Master PBBS list compiled by W9ZRX.

8. R95 - A conversion utility to permit transmission of binary files by packet radio by Greg Jones, WD5IVD.

9/9a ROSESERVER - A packet radio BBS with telephone modem support by Brian Riley, KA2BQE. Source code is included.

10. ROSE - The ROSE switch by Tom Moulton, W2VY.

11/11a TCP/IP Plug & Play - Executables for the KA9Q's NET TCP/IP package.

12/12a TCP/IP sources - C language source code for the KA9Q NET TCP/IP package.

13. TNC-1 source code - Sources for the TAPR TNC-1 firmware.

14. TNC-2 Software notes - Notes on TNC-2 versions 1.1.0 through 1.1.7 by Howie Stein, N2WX.

15. WA7MBL BBS - Packet BBS system by Jeff Jacobsen, WA7MBL.

16. W0RLI BBS - Packet BBS system by Hank Oredson, W0RLI.

17. YAPP - A packet terminal program by Jeff Jacobsen, WA7MBL. Supports split-screen operation, ASCII and binary file transfer.

18/18a INTRO TO TCP/IP - Much descriptive and reference information on TCP/IP.

19. LAN-LINK - Packet terminal program by Joe Kasser, G3ZCZ. Also supports the non-packet modes of PK-232, KAM and MFJ-1278.

20. ARES/Data - A packet radio data base system for emergencies by Weo Moerner, WN6I and Dave Palmer, N6KL.

21. MSYS - A multiconnect BBS with telephone modem, terminal, node and TCP/IP support by Mike Pechura, WA8BXN. Requires KISS mode.

22. G8BPQ NODE - A NET/ROM-compatible multiconnect software packet switch by John Wiseman, G8BPQ, which can be run standalone or in conjunction with a BBS package.

23. Compression/archiving utilities - Utilities for archiving and unarchiving .ARC and .ZIP files.

24. THS - A terminal program for TNC's with WA8DED firmware or the DRSI PC*PA by Peter Heinrich, HB9CVV.

25. NTS traffic generator - A software package for generating NTS traffic by Bill Bowman, VE4UB.

26. NM1D DOSgate - A program allowing remote operation of a PC via packet radio by Rich Bono, NM1D.

To order any of the disks, use the order blank found in Packet Status Register. New submissions or updates to the TAPR software library should be sent to the TAPR office.◆

ORDER FORM – Kits – Firmware – Software – Membership
(All prices are payable in U.S. funds and include shipping and handling except foreign air)
Please allow six to eight weeks for your order to be shipped

KITS

		Qty.	Total
PSK Modem	$110.00	___	_____
K9NG 9600 Baud Modem	25.00	___	_____
TNC 2 Tuning Indicator	25.00	___	_____
XR2211 DCD Mod.	11.00	___	_____
State Machine DCD Mod.	17.50	___	_____
State Mach. DCD w/Internal Clock	21.00 For Packet Communicator, KPC2 or ANY other TNC	___	_____
PK232 Modem Disconnect Upgrade	17.50	___	_____
TNC 1 Upgrade to TNC 2	59.00	___	_____
* TNC 1 Upgrade Memory kit	20.00	___	_____

* When purchased w/TNC 1 upgrade. Includes 32k RAM and 1.1.7 w/KISS EPROM

FIRMWARE

			Qty.	Total
	32K RAM w/TNC2 update docs	15.00		
-NEW-	TNC 2 ver 1.1.7 w/kiss (27C256)	12.00 (includes new 1.1.7 Commands booklet)	___	_____
	TNC 2 WA8DED (27C256)	12.00	___	_____
	TNC 1 WA8DED (2x2764)	12.00	___	_____
	TNC 1 KISS (2764)	12.00	___	_____
	TNC 2 KISS (27C256)	12.00	___	_____
-NEW-	1.1.7 Commands booklet	3.00 (The full TNC2 command set for 1.1.7)	___	_____

SOFTWARE - Please circle disk numbers requested (all in 5-1/4" MSDOS format).

Disk #

1.	APLINK - W5SMM - Runs MBO & BBS	14.	TNC-2 Software notes - N2WX - 1.1.0 thru 1.1.7
2.	BB - AA4RE - A multiconnect Mailbox	15.	WA7MBL BBS - WA7MBL - BB system
3.	C-BBS - K3RLI/AG3F - BBS w/sources	16.	W0RLI BBS - W0RLI - BB system
4.	EZPAC11 - M. Imel - NTS formatter	17.	YAPP - WA7MBL - Terminal program
5.	MONAX-NK6K/WB6YMH-Gathering system stats	18/18a	INTRO TO TCP/IP - Much info on TCP/IP (2 DISKS)
6.	Packet S/W - WB6UUT - for PK 87,88,232	19.	LAN-LINK - G3ZCZ - Terminal program
7.	PBBS Lists - W9ZRX - Master PBBS lists	20.	ARES/Data - WN6I,N6KL - Emergency data system
8.	R95 - WD5IVD - Binary conversion utility	21.	MSYS - WA8BXN - BBS System using KISS
9/9a	ROSESERV-KA2BQE-BB and server for ROSE	22.	NODE - G8BPQ - Packet switch/BBS networking pkg.
10.	ROSE Switch - W2VY - The ROSE executibles	23.	COMPRESSION/ARCHIVING Utilities, .zip & .arc
11/11a	TCP/IP Plug & Play - KA9Q - (2 DISKS)	24.	THS-HB9CVV-Term. program for TNCs w/WA8DED firmware
12/12a	TCP/IP Sources - KA9Q - (2 DISKS)	25.	NTS Traffic Generator - VE4UB
13.	TNC-1 Source code - TAPR - TNC-1 Sources	26.	NM1D DOSgate - NM1D - Remotely operate PC via packet radio

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