

Packet Status Register

Tucson Amateur Packet Radio Corporation

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President's Corner

by Lyle Johnson, WA7GXD

WEATHER (everyone talks about it)

We actually had a white Christmas this year. It snowed. In Tucson. Three inches of white stuff, which turned to wet, muddy stuff in a couple of days. Now I know why folks move out here...

Still, it was good to be back, after spending most of December on the edge of the Simpson Desert in Western Australia, with daytime temperatures around 106 Fahrenheit!

BIRTHDAY

As I mentioned in the last PSR, TAPR was founded more than six years ago! The Amateur packet landscape has changed radically in those six years, and I don't think there are many who would dispute the assertion that TAPR has had a strong influence on that change. And the best is yet to come.

NEW BLOOD

In February, 1983, I was elected TAPR President. This February will mark five years for me at the helm of the organization. I am grateful for the opportunity to have been closely involved with TAPR, and I am likewise grateful for the support and encouragement I have received during these years.

This year, at the TAPR Annual Meeting (see elsewhere in this PSR for a meeting announcement), you will meet your new President. I have informed the Board of Directors, which elects all TAPR officers, that I will not be a candidate for President this year. It is time for new blood and new leadership.

FUTURE DIRECTIONS

What direction will the organization take? Of course, I don't know, but I think we have done a good job at getting packet into the hands of every ham. We need to direct energy and resources into Level 1.

Yes, you read correctly. Level 1. Modems.

In my opinion, we (as Amateur packeteers, not "we" as in "TAPR") have a workable Level Two protocol that is being refined via the ARRL Digital Committee. We have several Networking protocols being used and/or developed, including NET/ROM, TEXNET and TCP/IP.

Nearly all of this is running at 1200 bauds, on two-meter FM channels. Useable by almost everyone, but slow and inefficient. Long-haul traffic is handled on HF at 300 bauds, using direct FSK (or equivalent). Much more efficient, but slow.

Digital Signal Processing (DSP) offers a possible solution for low and medium speed

Continued on page 2

noise susceptibility.

In addition, if the same divide-by-16 section of the 74HC393 chip is used for both Tx and Rx clock generation, the transmitted data may be subject to jitter from the Rx signal. This may be a problem for the distant receiving station, especially if a full-duplex link were attempted across a noisy path.

In practical operation, using strong-signal two-meter FM channels, this circuit is probably quite adequate.

In fact, this approach to NRZ/NRZI signal conversion is used in at least two commercial TNC 2-based products. I have used both and found them completely adequate for casual operation. I didn't attempt to wring them for the last dB on a noisy path, but neither has had problems decoding off-the-air signals on two meters.

The products in question are the Pac-Comm TINY-2 and the TASCOTelereader TNC u21. The Pac-Comm unit looks like a good, low-cost TNC; the TASCOTelereader is shirt-pocket sized, and includes internal NiCd batteries!

PHILIPPINE PACKET INFORMATION NETWORK (PPIN)

The first NET/ROM in the Philippines DU-land Packeteers recently had a grand time after the installation of the much awaited first NET/ROM (version 1.2) in the Philippines. It went on the air last December 1, 1987. Art, DU1AUL drove up to Tagaytay, a mountainous part of Luzon about an hour's drive from Metro Manila, and installed the NET/ROM with an ICOM IC-28H radio and an omni antenna. Benjie, 4F1ANX was the first station who used the NET/ROM together with Eddie, DU1UJ who generously donated the equipments. The NET/ROM will cover the whole area of Metro Manila while awaiting the installation of the same in Cebu, a province in the Visayas, after which the whole Philippines will then be linked via Packet. The NET/ROM is operational on 144.09 MHz and is open 24 hours a day.

Happy Packeting de Glenn DU1FGA!

TCP/IP Update

On December 25th the newest revision to the KA9Q TCP/IP software was released. The release numbered 871225.0 is unofficially known as 87XMAS.0.

Phil Karn, the author has incorporated a great number of refinements and major improvements to the code.

Among the most significant from the user standpoint is the new capability to operate normal AX.25 packet and TCP/IP from within the same program. Not only that but you can also have multiple AX.25 connections going while simultaneously transferring files and/or forwarding mail under TCP/IP. This part of the program is a result of work done by Jon Bloom, KE3Z and as massaged by Phil.

The development work on the code has been done on IBM PC's and their clones. As a result most of the current use of the software is limited to owners of this gear. With this release there is now support for the Macintosh and the Amiga, thanks to the efforts of Mikel Matthews. Code for these machines is included in the distribution. Phil has taken great pains to make the code as transportable as possible. As a result we can expect to see it ported to other machines in the future.

Dave Trulli, NN2Z has made major enhancements to Bdale Garbees, N3EUA, mail modules and the user interface. It is pretty neat to be able to set down at your computer, call up the mail program, answer the TO: and SUBJECT: queries, key in the message and let the system take care of putting the message on the recipients machine.

A few of the other changes include a new recording capability, a new ASCII upload capability, modifications to the command interpreter, driver for the Eagle I/O card and an update to the mail/PBBS software by WA3PXX.

Bdale Garbee has taken on the task of integrating all of the earlier documentation into an all-in-one Users Manual. The manual is based on existing documents by Phil and Brian Lloyd,

WB6RQN and other README files formerly accompanying the code.

Ok! So how do I get involved in this new exciting aspect of packet radio? Its easy. The following article tells how to get the code via BBS, the internet, and on floppies.

The floppy distribution comes on three disks. Two of them contain the code, executables and sources. The other one is a Plug and Play disk. The P&P contains the necessary executables and samples of the necessary configuration files. Just follow the instructions contained within each of the configuration files and in the README.1ST file. I have completely revised the P&P since the last version in an effort to protect the first time user from networking terms that might be unfamiliar to him. Once the new user is on the air the documentation will provide a wealth of information on networking per se and on the KA9Q package.

Andy Freeborn NØCCZ

HOW TO GET THE TCP/IP CODE

ON DISKETTES:

The floppy distribution handled by Andy, NØCCZ for the last version has now been taken over by TAPR. All diskette software is IBM PC DOS 2.0 or later format, on 5 1/4" diskettes. Please send return mailer with postage and \$2 for copying. If you desire TAPR to provide the diskettes, the charge is \$1 for mailer and postage, then add \$0.75 per diskette

- o TCP/IP including Plug and Play (3 diskettes)
- o Introduction to TCP/IP (2 diskettes)
- o TNC 1 Source Code (1 diskette)

Send orders to TAPR at address on page 1.

VIA BBS:

From the N3EUA Opus system. Log in to the BBS and download from the appropriate files area. There are several .ARC files for the full distribution, one for each of the directories.

Bdale has configured his BBS to allow first time users ample resources to

download the full distribution at 1200 baud. The phone number is (303)495-2061. Speeds supported are 300, 1200 and 2400. If you have any trouble downloading from the BBS let him know.

VIA INTERNET:

Direct UUCP connection to winfree is available to those who request it for polling to get new versions. Inquire via mail to one of the addresses below. Anonymous uucp is available. The phone number is (303)495-0492, 300/1200/2400 baud, 24 hrs/day. A typical L.sys entry might be: winfree Any ACU 2400 13034950492 ogin:Uanon word: notFTPStart by grabbing the file /usr.spool/uucppublic/pub/README, which contains info about what is available. A possible uucp command ala BSD might be: uucp winfree!~/pub/README /usr/spool/uucpublic

Andy NØCCZ

TCP/IP Hardware Considerations

by Andy Freeborn, NØCCZ

The development work on the TCP/IP software was done on IBM PC's/compatibles using TAPR TNC-2's/compatibles.

Phil Karn has gone to great lengths in writing the code to permit ready transportability to other types of computers. In recent months the code has been ported to the Macintosh, Amiga and Unix machines. It is reasonable to expect that as time passes others will port the code to additional hardware types.

The key to the use of TCP/IP in a TNC-2 has been the KISS code (Keep It Simple Stupid), written by Mike Chepponis, K3MC. This code is installed on an EPROM inserted within the TNC. It provides the capability for the external computer (PC) to take over the microprocessing functions originally performed within the TNC. The modem portion of the TNC is left untouched and continues to perform its original functions. Marc Kaufman, WB6ECE subsequently wrote the KISS code for the TNC-1.

A bit of the development history of KISS:

The first implementation required that the EPROM containing the KISS code 'replace' one of the TNC-2 chips. This

meant that the TNC then became a dedicated TCP/IP machine until the original EPROM was reinserted.

The next version was an EPROM which contained the normal AX.25 code plus a KISS 'loader'. With this capability it was not necessary to replace EPROMS to alternate from TCP/IP to regular AX.25. The loader was able to accept an uploaded hex file containing the KISS code. It was, however, necessary to upload the KISS code each time the operator transitioned from TCP/IP to AX.25.

