Packet Status Register

July 1982
Number 1

Tucson Amateur Packet Radio Corporation

Welcome to the first issue of the Packet Status Register. This will be the regular publication of the Tucson Amateur Packet Radio Corporation. Projected publication will be every two months, finances permitting. The newsletter is available free to all members of TAPR.

There will be a number of regular columns in the newsletter reporting on various TAPR activities. These columns include "President's Report" by KD2S, "Hardware Happenings" and "TECH/notes" by WA7GXD, "Microwave News" by KT7D, "Software Update" by WA7PXW, AND "Beta Status Report" by KB3UC. Most of these columns will include input from readers. In particular, the "Beta Status Report" will serve as a communications medium for Beta Test participants throughout the continent. In addition, we solicit articles on topics related to TAPR's activities from any source.

We expect to run a series of introductory articles on packet radio. Contributions to this series are now being solicited.

If you have comments, ideas, or contributions for a particular column, please send them to:

<Column name>
c/o Tucson Amateur Packet Radio
P.O. Box 22888
Tucson, AZ 85734

Correspondence of a general nature, and any other contributions to the newsletter should be sent to Editor, Packet Status Register, at the same address. Let us hear from you!

Other Sources of Information

Packet radio has been or will be a featured subject of several other publications. In addition to the regular monthly TAPR column, the June AMRAD Newsletter contained "Protocol Exposed" by Den Connors, KD2S. This summer QEX will carry "Digital Modulation and Coding Schemes" by KD2S, and "Using the XICOR NOVRAM" by Lyle Johnson, WA7GXD. Many Amateurs first read about packet radio in the pages of the October 1981 issue of QST. WA7GXD, KD2S, WA7PXW, and NOADI are working on a series of four articles for anticipated publication in 73 magazine sometime this fall.

TAPR members in Arizona are invited to join our weekly net (F3, not packet) on 147.75/.15 MHz. This repeater is located on Mt. Lemmon north of Tucson and is accessible from most of Southern Arizona. I would like to see an HF net organized to keep us in closer touch with groups outside Arizona. Any time/frequency suggestions?

TAPR has prepared a collection of articles for distribution to members and other interested persons in the form of an information package. The articles currently available are:

Tucson Amateur Packet Radio Activities
Introduction to Packet Radio
Preliminary Hardware Manual, by WA7GXD
4 illustrations for hardware manual
Letter to prospective Beta Test Coordinators

If you need a copy of some of these, let me know. Please note that it will be costing us some money to distribute this material. This means that we'd appreciate it if you could help out with a donation to cover mailing, or pick up your material in person (if you live in the Tucson area). Copies of everything will be available at TAPR monthly meetings, of course.

Margaret Morrison, KC7MA
Editor

TAPR General Meeting

The next general meeting of the Tucson Amateur Packet Radio Corporation will be at 10 AM on July 17, 1982 at the Franciscan Renewal Center, 5802 E. Lincoln Drive, Scottsdale. Talk-in will be on 147.75/.15 and 146.55 MHz. We will have a lot to talk about, so be there!

Important topics of discussion will be Alpha, which is really getting off the ground and should be flying high by mid-July, and Beta, which will be looming imminently ahead of us. We just might be able to prevail on Lyle to give a demonstration of REAL packet radio to attract a good crowd.

This is a good opportunity to get together for some good discussions with fellow "packeteers". The discussions following the last meeting actually contributed to the advancement of packet radio techniques!

President's Report

by Den Connors, KD2S
President, TAPR

Hello from hot and sunny Tucson, and welcome to TAPR's first newsletter! I hope that it will help to provide members and interested hams with the information they need to get them up and working on Amateur packet radio. I think newcomers will find a remarkable collection of experimenters throughout the U.S. and Canada already working on this mode, and will have lots of fun with this newest mode of ham radio.

Although Tucson's packet activities are just part of what's happening in packet radio today, I consider TAPR's role as one of the most important, with a three-fold purpose: to provide inexpensive, reliable packet systems for creating local-area networks and the future continental and intercontinental computer networks; to develop the state-of-the-art technology required for the next generations of packet radio systems; and to create and maintain a thorough and reliable information system for informing and updating the Amateur population on the packet radio happenings throughout the world. Cooperation with other groups currently involved in similar and associated projects will be a major goal.

