Packet Status Register

March 1983

Number 4

PSR

Tucson Amateur Packet Radio Corporation

Annual Meeting

The first annual meeting of the Tucson Amateur Packet Radio Corporation was held on February 5, 1983 at the University of Arizona. Den Connors, KD2S, President of TAPR, called the meeting to order and welcomed the group, which included many out-of-state members. Fried Heyn, WA6WZO, Chairman of the Southwest Division of the ARRL, discussed the ARRL and its involvement in digital communications. Tom Clark, W3IWI, President of AMSAT, spoke about Amateur involvement with satellites and the future of packet radio with respect to the satellite service. Pete Laton, WB9FLW, President of SLAPR, spoke about his involvement in ham radio and packet radio. He presented a donation of $100 against Black Thursday from SLAPR.

Den Connors presented an introduction to packet radio and discussed the FCC's commitment to packet radio communication. Chuck Green, N0ADI, gave a discussion of protocols in use and under consideration for Amateur packet radio. Following a short break, Lyle Johnson, WA7GXD, described the history of TAPR and the development of the TAPR Terminal Node Controller. Pete Laton then described the evolution of SLAPR and the St. Louis Beta Test Site.

After lunch, Den Connors discussed several network linking philosophies. Tom Clark described the AMSAT Phase III-B digital frequency allocations. Mike Parker discussed the L-band amplifier project for accessing the Phase III-B satellite. Lyle Johnson talked about the future of TAPR and projected projects, including proposed terrestrial linking experiments. Dan Morrison, KV7B, announced the plans for distribution of the first Beta Test boards following the meeting.

The results of the Board of Directors election were announced. The members of the Board are as follows.

Term expiring 1984 (elected by membership)

    Tom Clark, W3IWI
    John DuBois, W1HDX
    Pete Laton, WB9FLW
    Margaret Morrison, KV7D
    Harold Price, NK6K

Term expiring 1985 (elected by previous board of Directors)

    Mike Brock, WB6HHV
    Dave Henderson, KD4NL
    Dan Morrison, KV7B
    Mike Parker, N17D
    Bill Reed, WD0ETZ

Term expiring 1986

    Mark Baker
    Marc Chamberlin, WA7PXW
    Den Connors, KD2S
    Chuck Green, N0ADI
    Lyle Johnson, WA7GXD

The meeting of the Board of Directors of the Tucson Amateur Packet Radio Corporation was held on February 5, 1983, following the general meeting. John DuBois and Bill Reed were absent. Officers of the corporation were elected as follows.

    President, Lyle Johnson, WA7GXD
    Executive Vice President, Den Connors, KD2S
    Secretary, Heather Johnson, N7D2u
    Treasurer, Chuck Green, N0ADI

The Board discussed various options for providing terminal node controllers beyond those produced for Beta Test. Supplying boards assembled and tested beyond the Test would require the corporation to handle problems associated with implied warranty, as well as type certification under FCC Part 15. The board decided that TAPR should make a kit of parts and boards available upon successful completion of Beta Test in order to further Amateur Packet Radio by getting more TNCs into the hands of Amateurs. Consideration of providing assembled boards was tabled. No decision regarding the improperly plated-through boards was made, since it was not clear to whom those boards belong.

Packet Radio enthusiasts from all over the world attended the Second ARRL Amateur Radio Computer Networking Conference in San Francisco in conjunction with the West Coast Computer Faire. The conference was hosted by AMRAD and the Pacific Packet Radio Society. The Proceedings of this conference contains the text of 16 papers on a variety of topics of interest to packet radio. It will be available from the ARRL for $9.

Starting with the next issue, the Packet Status Register will be edited by Pat Snyder, WA8TTW, with assistance from members of the Minneapolis-St. Paul packet radio group. Contributions to the newsletter may be sent to TAPR or directly to Pat. We very much appreciate the help this group has offered, and we wish them the best of luck.

Margaret Morrison, KV7D

The President's Corner

by Lyle Johnson, WA7GXD

Tucson Amateur Packet Radio Corporation is a dynamic entity, full of surprise and change. One such change is indicated by the new byline for this column. As reported elsewhere in this issue, TAPR has both an expanded Board of Directors, from five to fifteen in number, with seven members from beyond Arizona's borders and a new slate of officers. Due to numerous commitments, Den Connors, KD2S, decided to step down from the helm of the organization and Mark Baker from the office of the Secretary. Although I am not exactly blessed with much extra time myself, the Board asked me to assume the Presidency of TAPR, which honor I accepted. Den will continue to serve us as the Executive Vice President and I have given him explicit charge to help mold a National Field Organization, based on the existing Beta Test structure. Heather Johnson, N7DZU, was elected Secretary and has the overall responsibility to organize the membership services sector. Finally, Chuck Green, N0ADI, has agreed to once again take over the financial affairs, and will be serving us as Treasurer.