The latest version now provides both the N2WX AX.25 code and the K3MC KISS code within the EPROM. Upon powering up his TNC the operator can key in an 'h' (for Howie, N2WX) or a 't' for TCP/IP. The TNC will then be in the desired mode.

Some of the TNC manufacturers are now providing a TCP/IP capability in their products. You will need to refer to their documentation for TCP/IP operating instructions.

TAPR has available the necessary EPROM's to provide your TNC-2/clone or TNC-1/clone a TCP/IP capability.

EPROMS: TAPR will program your EPROM(s) for \$2 per TNC-worth plus a prepaid return mailer. If you choose to buy EPROMS from TAPR, they will include the mailer and postage in the purchase price of the blank EPROM.

TNC2 release 1.1.5 requires 32k RAM in your TNC2. If you haven't already upgraded, 32k RAM chips are available from TAPR for \$20 postpaid. Current blank EPROM prices are \$10 for 27C256 and \$5 for 2764 (may be 27C64, depends on availability).

TNC2 1.1.5 includes documentation.

- o TNC 2 KISS only (27C256)
 - o TNC 2 1.1.4 w/loader Discontinued
 - o TNC 2 1.1.4 w/kiss Discontinued
 - o TNC 2 1.1.5 w/loader (27C256)
 - o TNC 2 1.1.5 w/kiss * (27C256)
- *Not yet available at press time

(I suggest that foreign shipping addressees include sufficient postage to assure airmail delivery, if you don't know the rates add about \$1 per EPROM).

Andy NØCCZ

NET/ROM Update

by Mike Busch W6IXU

Here's a brief "NET/ROM Scoreboard"! Note that the number of NET/ROM nodes in the amateur service has now passed the 1,000 mark! Specifically, our database now lists 1,068 nodes worldwide delivered as of 12/26/87. Since NET/ROM was released for general distribution in May, 1987 (eight months ago), the average growth rate has been 30 nodes per week. Orders continue to flow in at or above this level, so we estimate that another 1,000 nodes or more will be installed in 1988.

Increased NET/ROM activity is especially noticeable overseas. An increasing proportion of orders is coming from outside of North America. NET/ROM is now in use in 19 countries. Especially notable is Japan, where 185 nodes are now operating (including many multi-port nodes and an elaborate backbone system). England has only 37 nodes, but the equivalent of the FCC in U.K. has hampered the growth of packet nodes and BBSs by imposing a great deal of red tape.

Detailed NET/ROM node population...U.S. and CANADA (by state/province):

Alberta	2
Alaska	6
Alabama	7
Arkansas	12
Arizona	16
Br Columbia	6
California	75
Colorado	16
Connecticut	12
D. Columbia	6
Delaware	1
Florida	51
Georgia	5
Hawaii	10
Iowa	23
Idaho	8
Illinois	10
Indiana	15
Kansas	3
Kentucky	11
Louisiana	7
Massachus.	6
Manitoba	3
Maryland	11
Michigan	5
Minnesota	10
Missouri	10
Mississippi	7
Montana	3
North Carolina	23

North Dakota	5
Nebraska	5
New Hampshire	9
New Jersey	18
New Mexico	6
Nova Scotia	2
Nevada	15
New York	30
Ohio	31
Oklahoma	12
Ontario	6
Oregon	15
Pennsylvania	18
Prince Edward I.	1
Rhode Island	2
South Carolina	12
South Dakota	3
Tennessee	5
Texas	49
Utah	26
Virginia	29
Washington	31
Wisconsin	19
West Virginia	9
Wyoming	5

NET/ROM node population overseas (excluding U.S. and Canada, by country):

Argentina	1
Australia	6
Austria	5
Belgium	14
Chile	2
Denmark	4
England	37
Indonesia	1
Italy	4
Japan	185
Netherlands	1
Norway	20
Spain	4
Sweden	10
Switzerland	7
W. Germany	21
Yugoslavia	3

Best 73 and Happy New Year,
Mike W6IXU

Texas Packet Radio Society TexNet Update - 1/5/88

by Bill Wade WD5HJP

Current activities of the society have shifted and expanded to site installations. In addition some significant software upgrades have been made.

NODE INSTALLATIONS

At present, there are three nodes being installed in Austin, San Antonio and Seguin. Two of the nodes are undergoing burn-in in San Antonio.

After a tune-up of the modem and radio, they operated in a 3 node configuration with the single port node already installed in San Antonio. The 3 NCP boards for the nodes had been built by Jim Brooks, W5ERO. Jim has been very busy with the iron lately! He has assembled 3 NCP boards, a daughterboard and installed and tested a PMS hard disk subsystem for use in the ALAMO node. As a result he is the most experienced node builder in Texas!

The fellows in San Antonio and Austin should soon have their three nodes running full speed 9600 baud network links through Seguin between San Antonio and Austin.

TEST SYSTEM

Our test system nodes on the air here in the Dallas area, include PLANO, MURPHY and TESTBED. The PLANO and MURPHY nodes have been on the air for over a year now. Operation of these nodes have continually proven that the basic design works. The NCP boards have been very reliable and continue to blast packets successfully irrespective of the dementia of the software/hardware testers here in the Dallas area! As has been expected the radios have been the biggest problems with reliability. Newer radios then then the RCA 700 series might be better for longer service time between tune-ups or repairs. Currently the three nodes are running a new software version that allows many improvements.

SOFTWARE UPDATES

A number of new features have been incorporated into the new code now being tested. Multiple PMS units with multiple Weather Information Servers concurrent with the PMS upgrade. Weather Information capability is now a network service. A number of internal to the network functions have been improved. Initiation of a node is protected and can be done independent of the affected node's connection status with the network.

Multiple Packet Message Servers are now supported in the TexNet software and protocol. When at the Network Cmd?> prompt, the user has a choice of message servers. A simple M, will route the user to the pre-programmed default node with a PMS sub-system. A M @ nodename will route the user to that node and connect the user to

the PMS system if that node is equipped with one.

Also the user once connected to the PMS, gets a PMS Cmd?> prompt. This helps avoid user confusion with network system commands.

A future improvement will be a on-line TexNet User's Manual on the PMS. It's not clear at this time how the manual will be setup. It will certainly reside on a node's PMS hard drive. The big question is how to make it useful to users without requiring each user to download the entire manual to use or read portions of it.

One other network command convenience feature is B(ye), the network will initiate the disconnect from the user on command from the user. On flaky paths to the node, this allows positive control from the user side on a controlled disconnect.

Of interest to the weather watchers is that the weather information utility has been shifted to the PMS hard disk subsystem. Weather Information now is available throughout the network. They are stored as "semi-permanent" messages that will contain the same key information at specific message numbers. For example, Dallas Weather Forecast is always message #8. The user once connected to the PMS now operating as a Weather Information Server (WIS ?), can issue a LW command to list all weather messages of type W. Then he chooses to read one of the NOAA "products" by issuing a r (msg number), in our example: r 8. The PMS(WIS) then returns the text for the Dallas Weather Forecast.

In addition, severe weather alerts get a special message number assigned to them and are readable at any time after they are issued. If the alerts are updated, they are automatically changed to reflect the new information. LS at the PMS Cmd?> prompt will return all messages of type S(evere Weather). The user then issues a r (msg number) to read the severe weather alert of interest.

As with the M command, there are two options for weather information. W @ nodename or just W routes the user to the desired node's PMS sub-system with the weather information. The W @ nodename command will disconnect you from the network if there are no weather information capabilities at the named node.