I hope the articles in this and future issues will be of assistance to readers. There is a membership application included in the newsletter, and I hope non-member readers will find enough interest in packet radio to join the group. This is the most critical phase of packet radio, and interest and participation at this time could accelerate the growth of packet radio from the outset.

I will use this column to keep our members and friends up to date on activities outside of TAPR, and on coordination between TAPR and the other excellent groups, clubs, and corporations already hard at work on packet radio. I hope our readers will be able to share the sense of accomplishment that we feel here in Tucson, and to help us out in future endeavors.

Software Update

By Marc Chamberlin, WA7PXW

While the hardware group has made great strides in getting the TAPR TNC running, the programmers have been no less active. Most of the software for the TNC is being written in FORTH, since a number of members of the software group have expertise in this language, and because FORTH is especially appropriate for real-time control processes.

Dave McClain, N7AIG, has developed a new variety of FORTH called HYPERFORTH, which now runs on an Apple II. Included in his FORTH system is a target compiler, a FORTH program which takes as its source other FORTH programs and produces object code for downloading into TNCs. Concurrently, Marc Chamberlin, WA7PXW, the TAPR software chairman, has been developing the high level applications code for the TNC. This includes software for the terminal interface, the link interface, and the TAPR protocol. This code is being written in one of Dave's earlier versions of FORTH called SUPERFORTH, which runs on a Point 4 computer. Dave and Marc are also finishing a multi-tasking system for the TNC, which allows different programs to execute as independent tasks, being awakened when they are required, and put to rest again when finished.

Lyle Johnson, WA7GXD, has written many of the low level chip drivers and handlers, some of which will be used later on for the actual interface between the software and hardware. Margaret Morrison, KC7MA, is working closely with Lyle in writing some of the interrupt handlers. These routines are written using A combination of HYPERFORTH and the FORTH assembler for the 6502. Margaret is involved in investigations into bit-sliced microprocessor coding with Den, KD2S, for future high-speed modem designs. Den has been working on the transfer of high-level software from the Point 4 to the Apple. Chuck Green, N0ADI, has been working on the TNC protocol design and has done invaluable work on documentation.

(continued on page 7)

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:

Den Connors, KD2S	President
Lyle Johnson, WA7GXD	Vice-President
Mark Baker	Secretary

The members of the Board of Directors are:

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

The Packet Status Register is the official publication of the Tucson Amateur Packet Radio Corporation.

Hardware Happenings

by Lyle Johnson, WA7GXD

The Hardware Happenings column will be a regular feature of the TAPR newsletter. This column welcomes and solicits input from TAPR members. Please send comments, criticisms, ideas, and anything else that is digital communications hardware-related to me.

The first major undertaking of the hardware group was the design of the TAPR Terminal Node Controller (TNC). The TNC is a microcomputer-based device that interfaces a user's terminal (or personal computer) to a radio transceiver, and implements the required protocol for Local Area Network support. The articles entitled "Introduction to Packet Radio" and "TNC Hardware Description", which were part of the first TAPR information package, provide a fairly complete description of the TNC and what it does.

Prior to releasing the TNC to the general Amateur community, TAPR decided to conduct an exhaustive laboratory test of the design. The TAPR TNC was designed not only to be a development tool for the experimentally inclined Amateur, but also to be a fully functional, easily implemented TNC for the non-technical Amateur who merely wished to exploit the inherent communications advantages of packet radio.

In this spirit, a two-phase test program was planned. (Note that the word "plan" and its derivatives are really euphemisms in projects such as this.) The first phase, Alpha, called for 12 boards to be produced and supplied to those foolhardy souls who dared put them together. Alpha boards were delivered to the participants during April, and by late May a FORTH language compiler-interpreter was running some test software allowing two TNCs to communicate. This system was demonstrated at the ARRL Southwestern Division Convention in San Diego on June 4 and 5, 1982. Since then, communication via MODEM has been established as well as limited linking by RF. The first packets were transmitted on the weekly TAPR Net on June 9, and the first reception of transmitted packets (not the same ones transmitted on June 9!) occured on June 18.

So much for background and landmarks. What remains to be done on Alpha so that Beta can commence?