Generally, a new President seizes upon the opportunity of his first communication to the general membership to extol the virtues of his predecessor, then outline glowing plans of the new administration's hopes and ambitions. Suffice it to say that Den did an incredible job, and saw TAPR grow from six local hams to a growing group over 250 strong, spread over four continents!

As for the glowing plans, TAPR is a broad-based group with an amazing amount of talent. I see it as Priority One to spread the rewards and burdens of TAPR's role in Amateur packet communications throughout the organization. As we stated at the Annual Meeting last month, we must work together to bring about the next phases of technical evolution if we are to see packet radio become a viable means of Amateur communications.

Many folks have talked about the need for inter-area networking, but not many have pressed ahead to do it. There are many reasons for this, the primary one being that there are very few packet networks anywhere. Therefore, there has been little need for linking between groups. The Beta boards are changing all of this. There are now several TAPR-based packet networks up, and several more coming on line as the TNCs are run through final test, calibration and distribution. Formerly there were perhaps 100 to 200 VADCG TNCs active in a few US and Canadian cities, and soon there will be over 160 TAPR TNCs active in about two dozen additional cities as Beta testing progresses. The need is clear for linking to proceed.

AMRAD is busy with an experimental modem system for HF linking, and we at TAPR plan to participate and assist in whatever ways we can. AMSAT has generously allocated a portion of Phase lll-B's precious bandwidth for digital communication, and TAPR plans to be very active in testing and utilizing this resource. However, these "gateways" are slow, supporting baud rates in the 1200 and under range. As many of you are finding out, 1200 baud can seem mighty slow, especially when one is interested in transfering large amounts of information. It gets worse when many users try to do so on the same frequency. Many of us believe that the best long-term solution in many cases is a high-speed terrestrial linking system, meaning the use of UHF and/or microwave frequencies with data transfer rates of 50,000 to 1 million bits per second.

"Great!", you say. "When will you guys crank that out? I'm willing to help beta test that!" The answer is -- never. You see, TAPR is not a we/they group, TAPR is "us." The Tucson-based core cannot pull this rabbit out of the hat. The TNC would not be real now if it weren't for the active assistance of the groups in St. Louis and Los Angeles. These folks realized that things were getting bogged down, and rather than worry that the TNCs might never get out the door, they stepped forward and pitched in. If each of you will pause and reflect on the fact that a handful of people put in a truly heroic effort over a period spanning 14 months, alienating family, friends and employers so that you could benefit from our common belief that packet radio can be of great value to Amateur Radio, you will have taken the first step toward helping TAPR achieve our goals. TAPR needs your help. Not just the 512 annual dues, but your time and talents as well.

"I'm no hardware guru. I can't write software. I'm no systems designer, nor RF engineer. I can't build a high-speed modem. I'm not a technical writer, and besides I can't...," you object. Perhaps. But can you staple, or fold, or lick, or talk, or... You see, there are many things required to make TAPR tick. Newsletter publication is an area that takes an amazing amount of time. With electronic mail at our disposal, members in nearly any area can assist in writing columns, or letters (I will be very disappointed if we don't get at least one letter from every Beta participant...), or typesetting, or pasteup, or printing, or... You get the idea.

So, even if you aren't a super-technical type, your skills are sorely needed. You may also try checking in on the HF net on Sunday. SLAPR has agreed to conduct this one for us, being located near the center of the country. If you know someone in your area that has skills and is reluctant to step forward, push a little! Volunteer to help him. You may be amazed at what a little "non-technical" moral support can do. If you are technically oriented, please identify yourself. If you are a Beta Coordinator, identify people in your area and report them to Tucson so we can all do a little arm-twisting! Enough said? Let us hear form you. Packet radio can be very exciting and rewarding, or it can flop around and become a curiosity rather than a dominant mode. We can be the SSB of the late 50's, or the FM of the 70's.

It doesn't depend on me. It depends on you.

The Tucson Amateur Packet Radio Corporation is a nonprofit scientific research and development corporation. The corporation is licensed in the State of Arizona for the purpose of designing and developing new systems for packet radio communication in the Amateur Radio Service, and for freely disseminating information acquired during and obtained from such research.