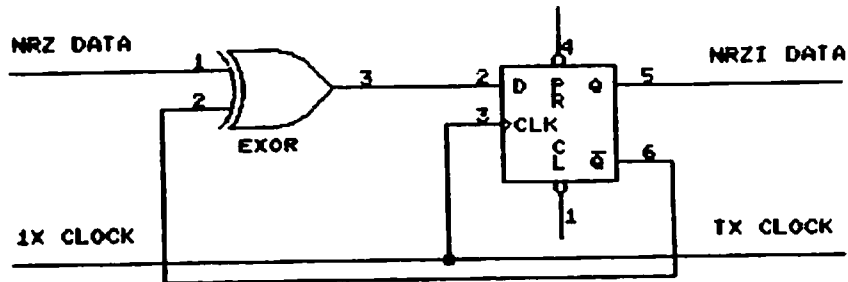


FIG. 1 - NRZ TO NRZI CONVERTER

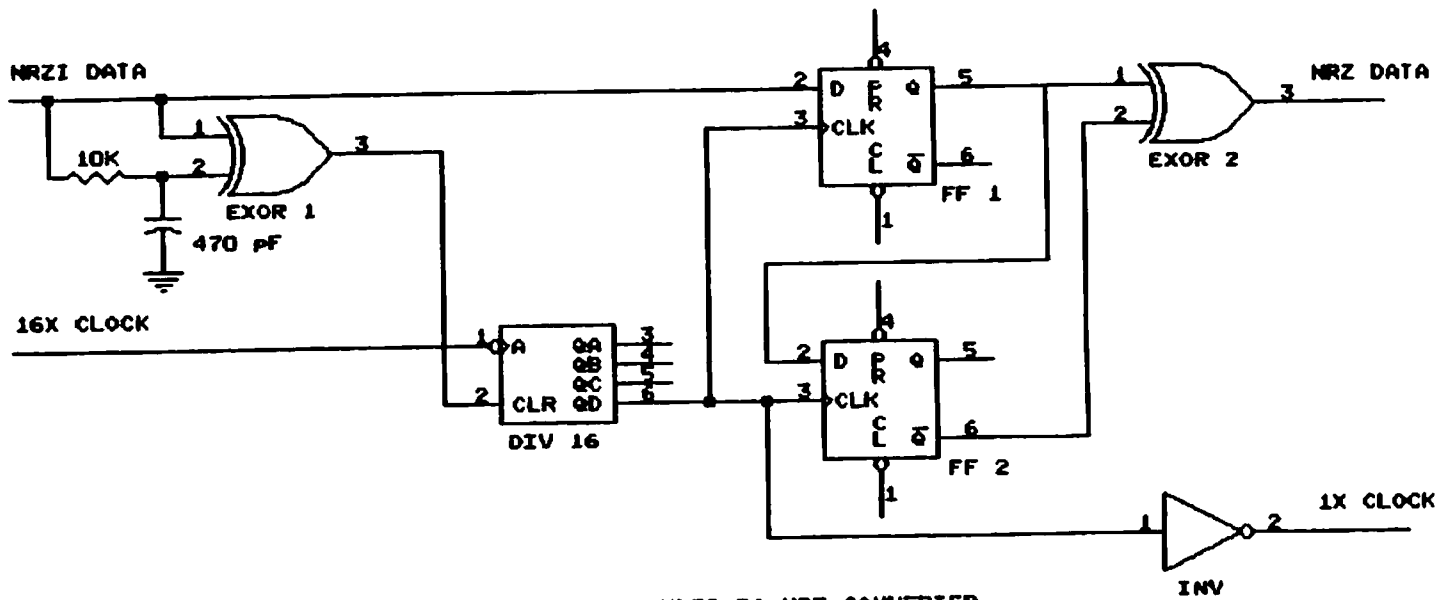


FIG. 2 - NRZI TO NRZ CONVERTER

TUCSON AMATEUR PACKET RADIO

Title		
NRZ (-) NRZI CONVERTER		
Size	Document Number	REV
A	PSR JAN 1988	A
Date:	January 4, 1988	Sheet 1 of 1

IN THE MAILBOX

by Roy Engehausen, AA4RE

Well a lot has happened since the last edition but I still could use more news especially on the non-IBMPC based systems. Please drop me a quick note and share this information with us all.

Latest Software

Jeff, WA7MBL has released version 3.31/4.31. The 3.31 is the upgrade to the previous version. The 4.31 system is the same as 3.31 except modified to run under Desqview and to share the mail and user files.

Brian, KA2BQE, reports that he is currently delivering patch revisions to beta version 0.98. Revision L was the last. New features upcoming are:

1) fully MBL-compatible Bulletin distribution, negotiated message transfer (i.e. exchange of message ID (a la MBL bulletin transfers) (message ID derived from first forwarding header message number and @BBS) to check for DUPs.

2) Expiration dates on messages

3) Holding onto the message headers for a sysop configurable time (1-30 days) after the message text is killed, to allow for DUP checking.

The 0.99 beta release is scheduled by mid-January and 1.0 in early to mid-February barring any unforeseen circumstances.

A 50 page manual is available from Brian for \$5.00 to cover reproduction, postage and handling. Though a 'print to disk' copy does come on the diskettes.

Version 4.3 of CBBS is now out and is running well at my QTH. Several forwarding bugs has been fixed and a .400 like "Read Message" format has been added. Dave, VE3GYQ says that version 4.4 will be out soon.

The big news is that WORLI has decided to take a sabbatical from his code writing efforts. Hank is in the midst of starting his own software company and has not had the time to devote to the program. Dave, VE3GYQ, has stepped in to handle development, maintenance and distribution of the CBBS. Both Hank

and Dave ask that all questions, comments, etc be directed to VE3GYQ. Hank is still keeping his hand in the works, however, since his own BBS now has a release 5.6 logo.

UNIX BBS

A multi-connect BBS under UNIX or XENIX on the IBM/PC architecture has made its debut. Written by Andy, WB6RRU, the program currently has only been tested with one TNC attached but he says it should work with many. The mailbox is forwarding compatible with the RLI standard and the various level 3 switches (e.g NETROM).

Raw news

Mike, W6IXU, reports that KA6IQA has ported his "Multi-box" software from the Macintosh to the IBM/PC architecture. This system is a multiconnect one using the "NETROM host mode" interface.

Brian, AF4K, tells of a Radio Shack Color Computer BBS program developed by WJ5W. The program is forwarding compatible with most other systems and includes NETROM forward path capability.

Gary, WB9TPG, reports successfully modifying the CBBS V4.1 to use both ports on his Kantronics KPC-4.

WP - Packet Radio's "White Pages"

Most of the CBBS people are familiar with WP. When a user logs onto the CBBS, he is asked where is home mailbox is. This information is then forwarded automatically to the "WP" program which updates a database. Eric, WD6CMU, was the inventor of WP and is the only one running the program. Last time he checked, the database contained 6246 call signs on 631 mailboxes. 396 of those mailboxes have at least two users in the WP database with N6IIU in Palo Alto, California being number one with 174 registered users. In a typical month, WP receives 1122 updates and 115 queries.

Eric reports his biggest problem is cleaning up the "GARBAGE IN, GARBAGE OUT" syndrome. People put in their own call sign, city, or zip code as their home mailbox. The call sign in the database should be that of a nationally recognized mailbox so that others may route mail to you. The premier authority on recognizing

mailboxes is W9ZRZ. Any full time, forwarding compatible mailbox should be listed with him.

To register with WP, N6XXX would send a message like this to tell the database that he wants his mail sent to N6YYY

SP WP @ WD6CMU
Register
N6XXX QTH N6YYY

To ask WP where N6XXX gets his or her mail, send the following

SP WP @ WD6CMU
Query
N6XXX QTH?

Multiple registrations or queries can be in one message. You can also mix queries and registrations.

Header Wars

Just when you thought it was safe to read your local BBS, the header wars returned. WA7MBL and KA2BQE have hard coded a new header format that they mutually developed. Unfortunately, this new "standard" is not readily compatible with the old "NK6K" one but is supposedly more easy to scan using software.

I would like to take a poll of which standard is preferred by the packet public. Drop me a line voting for one of following: the new MBL/BQE header; the old NK6K header; or why are we wasting time on a stupid issue like changing headers when there is so much needed work to be done. The results should be interesting. Send all votes via packet to AA4RE @ AA4RE.

Information wanted

I keep hearing that there is an interface between the TCP/IP electronic mail systems and the "forwarding-compatible" mailboxes but haven't been able to chase down the information. Anybody in the know, please drop a line.

Zip Code versus Area Code — continued

The consensus seems to be in. The Zip Codes have it. The accepted standard seems to be to send your traffic to "xxxxx @ NTSzz". xxxxx represents the full 5 digit zipcode while zz is the state designator.

In California, the NTSCA should be omitted for traffic within the state.

Food for Thought — One Man's Opinion

A New Year seems to be the time everybody makes forecasts for the future so why not me.

Look for a big change in mailbox programming within six months. There are at least four projects underway that not only are multi-port but multi-connect on each port. No other multitasking software (e.g. Desqview or DoubleDos) is needed. Several are now being tested on the air. Most are based on HOST-MODE interfaces and not the traditional TNC command set.

The generalized addressing of mail using Zip Codes will be applied in 1988 to all mail and not just NTS traffic. Pretty soon, you can just send mail to AA4RE @ US-95020 or some such thing.

Network bandwidth won't be able to keep up with volume of packet traffic. This is a scientific fact that users will always consume available resources.

Feedback Wanted

I would love to hear from you. Send any suggestions, comments, new tibits, and hate mail (in good taste of course) to packet: AA4RE @ AA4RE, CompuServe: 76064,2107 or USMail: 8660 Del Rey Court, Gilroy, CA 95020.