From a hardware standpoint, the primary Alpha goals which remain are: first, to design and verify an interface between the XR2211 PLL and the on-board calibration counter, and second, to test the transmitter PTT with a transceiver. Once this has been done, the updated schematic will be used to generate new artwork, possibly via a Computer-Aided Design system. This artwork will then be used to produce the Beta boards. At this time it appears that the first release of Beta will be limited to 75 boards, due to a temporary shortage of the XD2210 NOVRAM. If enough interested participants are out there and are willing to wait a bit longer, there will be a second release of Beta in September.

Apart from the formidable tasks associated with the TNC, there are other hardware activities within TAPR. Preliminary investigations are being made into developing an RF deck for packet radio, with an integral high-speed MODEM running at between 20 and 64 kilobaud on 220 MHz or higher. A fast, multi-port node controller for gateway operation and TERRACON linking is under investigation. We are looking at AMTOR for possible use in the HF environment, perhaps as a temporary measure.

There you have a brief overview of what is happening in the TAPR hardware group. Remember, TAPR is NOT a "we/they" organization -- it is strictly a "we" organization. Without the active involvement of the membership, TAPR will fail. Please write and let me know your ideas and how you think you may be able to help in these projects. It is an opportunity to be at the forefront of new technology applications in Amateur radio. Get involved!

ADDITIONS TO MEMBERSHIP LIST
Since June 8, 1982

John Beaston, N6TY Hillsboro, Oregon	Member #106
Phil Callahan, N7COB Tucson, Arizona	Member #105
Robert Hopkins, W6LLE San Diego, California	Member #102
Donald Jacob, WB5EKU Sepulveda, California	Member #104
Donald J. Johnson, WD6FWE Carlsbad, California	Member #103
Heather Johnson, N7DZU Tucson, Arizona	Member #077
Karl Keller, KJ6F Los Angeles, California	Member #63
Victor B. Johnson, Jr., K4GXV Cabot, Arkansas	Member #057
F. Vince Pavlicek, WB6MLL San Diego, California	Member #100
Carl Prinsen, WB6CYA San Diego, California	Member #107
Gunard Steele, W7EGV Tucson, Arizona	Charter #24
William B. Talanian, W1UUQ Goleta, California	Charter #25
David J. Waterman, K6MAR Alpine, California	Member #101

A complete updated membership list is available to members who send a s.a.s.e. to Mark Baker, TAPR Secretary.

Beta Test Status

by Dan Morrison, KB3UC

Greetings to everyone from your Beta Coordinator. This column will be used to keep all Beta participants and Coordinators up to date concerning happenings around the country, as well as passing on those pieces of information which fall through the cracks in the other columns in this newsletter.

Important Notice For Beta Site Coordinators

We need from each of you a list of confirmed Beta participants. Please include, for each participant, name, address, call, whether currently a member of TAPR, and the estimated number of boards required. (Some eager beavers have requested two or more boards and EPROM programming adapters.) We will also need to know which participants will not permit their names to be sent to the FCC on a TAPR request for Special Temporary Authority, in the event it is needed. Therefore, please include this in the information for each participant. This is our master list, so please keep us up to date on the situation at your site.

Our current window for initial distribution of Beta TNCs is from early August to mid September. In the event that our initial delivery comes prior to September it will be limited to 75 TNCs owing to a shortage of EEPROMS before this date. After September they should be available in large numbers, and we do not anticipate a shortage of boards.

Currently the confirmed Beta Test sites are as follows:

Location	Site Coordinator	Approx. Number Participating
Dayton, OH	Bob Neben K9BL 513/299-4436	7
Little Rock, AR	Don Reaves KC5JH 501/835-5614	3
Los Angeles, CA	Harold Price N6DUF 213/371-0867	12
Northern NJ	Steve Robinson W2PPY 201/835-0161	8
Phoenix, AZ	Gavin Griffith KB7KX 602/948-7460	17
St. Louis, MO (SLAPR)	Pete Eaton WB9PLW 618/288-5432	241
San Diego, CA	Michael Brock N6DUF 714/566-3799	10
San Francisco, CA (PPRS)	Bob Reiling W6JHJ 415/967-6754	5
Tucson, AZ	Dan Morrison KB3UC 602/325-4775	15
Washington, DC	Paul Rinaldo W4RI 804/356-8918	5

Please note that these are only the confirmed sites. Hams in Albany, Boston, Calgary, Portland, and Princeton have indicated interest, but have not yet declared themselves as committed Beta Sites. I would like anybody interested in Beta Test to call his local Coordinator, or, if there is no Coordinator, please get in touch with me as soon as possible. Our current plan is to require prepayment from Beta Sites within the next four weeks, and the sooner our lists are complete the less time things will take.