The officers of the Tucson Amateur Packet Radio Corporation are:

Lyle Johnson, WA7GXD	President
Den Connors, KD2S	Executive Vice President
Heather Johnson, N7DZU	Secretary
Chuck Green, N0ADI	Treasurer

Software Update

Standards (sigh)

by Margaret Morrison, KV7D

Although Beta Test is still just starting, and not all the boards are even shipped, there is already a new version of software out. The original plan called for the first software revisions to appear in conjunction with the EPROM burner attachments, but we had a couple reasons for jumping the gun. The primary reason was the incompatibility between different implementations of AX.25 protocol, which is discussed by Harold Price. Almost as pressing a reason was the presence of a number of fairly annoying bugs. The most obnoxious of these is the so-called "monster packet" problem. The monster packets resulted from the fact that the low-level software person took inadequate account of the possibility of the demodulator detecting a carrier momentarily while the radio is keying up. While we were revising things, we took the opportunity to fix several other less urgent problems, and to implement some changes suggested by some of the first beta testers.

Until the prom burners are available, we will reburn proms on request. Send your old proms, preferably in a rigid, nonstatic tube, to TAPR along with sufficient postage for us to send them back. Alternatively, you can send $10 each or $30 per set (plus postage) for new proms and we will send you your new proms burned with the latest software. In either case, we will send a set of notes keyed to the manual describing all changes.

Following is a summary of the major changes incorporated in the latest software, version 2.1.

* The AX.25 protocol corresponds to the description in Appendix B. For compatibility with Version 1 software, a compatible protocol remains for the time being.

* The monster packets are fixed.

* The TNC resets successfully on power-up.

* The timeout for retries of unacknowledged packets now starts after the packet has been transmitted, rather than after the packet has been formulated. This prevents transmission of several copies of one packet after a wait due to busy channel.

* A ROM checksum option has been added to the calibration routine. This was prompted by the fact that there were a few mis-burned proms in the first release.

* The calibration routine and the low-level debugger accept lower-case.

* HDLC baud rates of 400 and 800 have been added. AMSAT has chosen 400 baud as a satellite standard.

* Several diagnostic messages have been added to indicate failure to be commanded of peripheral chips at reset. In case the 6551 serial port fails, LEDs D1 and D2 blink.

Work on the EPROM programmer attachments for the TNCs is progressing. We need to know very soon how many of these will be needed. Get your reservation in now.

by Harold Price, NK6K

As some of you have already found out, version Beta.1 of the TAPR implementation of the protocol agreed on at an October AMSAT meeting does not match the VADCG TNC TIP/LIP 5 version of that same protocol. As it turns out, neither of the two implementations match what was actually agreed on at the October AMSAT meeting. The exact reasons for this are best described late at night in smokey back rooms. For now, the important thing to know is that steps are being taken to correct the situation.

To explain quickly, the Beta.1 version of the TAPR TNC software matches the protocol as defined on Saturday, October 9. The specification in the manual contains updates made on Sunday October 10. The KA6M TIP/LIP 5 software matches the Sunday October 10 version, except that some of the frame types aren't implemented and a different layout of the PID byte is used. The expected future actions are that TAPR will release a new version of the TNC software that matches the October 10 version (as modified by KA6M), the AX.25 "specifiers" will update the specification, and the KA6M software will be upgraded to a full implementation.

While all of the above sounds bad, the overall outcome was very good. Recall that the time from ratification of the protocol to the availability of software for several sets of hardware was only five to six months. In addition to the TAPR and VADCG TNCs, software is in development for homebrew TNCs on both coasts. Two hams in San Diego have a version of AX.25 written in C for an S-100 Z-80 board. This software is compatible with the current TAPR implementation and has been used to communicate with TAPR TNCs in Los Angeles and San Diego.

This type of turnaround for protocols, specifications, hardware, and software is enviable even in industry and was achieved by a volunteer workforce distributed in various groups spread across the country. The next steps will require even more work, and even more cooperation between groups. The next big step, of course, is networking.

The "AX.25" protocol as currently defined covers only level two of the seven layer ISO model. AX.25 level two deals with point to point connections between two nodes that are closely coupled, i.e., no other nodes are in between them. Digipeaters, in the network sense, are passive devices, repeating anything sent their way. They are invisible as far as the network is concerned. The next level is the true network level where multiple node routing comes into play.