AEA PK-FAX Software

AEA has announced the release of their new "PKFAX" (tm) program for AEA's PK-232 and IBM PCs and true MS-DOS compatibles. PK-232 users can now receive weather charts and facsimile pictures and display them directly to the computer's video monitor. Pictures can be saved to disk, read from disk and retransmitted by FAX or packet. In addition, users can transmit pictures created by one of the available "Paintbrush" programs. The new software package will be available at amateur radio dealers in January, and will sell for \$24.95 amateur net

The "PK-FAX" program requires:
An IBM Personal Computer or close compatible
256K memory

Two floppy disk drives, or one floppy disk drive and a hard disk
A video graphics adapter and display
DOS 2.0 or above
A serial port
An AEA PK-232 or Heathkit HK-232 data controller
A serial cable capable of 4800 baud operation (included with PK-232)
A radio receiver capable of tuning facsimile frequencies.

"PK-FAX"'s usefulness is enhanced with:

A dot-matrix printer capable of bit graphics
A parallel port
A Paintbrush program
A radio transmitter

A typical "PK-FAX" configuration menu looks like this:

A. PK-232 serial port	COM1
B. Printer port	Parallel
C. Serial printer baud rate	1200
D. Serial printer parity	None
E. Printer data bits	8
F. Printer type	Epson
G. Printer graphics density	120 dpi
H. Printer status method	BIOS 23
I. Video adapter	Automatic
J. Transmit Morse ID	No
K. Callsign for Morse ID	PKFAX
L. Next auto-save disk file	(none)
M. Auto-save start time	12:00
N. Auto-save stop time	12:00
O. Screen display timeout	20 minutes

"PK-FAX" operates with the following printer types: Epson, Star Gemini, IBM, Star Micronics, Radio Shack, GX-100, Gorilla Banana, Apple "G", Texas Instruments, Apple "S", Genicom, Okidata 82/83 w/ Okigraph, Okidata 192, 193, NEC.

"PK-FAX" permits configuration with the following video graphics adapters:

0. Automatically selected
1. Hercules monochrome adapter, page 0
2. Hercules monochrome adapter, page 1
3. IBM Color Graphics Adapter (CGA)
4. IBM Enhanced Graphics Adapter (EGA)
5. IBM EGA with monochrome monitor.

"PK-FAX" saves pictures to disk in a file format compatible with "Paintbrush" programs, including PC Paintbrush (ZSoft Corporation), Logipaint Set (Logitech, Inc.) and Microsoft Paintbrush (Microsoft

Corporation).

You can create your own pictures with a "Paintbrush"-type program and save them to disk. As long as your homebrew pictures are in black and white, they are compatible with "PK-FAX" and you can read them into a buffer and then transmit your own pictures over the radio.

AEA has included a FRAME program on the "PK-FAX" disk to process the picture after "PK-FAX" has saved it, but before you use your Paintbrush program. FRAME is a program that pre-processes FAX pictures so that the resulting pictures are much more convenient to manipulate in Paintbrush. FRAME is not required between Paintbrush and "PK-FAX", as "PK-FAX" itself takes care of the re-sizing.

FRAME features include:

1. Processing pictures so the proportions are correct on EGA and Hercules video adapters.
2. Re-sizing pictures so they take up no more than a full screen, or a portion of a screen.
3. Rotating pictures clockwise or counter-clockwise.
4. Turning pictures upside-down.

"PK-FAX" also provides an "Auto-save" feature that permits you to store every picture that you receive and saves pictures to disk automatically, with sequential file names, starting and ending at times you select.

Producing an Issue of PSR

by Scott Loftness, W3VS

TAPR's Packet Status Register is largely put together from files provided electronically to the editor via electronic mail or diskette. In putting an issue together, I format and edit the articles using Microsoft Word on the Macintosh. Here the articles are highlighted appropriately, spell checked (if I remember), and generally cleaned up.

From Word, the articles are laid out using Pagemaker on the Macintosh. Pagemaker permits rapid text layout and adjustment, making that part of the editor's job enjoyable. The complete issue is then printed on an Apple Laserwriter Plus. Schematics are added in a final pasteup step and then the issue is ready to be delivered to the printer, printed, folded, stapled, labelled, stamped and mailed to you!

Red Ryder: A Packet Radio Terminal Construction Set for Any Mac->TNC

By Ron Cox
1182 Edison St.
Santa Ynez, CA 93460
(805-688-3540)
W9KFB @ W6IXU

RR TUTORIAL- CHAPTER 1

INTRODUCTION

When I first heard the name Red Ryder, I asked my self "What could that be; is it a toy cowboy terminal program?" I needed a serious terminal program! After trying a couple of early buggy commercial programs and some free terminal programs downloaded from CompuServe(tm), I finally downloaded an early version of Red Ryder. It had many cosmetic bugs, but I was impressed with its extensive file handling features, its programmable macros and the frequent updates that were providing bug fixes and functional improvements in response to user experiences. I sent in my registration fee and found that not only was I provided with the latest version in advance of it's availability to the masses via CompuServe(tm), but that I could now continue to get information, updates and support files from the GENie(tm) service that is similar to CompuServe(tm).

Soon I had macros programmed to logon to the mainframe at work using Red Ryder's VT-100 emulation and had automated all of the tedious procedures required for local access of CompuServe(tm) and GENie(tm). With later versions of Red Ryder I installed macros that allowed me to just select the BBS (radio or land line) I wanted, and Red Ryder would call and log me into the BBS selected.

After using Red Ryder for the land line modem for a while, I somehow thought I could probably create the macros I would need on packet radio with the extensive procedure programming language available in Red Ryder. Hopefully I could get a scrolling receive buffer, file transfer facilities, split-screen send and receive, cut and paste to clipboard (Edit menu)

features, and have a terminal program that I was familiar with operating on land-line modems. I also hoped to be able to operate the Red Ryder program in some form as a personal BBS when out of the shack.

I am happy to report that most of my goals have been accomplished with the Red Ryder program and what follows should at least get you started. I have updated this several times trying to keep it current with the version of Red Ryder and useful with the various packet BBS's I have used. Scott Watson has moved, I have moved, and Red Ryder is currently at version 10.3 and improving rapidly again after a long pause with version 9.4!

After reading this please let me know if I can add or clarify anything better. I have found that trying to explain terminal programs and file transfer features is very difficult, due to the wide range of experience that various operators have in digital technology.

The next chapter will tell you how to get the software required and how to connect the Mac to your TNC.

RR TUTORIAL- CHAPTER 2

The first thing you need is a copy of the software and the documentation. Until version 10.0, Red Ryder was shareware with the program and documentation available on the networks and BBS's. With version 10.0 Scott Watson has required that the program and documentation be first purchased from him. This initial purchase will also allow you to obtain updates via a special database on GENie(tm).

Don't think that you won't need the documentation, you will! Red Ryder can be obtained by contacting The FreeSoft Company, 150 Hickory Drive, Beaver Falls, PA 15010.

Next you need to put the software on a disk. The files are getting so large that I think is only practical to operate with more than 400K on line now. I have it installed on my 20 Meg hard disk, but I find it is frequently just as easy to use a 3 1/2" disk configured as described below when I don't

expect to be doing anything else with the computer. Take a fresh 800K "working" disk (or two 400K disks if you have not upgraded your 512K Mac) and place the following files on it:

Red Ryder V10.3 or higher	264K
Finder V6.0 or higher	160K
System V4.1 or higher	Variable
AutoBlack (named Macsbug in System Folder)	2.5K
Menu Clock	1.5K

Optionally, the following files on your "working" disk will enable you to transfer any Macintosh(tm) files (not needed for text files):

Stuffit	58K
(used for multiple file transfers, and file compression)	
BinHex V4.0	7.5K
(used to convert binary files to text files and back)	

Other files that you will need but should not be on your "working" packet terminal disk are:

AutoBlack Docs	4K
Font/DA Mover V3.2	33.5K
STUFFIT.DOC	23.5K
10.3 New Stuff(Plain Text)	14.5K
Install Keypad	12K
RedWriter D.A. V4.2a	13K
(Same as MockWrite from CE Software)	

To have a clock continuously keeping the time displayed in the menu bar, place the file %Menu Clock% in your working disk's "System" folder. Next, if you are operating from a Micro Floppydisk (3-1/2"), remove all the system fonts except Chicago 12, Geneva 9 & 12, and Monaco 9 & 12 using the Font/DA Mover. This is not absolutely necessary, but it will give you more room for packet files in the future if you keep the disk dedicated to packet use. Next use the Font/DA Mover to install the RedWriter D.A.(provided with Red Ryder from FreeSoft) and to remove all other desk accessories except the control panel any anything else you can't live without. RedWriter will be very valuable to you in preparing or reviewing the contents of a text file

prior to (or during!) an upload to, or download from a BBS.

Some Macintosh(tm) screen saver programs will not continue to let an application operate when the screen darkens. AutoBlack will allow Red Ryder to function normally while the screen is "Black" and will bring the screen back to life with any mouse movement. Place the AutoBlack "MacBug" file in the System folder and reboot the system to try it out. You will see an analog clock in random positions on the screen when the screen is darkened.