Ground Rule for Becoming a Beta Test Site

In order to comply with state and federal requirements on TAPR Corp. we must ask everyone involved in Beta Test to be a member of TAPR. One important effect of membership will be that the TNCs will not be required to be type accepted, but rather Beta participants will comply with FCC regulations concerning RFI, etc.

Join Tucson Amateur Packet Radio

If you are not already a member of TAPR, we would like to take this opportunity to invite you to join us. There is a membership application included in the newsletter. Dues for one year are $10 ($12 after August 1 -- act now!). Dues for a CHARTER MEMBERSHIP are $25, which includes the first years dues. The only special privileges associated with charter memberships are philosophical -- you get the added satisfaction of supporting an extremely worthwhile Amateur project, the right to call yourself a charter member, and a certificate proclaiming you as such. Membership cards, as well as the charter membership certificates will be coming in the next two months. The deadline for charter membership applications is August 1, 1982. If you have already joined, you can still become a charter member by sending the remainder of your dues. Of course, all members will receive the newsletter and other TAPR publications, as well as being eligible to participate in Beta Test.

Some of you old members will note a few changes in the membership dues. For those of you who missed the last general meeting, a slight clarification is in order. As you may recall, sometime last spring you joined the Tucson Amateur Packet Radio Club. Since then, the club has been replaced by a corporation, and you are now members of the corporation. If you paid dues of $5 for six months, your membership in the corporation will expire on the semi-anniversary of your joining the club. If you want to continue getting TAPR literature, you will have to re-up for a year. Renew your membership before the dues go up...

If you joined the club (before June 1) as a charter member, you are now a charter member of the corporation, and your membership expires on the anniversary of your original joining. If you were a $5 member of the club you can become a charter member and extend your membership by six months by paying the extra $20. Hope this makes everything crystal clear.

Microwave News

by Mike Parker, KT7D

What do microwaves have to do with packet radio? Well, satellites are one means, perhaps the best, of communicating packets over long distances. AMSAT has allocated packet radio space on the Phase III-B satellite's Mode X transponder (L-band up, 70 cm down). Unfortunately, there are no ham-priced linear amplifiers commercially available which are capable of accessing the L-band uplink, at least while using an antenna that might fit in your back yard. That is why TAPR, at AMSAT's request, is attempting to design a moderately priced L-band linear amplifier.

Basic Parameters and Considerations

The amplifier target specifications are that it produce between 20 and 40 watts output with only a watt of RF drive. The exact power requirement is dependent on the assumptions that one makes in the calculation of link margins. We are shooting for the middle of this range with our first design.

A critical parameter in the path loss equation at L-band is feedline loss. At only 1000 MHz, RG-58 coax has a loss of about 18 dB per hundred feet! By 1260 MHz, it is probably over 20 dB per hundred feet. In other words, if 100 watts is fed into one end of a 100 foot line, only one watt comes out. At least it makes a good dummy load.

The usual solution to the feedline loss problem is to place the final amplifier near the antenna feed. This gets rid of feedline loss, but adds two additional problems, weatherproofing and safety. Weatherproofing can be solved by each individual ham, but safety must be planned. Nobody wants high voltage (say 800 volts) running up his antenna tower, so any tube design must also mount the power supply on the tower and feed it with a low voltage, say 24 VAC.

Why build a linear amplifier? Well, AMSAT wants a linear amplifier (for our SSB friends, I guess). There is no good reason why packet radio, CW, or any mode other than SSB needs a linear amplifier. However, the added cost of making the amplifier linear may not be too great. If it is, then two designs could result, one for SSB and the other for everyone else.