Anyone with thoughts on level 3 protocols is invited to send them to TAPR or contact me directly. We also need to hear from the user community, what features are desired, what uses are you/will you put your TNCs too? Put your ideas in the form of a technical proposal, a wish list, or a letter to the PSR editor. TAPR is supposed to disseminate information on packet radio and it doesn't say in the bylaws that we have to make it all up from scratch. TAPR would more than happy to maintain a list of all current packet protocols, packet repeaters, level three access schemes, local area net access procedures, etc. Currently, there isn't anyone assigned to the task of maintaining such information, mainly because there isn't any. Send it in and we'll find a volunteer. Better yet, volunteer yourself. Get involved!

Proposed Hardware Modifications

by Lyle Johnson, WA7GXD

This is a collection of suggestions for updating the TNC for the next go around. Please comment, as this may become the spec for the revised TNC. Thank you!

Serial User Port

Delete JP1 and add four 6.8k-ohm pull-up resistors from U16 (1489) pins 1, 4, 10 and 13 to +12 volts dc. This will enable the serial port to function with a "three-wire" RS-232 implementation without the use of jumpers, while still allowing operation with a "full" RS-232 port.

Add a 0.1-ufd bypass cap from U15 (1488) pin 1 to pin 7 and one from pin 14 to pin 7. This will effect a local bypass of the two supply lines to this part, which suppresses any tendancy of U15 to oscillate.

Make J2 a polarized connector to help prevent possible damage to equipment.

Power Supply

Replace D13-D16 with a 3-A bridge rectifier. The present quad of 1N4001s overheat. A bridge is less labor to install, and doesn't cost much more than the discrete approach. Possibly replace D9-12 with a 1-A bridge. Again, the bridge is simpler to install and takes up less space.

Change C24 and C41 from 0.1-ufd ceramic to 10-ufd electrolytic, 16-volt capacitors. The present capacitors are insufficient to suppress oscillations in the negative regulators. These caps correct this oversight.

Change J4 to a 14-pin polarized connector, with the +5 output from the regulator routed through it. This will allow use of an off-board +5-volt source, such as an externally mounted regulator. Furthermore, the connector will not be confused with the radio interface connector.

Optionally, change U22 to become a 7810 regulator, changing the +12-volt line to a +10-volt line. This will allow use of the original transformers without power-line ripple.

Memory Bank

Install a "JP-12"-style jumper at sockets L7 and U8. This will allow use of 4k and 8k byte memories in these sockets.

Connect U9-12 pin 26 to address line A13. This will allow these sockets to support 16k byte 27128 EPROMS. The sockets will no longer be compatible with 2716 and 2732 style parts.

Install a push-on jumper to detach U6 pin 16 (PB6) from pin 17 (PB7). A third pin on this jumper would attach to U27 pin 1 (or 17), with a 10k pullup on the U27 side. Disconnect switch S2 from U6 pin 3 (PA1) and run PA1 to U27 pin 17 (or 1). These changes will disconnect S2 and allow the U27 socket to support either the present XD2210 256-bit NOVRAM or the XD2212 1024-bit NOVRAM. The x4 increase in NOVRAM is probably more useful than the second switch.

Modem Modifications

Transmitter keying

C8 should be increased from 100 ufd to 330 ufd or more. This will still provide protection for other users, but allow multiple maximum length packets to occur, as well as support lower baud rates for HF and other slow speed work.

The parallel sections of U21 used as a transmitter keyer should be deleted and replaced with a Zener-protected VMOS FET. This will allow higher standoff voltages as well as provide a better approximation of a closed switch for very sensitive rigs (like most ICOMs).

Add an LED monitor to be added to U26 pin 3 to show status of the transmitter activation line.

Modulator

R33 should have a 10k resistor is series with the "top" contact and the + 12-volt bus. This will prevent possible damage to U25, the +12-volt regulator and/or R33 due to misadjustment.

C18 should be a non-polarized capacitor, and R25 should be reduced to a 25k pot.

An FSK mod for the CWID has been tested at WA7GXD. R33 is removed and the XR2206 AM input is then grounded. The CWID signal from U6-pin19 is routed to an input of an exclusive-or gate (74LS86) mounted in the wire-wrap area. The data signal from the HDLC chip, pin 25, is routed to the other input. The output goes to the 2206 (U19-pin 9). The primary problem with this method is that, often as not, the CWID is "upside-down", making copy difficult. If the CPU could determine the state of the HDLC TxD, it could then "invert" the CWID as needed to make it come out "right-side up." (Note: this is an alternate use proposed for the line now used to read switch 2.)