You will probably want to check out the operation of these items as much as you can now by running Red Ryder and the Desk Accessories you have installed. Stuffit and BinHex can also be run, but they are only useful for preparing files to be transferred or reconverting them after a transfer. I will explain the use of these files later. Read as much of the documentation as you can bear to now and experiment with the program menu selections. I don't think you can damage any of your files as long as you don't delete any of the working files listed above. Note that after running Red Ryder you will have a new file on your disk called "Red's 10.3 Stuff". Don't throw it away unless you want to go back to operating the software with the initial default values. This document will contain information that enables Red Ryder to remember many things about the last time you used it, such as parameters and macro key contents.

If you need to make a cable to connect your TNC to the Mac, Radio Shack has half the task already done for you. They sell a "Joystick Extension Cord", catalog number 276-1978. This cable consists of a DB-9 male-female pair with ten feet of interconnecting cable. Simply cut off the end that does not plug into the Macintosh(tm) and install a DB-25 to the remaining wires. Be sure to ohm out the wires to determine which wires connect to the DB-9's pins. Thanks to Brincomm Technology and KB7AG for this tip.

The DB-9 can be used with either the modem or printer ports on the back of

the Mac. If you use the printer port for packet (possible if you also have a land line modem and no printer) you will have to change the port selection in Red Ryder under the "Customize - Terminal Emulation Preferences..." menu selection.

Here are the pinouts required between the TNC and the Mac:

Note: Most cables supplied with Mac compatible modems should work between the Mac and the TNC although they do not implement the hardware handshake signal that some terminal programs use. I recommend that you use this cable for packet operation with Red Ryder in case hardware handshaking becomes available or in case you use another terminal program.

Macintosh (tm)	TNC-2	
Signal	DB-9	DB-25
Ground	1	-
+5V	2	-
Ground	3	7
TxD+	4	-
TxD-	5	2
+12V	6	20
Handshake	7	5
RxD+	8	-
RxD-	9	3

I also recommend that the TNC terminal interface be operated at 1200 B/S at first. Operation at 9600 B/S seems to work fine on many TNC's. I found that U3 (a LM324) had to be replaced with a TL084, which has a much higher slew rate, in my TAPR TNC-2 clone to enable operation at 9600 B/S.

The next chapter will be devoted to configuring the terminal software for packet operation.

RR TUTORIAL CHAPTER 3

This part of the configuration of Red Ryder for operation on packet radio will vary to some extent depending on the TNC parameters that you have available. I hope that by reading your TNC's manual you can determine what is best for your setup. I will give you what I have for a TAPR TNC-2

and you should be able to determine if you can duplicate the function in your TNC, or work around it somehow. It may be helpful to share what you come up with for other TNC's on the CompuServe(tm) Hamnet, the GENie FreeSoft RoundTable Library, or your local packet BBS.

To get you started on communicating on packet with Red Ryder, I will first give you the menu settings that should be manually set for packet operation. These settings can be saved by the "Save Settings to Disk..." selection under the "Customize" menu. The settings should work after the TNC-2 is "RESET" (all parameters at their default settings). This will get you communicating, but will not provide all of the features that the full set of macros will.

RED RYDER MENU SETTINGS FOR PACKET OPERATION

Pull down the "Local" menu and select the "Change Serial Port Settings..."

You should now select the following: 1200 Baud, NO parity, 8 data bits, 1 stop bit and Half duplex. You may be able to run faster and operate with 7 bits, but I know this works with the other files we will be working with, so save the experimentation until after you get more familiar with the system operation, OK?

While we are at the "Local" menu select the "Buffered Keyboard Status Bar" option. This option is as close to a split screen transmit and receive as you can currently get in Red Ryder. You will find it will be very useful to keep the incoming text separate from the text you are preparing for transmission in a real time QSO with another packet operator. The buffered keyboard will be relocated to the bottom of the screen after running a special start-up file we will cover later. If you want to remove the buffer for other services where you need the full screen, it may be removed and recalled by the "Local - Buffered Keyboard Status Bar" option or by just Typing a "Command/B". You will have to remember to always select the "Buffered Keyboard" option each time you start up the program if you turn it off as there is currently no procedure

command to make sure it is turned on. The fact that it was turned on or off when you last quit is saved in the "Red's 10.3 Stuff". Hopefully the ability to absolutely set the buffered keyboard will be provided in a later version.

The buffered Keyboard will now hold 32,000 characters. Scott Watson has put in a special feature with packet radio in mind! "As usual, pressing the Return key will send the contents of the keyboard buffer. However, typing Shift-Return will instead put a special "carriage return" character in the keyboard buffer, allowing you to type multiple lines of text. The "carriage return" character is translated to a true carriage return when the Return key (unshifted) is later pressed and the buffer is sent."

The "Customize" menu Red Ryder parameters will be set next.

Select "Terminal Emulation Preferences..." from the "Local" menu.

The "Display Columns (20-132)" is a matter of personal preference, but I think you will find that most packet communications is setup for 80, so lets use that for now.

"Cursor style" is also a matter of personal preference, I like the flashing cursor.

"Terminal emulation" should be set to TTY.

"Modem is connected to" should be set to the modem port and this is where you should have your TNC if you want to operate the interface at a rate higher than 1200 B/S. We have selected 1200 B/S, and Apple suggests that you not use the printer port at a rate higher than 300 B/S.

The "Scroll up lines before full-screen clear" is not required in packet operation. It may be needed in the VT-100 emulation mode with other services.

"Enable CompuServe 'RLE' graphics" should be off.

The next selection under the "Custom-

ize" menu is the "Keyboard Mapping Preferences..."

The "Modem BREAK signal keys supported" will be useful for getting out of any of the TNC's communication modes and back to the command mode when you are connected, so select this option. To return to the command mode at any time you can then just do a SHIFT-BACKSPACE (SHORT-BREAK).

The only other option that you need to worry about here is the what key to use as the "Control or CTRL" key. I use the Mac's "Option" key so I can use the "COMMAND" key for menu choice equivalents. Note that the documentation says that with this choice, to send a CTRL-E, N, or U you will have to press the press the key twice. This is not a problem because the control keys that you will be using most on packet are the CTRL-Z to end a message, CTRL-S to hold the TNC's output and CTRL-Q to restart the TNC's output.

"Personal Preferences..." is mostly just what it says. I think that you will want to select the "Cancel procedure in progress when new procedure is executed" and the "Strip control characters" allows tabs to pass through". The Buffered keyboard right margin column set at the default value of 80 will work best for most packet communications.

The "Set Saved Screens Buffer Size..." option under the "Customize" menu gives you the scrolling buffer you will find to be one of the best features of Red Ryder on packet. I operate with 20 screens but you can operate with more. If you have a 1 Meg RAM you can operate with about 99 screens. Scott Watson says that 99 screens is the equivalent to a Mac with a 45 foot high display screen!

INITIALIZING THE TNC

Here is where I must get specific to the TNC-2. I hope you can set your TNC to an equivalent state or work around any problems due to the differences in TNC's.

The first file that you will now create, I call the "TNC INITIALIZE" file. This is a file that when executed as a procedure, will always get you back to a known state. It doesn't set all of the TNC parameters, so if you really want to be sure what state your TNC is in without checking every parameter with the TNC "DISPLAY" feature, do a "RESET" before you execute this procedure file.

Use RedWriter and paste the following into a blank page, or use MacWrite(tm) and save it as a text file with CR's after each paragraph. Save it as: "INITIALIZE TNC-2 & RR.TXT".

```
(INITIALIZE TNC-2 & RR: Label = Reset TNC-2)
(By Ron Cox, W9KFB 11/1/87)
COMM 1200-N-9-1-HALF
TTY
DISPLAY 80
SHORT BREAK
TYPE ^S
TYPE AWLEN 8^M
TYPE AX25L2V2 ON^M
TYPE CLKADJ 11^M
TYPE CONSTAMP ON^M
TYPE PARITY 0^M
TYPE ECHO OFF^M
TYPE MONITOR OFF^M
TYPE BTEXT ^Santa Ynez, CA^M
TYPE MYCALL W9KFB^M
TYPE MYALIAS W9KFB^M
TYPE WERMODE ON^M
TYPE HSTAMP ON^M
TYPE FLOW OFF^M
TYPE TRFLOW OFF^M
TYPE TXFLOW ON^M
TYPE XFLOW ON^M
TYPE PACLEN 80^M
TYPE BU OFF^M
TYPE FRACK 6^M
TYPE AUTOLF OFF^M
TYPE SCREENLN 0^M
TYPE HFLITER ^M
TYPE HEADERLN ON^M
TYPE SCREENLN 0^M
TYPE CMSG ON^M
TYPE COMMODE CONV^M
TYPE CFACTIME ON^M
TYPE FACTIME AFTER 10^M
TYPE CR OFF^M
TYPE SENDPAC 800^M
TYPE STREAMSW 800^M
TYPE LFIGNORE ON^M
TYPE CBELL ON^M
TYPE UNPROTO ID^M
TYPE BEACON AFTER 250^M
TYPE LCALLS NONE^M
TYPE CTEXT Name: ^Ron^^V^MOTH: Santa Ynez,
CA USA^V^M N. of Santa Barbara, CA^M
CLEAR
TYPE ^O
(end)
```

A text file must be changed to a procedure file by pulling down the "Service" menu and selecting the "Change TEXT to Procedure" and double clicking the "INITIALIZE..." file. The file will be compiled into a fast operating Red Ryder Procedure. You now can execute the procedure by the "Initiate Procedure" selection under the "Service" menu. Be sure to change the BTEXT, MYCALL, MYALIAS, LCALLS, and CTEXT to

what you need first! You may want to change some of the parameters per your local LAN guidelines or personal preference, but this should get you started, and they are compatible with the macros that will be described in the next chapter. Have fun!