Tubes vs. Transistors

The choice of using tubes or transistors for L-band appears at the outset to be a toss-up. Without question, disc seal triodes such as the 2C39A can be made to do the job. Designs using this tube for L-band oscillators and amplifiers have appeared in several ham publications over the years. In addition to the high voltage problem mentioned above, it appears that tubes could pose a cost problem with the necessity for mechanically complicated (at least to me) resonators and possibly the need for blowers.

Another tube possibility is the travelling wave tube (TWT). Linear TWT amplifiers in the desired power range have been built commercially, but investigation to date has not yielded a viable TWT option.

In the transistor arena, gallium arsenide FETs are currently too expensive, but bipolar devices (similar to what you have in the typical ham rig) are almost affordable. Devices that handle the frequency range are readily available, but unfortunately, specifications for linear operation are typically not available.

The TAPR microwave committee has decided to initially design a transistor amplifier for the following reasons. First, a tube approach is rumored to be in progress by a Houston based group, so why duplicate their effort? Second, transistors appear to be simpler from the standpoint of mechanical and power supply considerations. Also, transistor designs at this frequency are not as readily available as tube designs, so any result would represent a useful contribution to our knowledge that would stand us in good stead for future designs. The results will produce a needed data point on the cost of such a design approach. Finally, talent and facilities in the area of PC fabrication is more generally available to TAPR than machine shops, etc.

Three sources of transistors have been identified: Motorola, TRW, and Communications Transistor Corporation. All devices seem to be grounded base, and spec'ed for Class C operation. Grounded base complicates the power supply biasing circuits. The TRW parts that look very good spec-wise are quite expensive ($250 for final amp transistor). Motorola applications engineer Steve Lazar says that transistors designed for pulse applications for TACAN and DME (just below the ham band) have been used successfully in SSB operation at or near our frequencies. He has promised to supply more info to the committee. We have also found out that teflon circuit board is more expensive that G10 glass (figure $10 to $20), but G10 glass is marginal for use at L-band. It has been done, though.

How Can You Help?

Advice, participation, or comments from people experienced in microwave design, especially transmitters, are always solicited. If anyone has information on inexpensive TWTs (is there such a thing?) that match our requirements, we would appreciate knowing about them. Do you have microwave components such as teflon circuit board, small variable capacitors (e.g., tubular), transistors, chip capacitors, feed-through caps, etc.? Any donation would be appreciated and would be tax deductible. If you have access to microwave test gear that could be borrowed or used in your lab, please contact us. Can you do PC layout or fabricate PC boards with reasonable precision? We want you! Can anyone give us practical guidelines on radiation hazards that one might be exposed to when our amplifiers are connected to antennas?

If you can help in any of these areas, contact me or come to the next Microwave Committee meeting, just after the TAPR general meeting in Scottsdale, July 17.

TECH/notes

by Lyle Johnson, WA7GXD

TECH/notes will be a column dedicated to technical information exchange among the TAPR community. Reader input is solicited. Any tips, tricks, or obscure technical information may be submitted to me.

CWID Solution

Much to my chagrin, the Alpha-level TNC CWID facility did not function due to a quirk in the WD1933 HDLC controller. We discovered that the TxD pin (U19 pin 25) cannot be reset to a known state via software commands nor hardware reset of the chip. A look at the Alpha schematic will show that the TxD output is multiplexed (MUXed) with the CWID line from the 6522 VIA (U6 pin 19) via an open collector wired-or network (U25). Since the 1933 TxD pin has a 50-50 chance (before the Murphy's Law correction factor is included) of being in the wrong state when CWID is commanded, this system will not work reliably (sigh).

A brainstorming session on June 19, 1982, in KT7D's swimming pool between KD2S and WA7GXD came up with the inelegant solution of sending "dit" and "dah" length dummy packets. A later session between WA7GXD and BAKE (Mark Baker, TAPR secretary) resulted in the following solution (see Fig. 1), which is not only elegant, but it works!

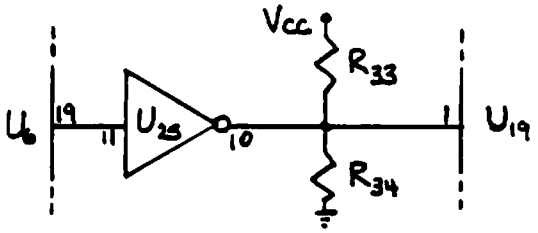

Figure 1. Revised CWID facility for the TAPR TNC.