Demodulator

R15 needs to be increased to about 22 k, since the 0.027-ufd cap is not readily available. The 0.022-ufd caps actually used make the adjustment out of range if their true values are on the low side.

Experimentation needs to be conducted to determine whether or not the MF-10 is needed in most installations. If not, the kit-builders should be able to bypass this "option", saving money.

Add an LED monitor for RxD and another for DCD.

Radio Interface

The connector, J4, needs to be polarized. The TTL level HDLC lines should be removed from this connector due to RF susceptibility of the TNC.

The following HDLC signals should be connected to the on-board modem via a series of push-on jumpers that can be replaced with a standard IDC connector for off-board modem applications: HSCOT, TxD, RxD, CD, DSR, DTR, RTS, CTS, RC, TC, WRZI, 32X. This will probably require a 26-pin connector. This will allow maximum flexibility in custom operation of the board.

Other Suggestions

Someone should experiment with the waveshaper (C16, D8) to try to find a more reliable circuit (simple, please) for calibrating the 1700 Hz VCO signal from the XR2211 demodulator.

We need some thorough investigation of the TNC's apparent sensitivity to RF, which parts are the worst offenders? What must be done to bring the tolerance to a more reasonable level?

Feedback

St. Louis

Greetings from St. Louis. Since the release of the TAPR boards, SLAPR has been busy exercising them on 147.555. Of the 21 boards delivered, approximately 15 are on line. Very few problems were encountered bringing the boards up. But alas, rag chewing on packet loses its appeal quickly and some other diversion was needed to keep interest up! Bill, WD0LTZ, had the answer. During the last several months Bill had built up a dedicated computer for packet and had implemented a bulletin board system that could be automatically accessed! We thought it would be sort of fun to share with you some of the messages that have been left on the system the last several weeks as some of the local Beta Testers tell you a little bit about their systems, and general comments about the TAPR TNC. Below are those comments taken directly "off the air."

It is with some sadness that I report that Bill, WD0LTZ, will be leaving the St. Louis area to become a Texan. Bill has been instrumental in St. Louis in getting packet up and running. He will be sadly missed, but there is no doubt his enthusiasm will help get Dallas active on packet. Thanks, Bill, and good luck!

73, Pete W69FLW

The following are messages that have been left on the St. Louis packet bulletin board system.

To: All
From: WD0LTZ
Subject: Bulletin board system

I have interfaced my TNC with a Digital Research "Big Board" single board computer, and a single 8" drive. I am using CP/M and the bulletin board program from the CP/M Users Group. I had to make a few minor changes to the program to interface with the TNC. The program automatically logs the user's callsign to disk and then operates much like an ordinary CBBS. I am operating the TNC in transparent mode with ECHO OFF. My radios are an Icom 22S and an Icom 290A. Both radios needed the TNC VFLT mod on the PTT line. de Bill, WD0LTZ

To: All
From: KR9H
Subject: Kenwood TR-7400 interface

The impossible TR-7400A is possible to operate on packet... All it needs is a 5 meg ohm potentiometer. You take the audio from the TNC and input it on the center leg of the pot. The audio in (to microphone input) and ground are connected to the other two legs. Have fun. de KR9H, Rusty, in Belleville, Ill.

To: All
From: KD9S
Subject: My system

The rig here is a Heathkit 2036A. The computer is a TRS-80 mod 1, 48K, disk drive, and microline printer. Interface to the Heath was simple and the only thing necessary was the VFLT on the TNC PTT line. TXDELAY had to be set to 16 because the Heath's VCO takes so long to settle down. I have a problem in that the TNC parameters won't stay "PERMed", and about one in three times when I power up everything comes up blank. I have to turn on Switch One and then do a hardware reset. 73, KD9S, Len

To: All
From: N0DVS
Subject: My system

My name is Frank Goeringer, N0DVS. My interface to the TNC consists of: First I interfaced to a Kenwood TR-2400 hand held using a relay for key down and a TXDELAY of 16 because the radio keys up so slowly. My audio line has a small speaker across JP9 on the TNC board to allow me to hear my audio out and place a load on the output of the HT. Next I interfaced a Kenwood TR-7400A. To keep from modifying the radio, I built a small interface box that connects between the radio and the TNC and allows me to switch between microphone input and TNC input by throwing a double pole, double throw switch.