RR TUTORIAL CHAPTER 4

PROCEDURES

Now we start on the fun stuff, procedures and macro keys!

The first procedure that you need to make is the one that is run each time you start up Red Ryder. It has to be named "RRJS", and it should only be long enough to insure that the terminal parameters are set correctly. If you don't use Red Ryder for any other modem communications, the file doesn't have to contain anything. You should have such a file even if it is blank to stop the Red Ryder startup screen from slowing down the program startup. I like to make sure that the TNC is in the command mode, reset the CTEXT to a certain message, set the TNC time to the Mac's time and make sure the TNC buffer is released. This is my startup procedure "RRJS":

```
(RRJS: Label = Packet Mode)
(By Ron Cox, W9KFB 11/1/87)
QUIET
PUTPARAM 12,1
MBAF 1
COMM 1200-N-8-1-HALF
TTY
DISPLAY 80
TYPE CTEXT Name: "Ron"~V~MOTH: Santa Ynez,
CA USA~V~M N. of Santa Barbara, CA~M
TYPE BTEXT "Santa Ynez, CA~M
TYPE BEACON AFTER 250~M
TYPE LCALLS NONE~M
(Set TNC-2 time procedure developed by N6PHJ
& N6IU, Ray, San Jose, CA)
(Get the year in 19XX form and chop off the
first two ds.)
COPYINTO OS,0
GETGLOBAL X0,7
NUMTOSTRING X0,XS
RIGHTS AS,2,XS
(Get the month and pad with a "0" if
necessary to get 2 digits.)
GETGLOBAL B0,5
NUMTOSTRING B0,BS
TEST B0 <- 9
IF YES CONCAT OS,BS
TEST B0 <- 9
IF YES COPYINTO BS,OS
(Get the hour and pad if necessary.)
GETGLOBAL C0,6
NUMTOSTRING C0,CS
COPYINTO OS,0
TEST C0 <- 9
IF YES CONCAT OS,CS
TEST C0 <- 9
IF YES COPYINTO CS,OS
(Get the hour and pad if necessary.)
GETGLOBAL D0,8
NUMTOSTRING D0,DS
COPYINTO OS,0
```

```
TEST D0 <- 9
IF YES CONCAT OS,DS
TEST D0 <- 9
IF YES COPYINTO DS,OS
(Get the minutes and pad if necessary.)
GETGLOBAL E0,9
NUMTOSTRING E0,ZS
COPYINTO OS,0
TEST E0 <- 9
IF YES CONCAT OS,ZS
TEST E0 <- 9
IF YES COPYINTO ES,OS
(Jam all this stuff together in one string
variable.)
CONCAT AS,BS
CONCAT AS,CS
CONCAT AS,DS
CONCAT AS,ES
(Enter the command to set the time.)
TYPE DAYTIME
TYPE AS
TYPE ~M
TYPE ~Q
PAUSE
CLEAR
TYPE DAYTIME~M
(end)
```

Don't forget to compile this and all the following text files to procedures as you did before so that they will be usable with Red Ryder.

The next procedure you will need is a disconnect. The SHORT BREAK is the fastest way back to the command mode. The SHORT BREAK Red Ryder command (233 ms) seems to work fine for my TNC-2. At 9600 B/S but some TNC's will not disconnect correctly with only the SHORT BREAK. If you never plan to operate in the transparent mode, you can also use a "TYPE ^C" command. Here is my "DISCONNECT" procedure:

```
(DISCONNECT: Label = Disconnect)
(By Ron Cox, W9KFB 11/1/87)
SHORT BREAK
PAUSE
TYPE DI~M
(end)
```

Here is the procedure I use to connect to W6IXU via a NETROM node near my QTH (SBA):

```
(C W6IXU/SBA: Label = W6IXU)
(By Ron Cox, W9KFB 11/1/87)
TYPE C SBA~M
PROMPT D to SBA
PAUSE
TYPE C W6IXU~M
PROMPT W6IXU
PAUSE
TYPE C~M
(end)
```

Want to leave your Mac in Red Ryder's HOST mode while you are out? Here is a procedure to do the HOST mode:

```
(DOHOST: Label = Host Mode)
(By Ron Cox, W9KFB 11/1/87)
SHORT BREAK
TYPE CTEXT W9KFB, Ron @ Santa Ynez~V~MRR
HOST MODE ON~V~Mtype:~V~MSENDA I~M
TYPE BTEXT "HOST IS ON~M
TYPE BEACON AFTER 0~M
```

```
TYPE LCALLS W9KFB~M
PAUSE 200
HOST
(end)
```

Note that you need to set up an instructions file named "I" to tell your connectors what to do. Here is my "I" file:

```
(I)
(By Ron Cox, W9KFB 11/1/87)
W9KFB Host Instructions:
Download "HOST" via a text file capture for
more info:
- Type several Return's, then type:SENDA
HOST
- Use UPPERCASE only for the SENDA command
- A file list can be obtained by downloading
FILE LIST (SENDA FILE LIST)
```

```
CUL, Ron
(end)
```

MACRO KEYS

The last thing you need to do to complete your custom TNC terminal program is to setup your Macro Keys. Your Macro Keys will be used to initiate all of the procedures established above. They also will be used to give you a "Stations heard" report and a quick way to connect to your local BBS's or frequently connected stations.

Macro Keys are used to send up to 240 pre-stored characters with only one keystroke or mouse click. There are 30 macro keys available in Red Ryder, so with ten keys used to execute the five procedures above and five other packet functions, you will have 20 left for connecting to land-line BBS's or frequently connected stations. You can call them by typing Command/0-9 if the key you want is active (displayed in the Macro Status Bar). I find it easier to just use the mouse and click on the one I want. Notice the "Scroll buttons" in the Macro status bar to look at all the macro keys (Select "Macros Status Bar" under the "Local" menu).

Scott has made it easy now to load your macro keys with procedure calls. He has a new button in the "Edit Macro Key" dialog box called "Get Procedure File". To put a procedure call into a Macro Key, just click this button and you will be prompted to select a procedure file. "Red Ryder will construct a valid path name to the file and insert it in the Macro Key String (complete with the leading backslash

character)." You will at this time also assign a label to the Macro Key in the dialog box.

If you have only a short command to send that does not require the procedure commands to Red Ryder, then just enter the text into the dialog box using a control-M (entered as a ^M) at the end of the command to send a return to the TNC after the command.

You can arrange the keys anyway that seems best for you, but here is an example of one of my current setups:

SET KEY	String	Label
Notes		
1	0 \RR:DISCONNECT Disconnect from QSO	Discon-
1	1 \RR:INITIALIZE TNC-2 & RR Reinitializes TNC & RR	Reset
1	2 \RR:MAILBOX	Mailbox
1	3 MH*M Lists calls heard	Calls
1	4 MHC*M Clears calls heard	Clear
1	5 \RR:DOHOST Host Mode	Host Mode
1	6 \RR:RRJS Also used on start of RR	Packet
1	7 =K=*M Used in QSO's	-K-
1	8 \C W6IXU/SBA Connect to W6IXU	W6IXU
1	9 73 from Ron Cox in Santa Signature for Messages Tnc2, CA USA *W9KFB @ W6IXU *2-M	73 *2

Be sure to save your macro keys by selecting "Save Macro Keys..." under the "Edit" menu. Also note that I have forced the use of a disk called "RR" by the "RR:" prefix in the strings that call procedures.