The WR2206 FSK modulator has provision for AM (Ancient Modulation, for you new hams, also referred to as Amplitude Modulation by some old timers), and this is exactly what we need. If pin 1 of the '2206 is biased to Vcc/2 (approximately 6 volts DC in this case), the output amplitude is nearly zero. If the voltage on pin 1 approaches either ground or Vcc, the output amplitude is maximum, at a level determined by R25. In the new circuit, R33 and R34 form a voltage divider to bias pin 1 to Vcc/2. The resistor values are chosen to minimize loading effects by the approximate 10K input impedance of the '2206, and 1% tolerance resistors are used to avoid a trimpot adjustment. When U6 pin 19 is in the high state (logical 1), U25 pin 10 is low, pulling U19 pin 1 to ground. This results in maximum output amplitude from the MODEM. When U6 pin 19 is low, U25 pin 10 is open, and the network R33-R34 biases U19 pin 1 to Vcc/2, effectively shutting off the audio signal from the MODEM. The result is easily controlled CW. Since there are no other available control outputs on the TNC, the tone selection (1200 Hz or 2200 Hz) is determined by the state of the 1933's TxD pin, which is indeterminable and the cause of the whole exercise...

Note that the 74LS05 used for U25 must be changed to a 7406 for the higher voltage standoff requirement, although a section of U21, the Darlington driver, may be used by Alpha testers who don't want to buy a new IC.

New Products

In this section I will briefly describe new products that TAPR is evaluating for possible application to packet radio. Samples of many of these products have been made available to the hardware committee, and we will be getting others in the near future.

Advanced Micro Devices (AMD) has announced their new MODEM-on-a-chip, the 7910. Using analog microprocessor techniques (a la INTEL 2920), AMD has developed a 28-pin device that can emulate a Bell 103/113/202 MODEM, as well as CCITT V.21 and V.23 specifications. All processing, including input filtering, is included in this chip, and mode selection is via pin programming. This device should prove useful in both Packet Radio and general purpose MODEM applications. Two samples from the second pilot production run are scheduled for mid-August.

Zilog has (finally) released the 8030 and 8530 serial communications controllers (SCC), with second source AMD running its first lot at this writing. The SCC is especially suited to packet radio activities because it incorporates two separate serial channels, with individual baud rate generators on chip, and each channel can be configured to be 5 to 8 bit asynchronous (for RTTY and ASCII buffs, as will as TNC users) or any of a number of synchronous protocols, including the packet-standard HDLC. The HDLC mode includes NRZI (as well as FM) modes with on-board PLL for clock recovery. Zilog has provided us with samples of each for evaluation in our packet radio projects. They are being considered for the high data rate point-to-point linking scheme (TERRACON) as well as for a multiport node controller such as a gateway node controller.

We are looking at several CMOS microprocessors (uPs). Herewith are some of the more interesting.

Rockwell, one of the manufacturers of the 6502 uP used in the TAPR TNC, has announced a high-speed (5MHz) CMOS 6502 to be released in 4th quarter 1982, along with a line of standard 65XX peripheral parts using the same high-speed CMOS technology. CMOS offers the twin advantages of low power dissipation and high noise immunity. If we can locate a CMOS HDLC controller, the TNC can be made battery powered and the speculations of KT7D, WA7GXD, and W7EGV, regarding a briefcase-portable satellite-accessing packet radio terminal, can become a reality after all!

National Semiconductor has had a CMOS Z-80

(continued on page 8)

First TAPR Packet QSO

by Den Connors, KD2S

After several hours of transmission of test packets, Lyle Johnson, WA7GXD, successfully initiated the first Amateur packet radio contact with all-American hardware and software, using the Tucson Amateur Packet Radio Terminal Node Controller (TNC), at 9:12 PM MST, June 25th, 1982. At the receiving end was Den Connors, KD2S, who was co-located with Lyle at the WA7GXD station. The tests were conducted at 146.55 MHz in the Amateur two-meter band, with both stations sending plain-text ASCII messages.

The two-way contact lasted for about one hour, during which time several different experiments were conducted to determine optimal selection of components for the TNC modem amplifier-filter set.