The TNC seems to work quite well but I think that it has a few bugs yet. I find that when in the CONV mode, the TNC sometimes will keyup before the complete CWID has been sent. Also the BEACON command sometimes switches from EVERY to AFTER but it seems to work OK. I would prefer that the monitors have defaults set to ON and ALL instead of OFF. de Frank, N0DVS

To: All
From: WA0KGU/WD6CZI
Subject: My system

The rig here is a Yaesu FT 227R... Ultra easy to interface, no relay or VFLT needed. #1 computer is a TRS-80 Model I, 48K, 2 disk drives, RS LPIV ST80III smart terminal program. #2 computer is a TRS-80 Color Computer, 32k, 1 disk drive, Videotex terminal program. I have been experimenting with interfacing the TNC with a land line modem. The TNC hardware has been very reliable. I have had mine on continuously for about the last 3 weeks and it still works fine. Tom, WA0KGU

Los Angeles

As far as TAPR is concerned, there are several Harold Prices. One of them does software development for TAPR and is on the TAPR board of directors, looking out for TAPR's interests. The other one is the Beta Site Coordinator for the Los Angeles area and is as demanding and suspicious of schedule slips as the rest of the Beta Coordinators. The Beta Coordinators must look out for their local groups just as much (more!) than they look out for TAPR. This report is written by the second Harold Price.

The trip to the TAPR general meeting in Tucson on February 5th was worth the plane fare if only because I got to hand carry 14 TNCs back with me. This was they only way my group would have let me into town. Imagine my disappointment when only four the TNCs worked the first time tried. To tell the good ending before the bad middle, all of the TNCs now work, and all but two would have worked first time at any QTH but mine.

The cards are definitely stacked against a TNC trying to receive in my apartment. In the first place my AC line voltage must be the lowest in town, second, my antenna is inside, third, I've got a computer that could work Heard Island on all bands without an antenna if I hooked a key to the on/off switch. All of this, combined with problems with the TNC power supply which degrade the onboard modem's "ears" worked to make most of the TNCs deaf when tested in my shack. All of the boards that were marginal performers at my place work well elsewhere and would probably work fine anywhere once the power supply mods are made.

Hardware Happenings

by Lyle Johnson, WA7GXD

Believe it or not, the Beta TNCs have been shipped! If you are one of about 120 TAPRites who have received their TNCs, or if you have been near a recipient, you no doubt believe it. If your site has not yet received its shipment, hang in there. They will come as soon as possible.

In spite of every precaution, the TNCs are truly _test_ devices. Several bugs have already cropped up, and I'm sure many more will appear before it is all over. While specific details will appear through "official" Beta channels, a summary is in order here. First the good news. Most folks have had little trouble bringing up their TNCs and interfacing them to a multitude of radios, terminals, and personal computers.

Now the rest of the news. Not all radios key properly. The 0.7-volt drop across the Darlington driver array (ULN2003/ XR2203) causes some radios to either ignore the transmit command, or light up an "XMIT" light, but refuse to transmit anyway. The fix is either a reed relay (expensive) or a VFET. To use the VFET, connect source to ground, gate to U21 pins 4 & 5, and drain to U21 pins 12 & 13. Voila! your rig should respond, and it has in all cases tried to date. VFETs are cheap, too!

Some TNCs are a bit deaf. While there are various causes, the most prevalent is ripple/noise on the +12-volt buss. This is because yours truly mis-spec'd the transformer. The 5-volt line is fine, and should work to about 105 VAC line voltage, but if the line voltage is below about 125 VAC, the 7812 (and 7912) have insufficient drop to properly regulate. This allows ripple, and the XR2211 hides its head in the sand. The fix? While several suggest themselves, we are sorting out the most easily applied and most effective (meaning cheap).

The TNC is susceptible to RF. This means you may have a problem if you use your hand-held with its rubber-duckey at the end of the radio inter-face cable. This one is easy. Use an outside antenna, and shield your TNC.

Many people have asked when the TNC will be available after Beta Test. This is not an easy question to answer. First, it can be stated rather emphatically that no TNCs will be forth-coming until Beta Test has fulfilled its basic purpose of debugging the hardware and software systems. At that point, a mechanism will be announced whereby the TNCs will be made available, either to members only or to the Amateur community at large. There are a few legal obstacles to overcome here, such as FCC Part 15/97 compliance. Perhaps more to the point, TAPR lacks the manpower to mass produce TNCs. Thus, the TNC will be available in the form of bare boards and/or parts kits. It is hoped that a means will be found whereby completed boards, perhaps in a case, may be supplied to those interested. Any form of distribution implies a commitment of time and money, and right now time is critical, while money... Well, each of you is aware of Black Thursday. TAPR is broke. Help and $$$ are _needed_.