Remember here in the procedures and macro keys is the place to make life on packet easier for you. You will be able to write procedures that check and save your mail in the middle of the night, but that will have to be the topic of another chapter yet to come. For now with these macros, I think that Red Ryder is hard to beat! Let me know what you think, or any improvements to this that you have found. I can be reached by sending a message to W9KFB @ W6IXU on any W0RLI type BBS. Chapter five will follow explaining how Macintosh(tm) files may be sent via packet radio.

RR TUTORIAL CHAPTER 5

MACINTOSH(tm) FILE TRANSFERS

ON PACKET RADIO

You have lots of options for transferring files via packet radio with Red Ryder. You can think of files, for the purpose of packet communications, as being in two basic categories. The first type is "text" which means that you saved it from RedWriter, MockWrite, or with the "text" option in some other application program such as MacWrite(tm), or BASIC. The second type is "binary" which I consider to be any application or document that is not a text file. If it isn't a text file, you must use either XMODEM or Kermit protocols to send them from Red Ryder.

It turns out that XMODEM and Kermit protocols are not very efficient for binary file transfers on packet due to the channel turn around times. The best solution will be new software programs coming that transfer "Macbinary" files using the AX.25 protocol. Here is Jack Brindle's statement regarding the next release of MACPACKET/TNC2term(tm) software:

"The Binary transfer mode is currently being implemented. It will not use XMODEM (which fails due to timing problems on packet), but will use true data communications protocols based on the CCITT X.225 specification. The protocol used is defined in the "Proposed AX.25 Session Layer Protocol." You can download a copy from Hamnet's DL9 area. MacBinary formatting will also be supported so that you will be able to transfer a "double-clickable" application. And while you are transferring it, you will still be able to converse with others, or transfer other files..."

Another problem that will be with us for a while after such software becomes available is that many other operators still will not have the updated compatible versions.

BINHEX

There is a way to convert Macintosh(tm) "binary" type files into text files for transmission on packet. The early land-line BBS's must of had

the same problem with ASCII control characters, because the early versions of a program called BinHex avoided these characters also. The last version of this program that has this feature is version 4.0. The last version of BinHex available in Compuserve's MAUG DL8 is version 5.0. This version will still convert version 4.0 files, but if you use it to convert a file for transmission, it will put it into the Macbinary format which will not work with the software flow control we are using in Red Ryder. Here is part of a message from Bob Morrow, WB6GTM, in Flora, IN concerning BinHex version 4.0:

"I think the answer to the file transfer problem is to continue using the BinHex4 format for a number of reasons. The BinHex4 character set consists of:

```
!"#$%&'()*+,-
0123456789:;@A[ \]^_`{|}~
` for a total of 64 characters.
```

These are probably mapped one-to-one into the consecutive binary set 000000 to 111111 when the file is un-BinHexed. The forward mapping when BinHexing a file into the ASCII set is probably done by simply encoding the binary file 6 bits at a time. Note the ASCII representation of BinHex4 carefully avoids special-use characters such as the backslash. This allows us to make "safe" Mac-to-Mac file transfers without affecting other terminals on the air, and to use BBS mail without problems as well. The penalty, of course, is a 29% reduction in transfer speed, based upon a 7-bit full ASCII alphabet, or a 37% reduction compared to a straight 8-bit binary file transfer. The actual transfers on packet will be a bit slower still, because of the header and acknowledgement overhead from the additional packets. However, in my opinion the speed cost is worth the added safety and ease of transferring files on packet."

When using BinHex version 4.0, there

are only a couple of things to know:

"Application -> Upload" under the "File" menu converts any file you select to a compatible text file. Please use the convention of adding a .HQX suffix to the filename to indicate that the text file has been converted and must be converted back before use.

"Download -> Application" under the "File" menu converts a filename.HQX file back to the original application or document form. It may show up as a new icon on your desktop if the icon resource is included with the file. If it appears as a blank document, the correct icon will show up when you get it on to a desktop with its correct application. Leave the "TEXT filter" on as that just makes it so that only TEXT files are displayed in the minifinder when you are asked to select the file to convert back to an "application".

STUFFIT

Stuffit is a handy program to have when you want to prepare many small files for conversion with BinHex and transmission on packet. This collects them up into a single file and makes the whole process simpler. It also assures you that the one receiving the files gets all or nothing (that is in the spirit of packet radio). This will require the file receiver to have the Stuffit program also to unpack the file after he converts it back to an "application" with BinHex. What tips him off to use this file is that after he converts the filename.HQX file, he gets a filename.SIT file. This is another convention you must follow to avoid undue confusion. Use the .SIT suffix on your Stuffit files. The latest Stuffit program also has several compression options that will compress most files depending on the length and the amount of data redundancy. After compression, such files converted to text files may be shorter than the original "binary" version.

RR TUTORIAL CHAPTER 6

TEXT FILE PREPARATION

Due to the fact that most of the Macintosh(tm) users are not used to formatting text files, this seems to be a

bit of a problem. It is required due to two facts. first, if you transmit them unformatted (with no carriage returns at the end of lines), most terminal programs will not format them for you. Also when unformatted files are sent via packet, they will be sent at the maximum packet length which will give some BBS's problems with users who have marginal signal strength.

Red Ryder will put in a carriage return at the end of an eighty character line but will not wrap a word to the next line, that is why we run with SCREENLN 0 in the TNC parameters. The Red Ryder text file capture will not put extra carriage returns in the file, but few will be reading captured files on word processor programs for many of the messages you will be sending. RedWriter has a default screen size of 79 characters, so if you prepare your messages on RedWriter and make sure you don't wrap any words by hitting a "return" every time you see the cursor getting close to the end of a line, these files should be OK (easier said than done though).

A better choice is to use the program "EDIT" with the screen set to 79 characters. This program will prepare text files without wrapping on line ends and has some other nice editing features. The problem with this program is that it doesn't operate as a desk accessory from Red Ryder and "EDIT" will not read "text" files that were not created with "EDIT". This can be fixed by changing a file's "Creator" to "EDIT" with a program like MacTools(tm) or by changing the "Creator" in the text files option in Red Ryder to EDIT from MACA (MacWrite(tm)). Both Red Ryder and RedWriter will read the "EDIT" type files as well as other types of text files.

The problems start when you want to prepare a file unformatted so that you can do some major editing before you ship it out. The longer the document, the greater your desire to do this will be due to the difficulty of resizing a changed paragraph if it is already formatted. One solution to this is to get the unformatted file into MacWrite(tm) and then change the font for the entire document to a evenly spaced font such as Monaco 9 point. Then figure out where the end

of 64 or 80 characters is by putting in a line of "1234567890"s repeated. Set your right margin marker to this spot and wait until the document reformats its self to the new size. Then do a "Save as" as "text" and pick the "place carriage returns at line breaks option". This will get your unformatted paragraphs the way you want them, but it adds an extra carriage return for each on you already had at the end of paragraphs and double spaced line become quadruple spaced lines! The only thing I know to do here is just go back and remove the unwanted CR's. I wish I had a better solution, and I hope some one out there in packet land has a better idea. After you have saved the new text file formatted and have deleted all of the extra CR's, save the file with the "Save as" and "text" function using the "paragraphs" option or you will get all of your unwanted CR's back and double space all of your text. If you survive all this, your text should be ready for transmission via packet radio!

A final word on style. Many BBS's still use CR's to define packets. Try to use a style that has as few CR's as possible. I have been very guilty of violating this recommendation, but who says you can't teach an old ham new things?