Within twelve hours of first QSO, the experiment was repeated over a distance of about twenty miles, from one side of Tucson to the other, under conditions which were as bad as "less than S1", with total success. Tucson's first packet "rag-chew" lasted about 45 minutes, with different antenna and signal-level combinations tried by Lyle and Den.

Also at the first transmissions were Marc Chamberlin WA7PXW, the TAPR Software Chairman, Margaret Morrison KC7MA, the TAPR Publicity Chairman and Heather Johnson N7DZU, a member of the Publicity Committee.

These tests culminate hundreds of hours of effort on the part of WA7GXD, who has spearheaded the design of the TNC as Hardware Chairman. Completion of modifications to the on-board modem next week will allow Lyle to release a final version of the TNC to a local Computer-Assisted Design firm for the artwork and construction of the TAPR TNC Beta boards, which are slated for an August release.

Software Update, continued from page 2

Current activities of the software group center on finishing the terminal interface software, testing net control functions, enhancing the HYPERFORTH kernel to include the multi-tasking system, writing interrupt handlers and chip drivers, and documenting our work. The actual CSMA protocols will be implemented as soon as the rest of the system has the kinks worked out and we can begin experimenting in a live environment. Work will also begin on interfacing the TAPR system to the Vancouver system when we get our Vancouver boards running. Finally, we are working out Beta Test Site procedures for debugging and upgrading the software. The Beta Test Sites will become responsible for developing various software packages needed to interface home personal computers to the TNC. This software will be collected and distributed by TAPR.

As it now stands, the terminal interface software is approximately 95% complete, link interface software 70%, FORTH system software about 70%, and the low level routines about 80% finished. Estimated time to "launch" is about 4 weeks.

For each issue I will write about a particular aspect of the software which I think is important enough or in which there seems to be a lot of interest. Next time, I will give a general introduction to the software, with an explanation of some of the fundamental concepts of the protocol used for Alpha Test.

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

I hereby apply for membership in T.A.P.R. I enclose (check one):

_____ $10 Dues _____ $25 Dues Charter

for one year.

Name: _____
Call Sign: _____ License Class: _____

Address _____
City & State _____

Zip (Postal) Code: _____

Home Phone: _____ Work Phone: _____

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

_____

Signature _____

Date: _____

Are you interested in operating a TAPR Beta Test site? _____

Are you willing to become a TAPR Beta Test Coordinator for your area? _____

At what times would you be available to participate in an HF net to discuss packet radio?

_____

_____

TECH/notes, continued from page 6

look-alike, the NSC-800, available for several months now. This part executes the complete Z-80 instruction set, but has a multiplexed bus, and on-chip clock generator, and has some peripheral chips to go with it, including a RAM/parallel-port/counter-timer chip and a ROM/parallel-port chip. We have two complete chip sets for evaluation.

The INTEL 8035 family is available in CMOS from INTEL, NEC, and possibly National. This is a low-level uP, great for controller applications (such as automated rotators), and is a plug-in compatible part in all respects to the NMOS part, including 6 MHz speed. We have a pair of these to play with -- and they work!

INTEL has announced the 80C31, a 15 MHz uP with on-board full-duplex UART, two 16-bit counter-timers (one useable as a baud rate generator for the UART), and 8-bit programmable I/O port, 128K address space, and 4 usec hardware multiply. It also has a Boolean processor on board for extensive bit manipulation, hardware divide, 128 byte RAM, multiple register banks, and most instructions execute in less that 1 usec! This chip is a part of the MCS-51 family, possibly the most powerful single-chip microcomputer family in production. Sample en route to the TAPR hardware group.

Hitachi has announced the 6303V, a 6803 look-alike with an enhanced instruction set. This is a superset of the Motorola 6800-series uP family, and includes such things as hardware multiply in the instruction set. The 6303 also has 128 bytes of on-chip RAM, a 16-bit counter-timer, and a full-duplex UART with baud rate generator. Some powerful bit manipulation instructions are included for page 0. This chip looks like a hot one, and is already being evaluated by WA7GXD for a commercial packet radio controller. Since this chip will be used with the 8030/8530 mentioned above, some valuable information relative to Amateur packet radio my be forthcoming. TAPR will have access to a sample or two of this chip as well.

Thanks for assistance with the newsletter to

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