The next question is usually, "So when does Beta Test end"? The answer to that was explicitly determined by the Board of Directors after the Annual Meeting. Quite simply, Beta Test ends when the President of TAPR so declares. As of this writing, it is only beginning. If all goes well, it will only be a matter of several weeks to a very few months before enough testing is done to have accomplished our primary goals.

Stay tuned...

(continued from page 5)

Two of the TNCs were DOA, both problems were found in two minutes with the schematic and a scope. Both were dead chips of the 50 cent variety. Four of the TNCs would not PERM, i.e., store data in the NOVRAM. This was traced to some improperly burned "L" eproms. As no reprogramming facility was available to me, TAPR quickly sent out replacement proms from Tucson. In all cases, response from Dan KV7B and Lyle WA7GXD were quick. Sometimes no immediate solutions but they were in there swinging.

Since my initial troubles, the test cycle in Tuscon has been lengthened and improved. My group was one of the first sites to get boards, sites shipped later on have had almost no trouble.

Because of obvious biases, I'll leave software reports up to someone else. Other than a tendency to send an occasional long garbage packet, the software has performed as expected.

Unlike the St. Louis group, no one is LA has put up an on-the-air bulletin board system yet; we're still looking for a volunteer. Activity in LA is therefore somewhat low currently. We look forward to linking experiments with the San Diego crew, and several packet contacts have been made between stations in LA and SD.

There are several packet frequencies available in LA. 147.675 (WA6JPR) is a repeater output frequency which is used for packets. Voice use of the repeater is light and the repeater is current-ly down for repairs. WA6JPR's TNC is currently up for DIGIPEAT 24 hours a day. This allows testing by connecting to yourself VIA WA6JPR. Use 147.675

as a simplex frequency.

145.360 (WB6YMH) is used as a repeater with the input 600 down. This machine is the home of the 8:00 PM Monday night Packet Radio voice net. When using WB6YMH set AXDELAY to 5 and AXHANG to 4. This is a split site machine with mechanical T/R relays. NK6K's TNC can be found here most evenings.

146.595 is a simplex link frequency between LA and SD and has been coordinated by the 2 meter authority in Southern California, TASMA. It has unfortunately proven to be unusable from many parts of LA due to strong signals from an adjoin-ing repeater frequency.

441.500 is a simplex frequency coordinated by the 440 authority in Southern California, SCRRBA.

Harold Price, NK6K

Chicago

The Chicago Area Beta Test group would like to extend our congratulations to those persons at TAPR Inc. who are responsible for the design and construction of the TAPR Terminal Node Controller. Believe me when I tell you that Chicago has ten very happy hams, all of whom are enthusiastic in extolling the virtues of Packet Radio.

We received our boards from Pete Eaton on February 6th at the Wheaton Radio Club Hamfest. Pete flew in from Tucson to give an hour long

Thanks

Tucson Amateur Packet Radio wishes to extend its thanks and appreciation to the following commercial organizations, without whose cooperation the beta test would have been far more costly, or more difficult, or both.

Components

Manufacturers: AMD, AMI, Intel, Synertek, Western Digital

Distributors: Anthem, Marshall, Shelley, Western Microtech, Wyle

Boards and Assemblies

Assembly: Beta-TEK, K&L Engineering

PC Fabrication: Southwest Circuits

Transformers: Siemens of Illinois

PC Artwork: Interconnections (St. Louis)

Special Thanks

The St. Louis Area Packet Radio Group, and especially its President, Pete Eaton, provided physical and moral support, including getting the transformer and PC layout sources.

Thanks are due to Professor Ted Williams for enabling us to use the University of Arizona Electrical Engineering Department's HP64000 development system. We especially appreciate his putting up with our sometimes heavy demands on this facility, as when the three software developers began living 24 hours a day in his lab!

Modular Mining Systems, a Tucson-based company has been instrumental in TAPR's success. MMS has allowed its facilities to be (ab)used in the design, prototyping, testing, construction, storing and shipping of the TNCs. Further, it has extended to TAPR its purchasing contacts and underwrote TAPR's purchases of components and services for the TNCs. Many hundreds of man-hours were donated to TAPR by MMS, and TAPR wishes to publicly extend its thanks and gratitude to Modular Mining Systems for its continued support of the TNC project.

Has your membership expired?
Check the address label for your
expiration date and

RENEW NOW!

Membership Application

Tucson Amateur Packet Radio Corporation
P.O. Box 22888, Tucson, Arizona 85734

Name: _____

Call
Sign: _____ License Class: _____

Address _____
City &
State _____

Zip (Postal) Code: _____

Home
Phone: _____ Work Phone: _____

Beta Test Status

by Dan Morrison, KV7B

As of the end of March, 141 out of a total of 171 beta TNCs had been shipped. Most of them are actively on the air, and comments from the owners of some of them appear in this newsletter. The boards are being shipped as quickly as they are gotten into working condition by the Tucson twice-weekly work parties. About a third of the TNCs worked the first time they were turned on. The remainder have had a wide variety of problems including wrong parts, incorrectly installed parts, dead ICs, shorts, and bad solder joints. Most of the problems have been simple to fix -- once identified! In general, boards are being shipped one beta site at a time, in the order in which we received money. The exception to this rule is for sites willing to take a shipment including non-working boards.

We are starting to receive reports from test participants describing radio and terminal or computer interfaces. Beta participants have successfully used TAPR TNCs to communicate with Vancouver boards running both Vancouver protocol and AX.25 protocol. Bulletin boards and mailboxes are operating over packet radio in several locations, including St. Louis, Los Angeles, and Tucson.

Below is a summary showing the number of boards shipped to each Beta Site.

Shipped

AMRAD/AMSAT	12
Chicago	10
Colorado Springs	5
Dayton	6
Dearborn	1
Indianapolis	4
Little Rock	5
Los Angeles	14
Minnesota	11
New Jersey	5
Phoenix	4
Racine	3
St. Louis	21
San Diego	13
San Francisco	4
Tampa	5
Tucson	13
Ventura	5

To be shipped

AMRAD/AMSAT	6
Dayton	1
Dearborn	5
Phoenix	7
Treasure Coast	7
Tucson	4

If you wish not to have published in a membership list any of the above items, indicate here which these are:

_____

_____

I hereby apply for membership in T.A.P.R. I enclose $12 dues for one year.

Signature _____

Date: _____

Which Beta Test area (if any) is closest to you?

_____

presentation on Packet Radio to several hundred attentive local area hams, and was kind enough to hand deliver our TNC boards. Needless to say, Pete received a very warm welcome. Those of us who had anxiously been awaiting receipt of our boards could hardly wait to scurry home and begin interfacing them to our computers and radio equipment.

One of our Beta Test sites was so anxious to begin testing that he spent several hour "talking to himself" while waiting for other stations to come on the air. Most sites reported that they had little difficulty in interfacing the boards. The documentation supplied with the boards was excellent, and careful reading provided most of the necessary information.

I can't really say that our initial excitement has subsided any, but we have been operating the TNC boards long enough that we can now tear ourselves away from the keyboard and begin compiling the interconnect information requested by Tucson. Several suggestions have been passed to me regarding possible modifications to future Terminal Node Controllers, but all agree that the boards are well designed.

For example, it would be nice if the PTT lead was coupled in such a way that the transmitter was not keyed in the event that the TNC board is powered down. Also, while the carrier sense feature works well in detecting the presence of modem carrier, it will not detect voice use of the frequency, thereby allowing packets to be sent on top of conversation.

As reported in other areas where packet radio was introduced, we did encounter some initial opposition from other hams who did not particularly wish to have another mode of operation added to those already in use on two meters. Some questioned the legality of what we were doing. The

first evening we were on, we were treated to almost five hours of non-stop RTY test patterns and pictures, this on a frequency selected because frequent monitoring indicated it was seldom in use.

This initial opposition has subsided somewhat, however, and some of our fellow hams on the frequency have even begun to ask questions about packet operation.

Our plans for the near future include the establishment of a bulletin board, providing an interface to the computer of a local junior college, and establishing a link to a weather net presently in operation for RTY enthusiasts.

As I mentioned earlier, everyone here is ecstatic with the TAPR boards, especially with the digipeater capabilities. We are anxiously awaiting the completion of TAPR's L-band amplifier in the hope that we might be allowed to participate in the first satellite packet network. You definitely will have our support in future undertakings.

Dick Gulbrandsen WD9DBJ

The TNC mounting holes should be plated through and tied to dc ground for good connection to the (assumed metal) case.

There have been suggestions that a gate be provided for ANDing the modem DCD with a radios squelch for use with a voice repeater. While there could be problems here (some repeaters have a long hang time when packets could easily be exchanged), perhaps some sort of option to support this capability is needed.

Thank you for your feedback. It is both needed and appreciated.

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