RR TUTORIAL- CHAPTER 7

ADVANCED MESSAGE HANDLING PROCEDURES

Here is a procedure to save messages to a disk file. Many thanks to KA6DVN, Bill in Escondido, CA, for this great procedure!

```
(MAILBOX: Label = Mailbox)
(KA6DVN's mailbox procedure modified for
TNC-2 by N9KFB on 10/9/87)
QUIET
CRAWL OFF
(MAKE SURE ON 24TH LINE AND BACKSPACE OVER
ANY GARBAGE THT MAY BE IN TNC)
TYPE
"*****"
PAUSE 120
TYPE ~M
PAUSE
TYPE "*****"
(GO SETUP THE STRINGS THAT WILL CONTAIN THE
CALL AND THE NAME)
(OFF THE FOLKS THAT WE WANT THE PROCEDURE TO
RECOGNISE)
GOSUB SETUPST
COPYINTO @0, .....
UNATTENDED Mode *****
: LOOP
(THE FOLLOWING ONPANIC EXISTS SIMPLY SO THAT
THE PROCEDURE CAN)
(CHECK TO SEE IF OPERATOR DELETED THE
MONITOR FILE WHILE)
```

```

( THE PROCEDURE WAS OPERATING)
( OTHERWISE, PROCEDURE MUST BE EXITED AND
RESTARTED TO CLEAR THE)
("A Message is waiting" MESSAGE ON LINE 1)
(A VERY MINOR CONVENIENCE, BUT WHAT THE HEY!)
ONPanic JUMPTO LOOP
PANICAFter 300
ERASE #1
(SEE IF A MONITOR FILE EXISTS - INFORM
OPERATOR IF ONE DOES)
USEROPEN1 1,HD-20:PACKET:MONITOR
IF ERROR JUMPTO ARNDTHIS
( IF HERE, ONE DOES EXIST, SO INFORM
OPERATOR)
COPYINTO #1, A Message is waiting
USERCLOSE 1
:ARNDTHIS
COPYINTO #2,
Waiting for a CONNECT Packet
# ON
SHOW#
( WAIT FOR DED ROMS TO SAY WE HAVE A
CONNECTION.)
(SURE HOPE THAT OTHER STATIONS ON FREQUENCY
DON'T SEND THIS STRING AS)
(DATA...A FALSE CONNECT INDICATION WOULD
RESULT!!!!!!)
(BOY, SURE WISH RED WOULD BE FLEXIBLE ENOUGH
TO)
(LET US INTERFACE W/ THE TNC'S HOST MODE)
PROMPT * CONNECTED to
PAUSE 120
(GOT A CONNECT PACKET - GET THE PERSONS CALL
AND SEND GREETING IF)
( I KNOW WHO IT IS)
(GOT CALL FROM LINE 23 AS CARRIAGE RETURN
FOLLOWS CONNECT MSG)
GETLINE 23,B#
(OPEN THE MONITOR FILE)
RECA HD-20:PACKET:MONITOR
TYPE "M
TYPE connected at
TIMEDATE A#
TYPE A#
TYPE "M
( THE PERSONS CALL IS LOCATED RIGHT BEFORE
THE via)
(change this for different roms)
INSTR A#,B#,1, (
(A# NOW CONTAINS OFFSET OF END OF THE
PERSONS CALL)
SUBTRACT A#,17
(A# NOW CONTAINS LENGTH OF CALL AND CALL
STARTS AT POSITION 18)
(change the 17 in the subtract statement for
different roms.)
(as well as the 18 in the following MIDS)
MIDS C#,18,A#,B#
(C# NOW CONTAINS THE CALL)
(NOW, GO SEE IF WE KNOW WHO IT IS)
GOSUB FINDNAME
(FINDNAME USES M# AS WORK STRING)
(THE NAME WILL BE IN Z# IF IT EXISTS)
LENGTH A#,Z#
TEST A# <> 0
( IF YES, WE KNOW WHO IT IS, SO GO SEND
GREETING)
IF YES GOSUB NAMENSG
(GO SEND A MESSAGE FILE IF ONE EXISTS)
GOSUB SENDFILE
(GO SEND THE COMMON MESSAGE)
GOSUB MAINMSG
( IF A DISCONNECT PACKET HASN'T BEEN RECEIVED
IN 480 MINUTES, THEN)
(FORCE A DISCONNECT)
ONPanic JUMPTO DISC
PANICAFter 28800
(LIST THE STATUS OF THE CHANNEL SO THAT THE
PERSONS CALL WILL)
(BE IN THE MONITOR FILE (A LAZY WAY OF DOING
IT!!!!))
SHORT BREAK
PAUSE 120
TYPE C"
PAUSE 120
TYPE COM"
COPYINTO #2,
ing for a DISCONNECT Packet
# ON
SHOW#
(CHANGE FOLLOWING PROMPT IF USING DIFFERENT
ROMS)
PROMPT * DISCONNECTED
:DISC
( SEND A DISCONNECT COMMAND TO THE TNC)
SHORT BREAK
PAUSE

```

```

TYPE DI"
:CLOSEIT
(CLOSE THE MONITOR FILE)
CLOSE
JUMPTO LOOP

:MAINMSG
TYPE Ron is not at the terminal at the
moment."
TYPE Red Ryder will save any messages to
disk that you might have for him."
TYPE You have 8 hrs. to complete, after
which a disconnect"
TYPE will be forced, assuming you haven't
already."
TYPE You may start now and thank you for
connecting to W9KFB. CUL - Ron...."
RETURN

:NAMENSG
TYPE Hello
TYPE Z#
TYPE ,
TYPE "M
TYPE "M
RETURN

:SENDFILE
(THIS WILL SEND A FILE NAMED MSGFILE LOCATED
ON A DISC BY THE NAME OF)
(RR10.0 IF IT EXISTS)
( IF ONE DOESN'T EXIST, IT DOESN'T MATTER)
( THE FILE IS SENT FOR EVERY CONNECT, WHETHER
THEIR CALL IS IN THE)
("NAME" STRINGS OR NOT)
USEROPEN1 2,HD-20:PACKET:MSGFILE
( IF ERROR, NO MESSAGE FILE, SO JUST RETURN)
IF ERROR RETURN
:SENDLOOP
( IF HERE, A FILE EXISTS, SO TELL RR TO PUT
THE FIRST "RECORD" IN)
( THE STRING M# - NOTE: A "RECORD" IS A BUNCH
OF CHARACTERS FOLLOWED)
( BY A CARRIAGE RETURN. IT IS YOUR RESPONSIBI-
LITY TO MAKE SURE THAT)
( EACH LINE TO BE TRANSMITTED ENDS WITH A
CR!!)
('NOTHER NOTE: RED DROPS THE CR THAT ENDED
THE RECORD, SO WE MUST)
( SEND ONE LATER...)
USERREAD 2,M#
( IF ERROR, EITHER END OF FILE OR A REAL
ERROR)
( WE CAN'T DO ANYTHING IN THE PROCEDURE ABOUT
REAL ERRORS SO,)
( BLINDLY ASSUME IT IS EOF AND FINISH UP
GRACEFULLY)
IF ERROR JUMPTO SENDCRS
( NO ERRORS AND NOT END OF FILE, SO SEND THE
"RECORD")
TYPE M#
( SEND A CARRIAGE RETURN TO THE TNC TO TELL
IT TO TRANSMIT THE LINE)
TYPE "M
( GO GET THE NEXT RECORD, AND CONTINUE UNTIL
EOF)
JUMPTO SENDLOOP

:SENDCRS
TYPE "M
TYPE "M
RETURN

:FINDNAME
(FINDNAME CALLS EXTNAME, "PASSING" M# AS A
"PARAMETER")
(EXTNAME COMPARES THE CALL IN M# TO THE)
( OPERATORS CALL IN C# (PLACED THERE
EARLIER))
( IF THEY ARE THE SAME, EXTNAME RETURNS THE
OPERATORS NAME IN Z#)
( THIS IS DONE FOR EACH STRING THAT WAS
CREATED IN SETUPST, OR)
( UNTIL A MATCH IS FOUND ON THE CALL)
COPYINTO M#,D#
(EXTNAME GETS THE NAME PART OF THE STRING)
GOSUB EXTNAME
(SEE IF Z# HAS A NAME IN IT, IF SO WE ARE
DONE HERE)
LENGTH A#,Z#
TEST A# <> 0
( IF YES, RETURN TO THE CALLER. AND THE
CALLER WILL TRANSMIT THE NAME)
IF YES RETURN
( IF HERE, NOT FOUND SO LOOK AT NEXT ONE)
COPYINTO M#,E#
GOSUB EXTNAME

```

```

LENGTH A#,Z#
TEST A# <> 0
IF YES RETURN
COPYINTO M#,F#
GOSUB EXTNAME
LENGTH A#,Z#
TEST A# <> 0
IF YES RETURN
COPYINTO M#,G#
GOSUB EXTNAME
LENGTH A#,Z#
TEST A# <> 0
IF YES RETURN
COPYINTO M#,H#
GOSUB EXTNAME
LENGTH A#,Z#
TEST A# <> 0
IF YES RETURN
COPYINTO M#,I#
GOSUB EXTNAME
( NO MORE STRINGS LEFT TO EXAMINE, SO JUST
RETURN)
RETURN

```

```

:EXTNAME
(MAKE SURE Z# IS EMPTY)
ERASE Z#
(SEE IF M# HAS THE CALL WE ARE LOOKING FOR)
CONTAINS M#,C#
IF NO RETURN
( IF HERE, THIS IS THE ONE, SO EXTRACT THE
NAME)
(FIND THE SPACE DELIMITER - )
(SPACE WAS TYPED BY ME AFTER LAST COMMA IN
NEXT INSTRUCTION)
INSTR A#,M#,1,
(A# HAS OFFSET OF FIRST CHAR IN NAME)
LENGTH B#,M#
SUBTRACT B#,A#
(B# HAS LENGTH OF NAME)
RIGHTS Z#,B#,M#
(Z# NOW HAS THE NAME)
RETURN

```

```

:SETUPST
(CREATE THE CALL/NAME STRINGS OF THE FOLKS
WE TALK WITH THE MOST)

( IF USING MORE OR LESS (OR FOR THAT MATTER,
DIFFERENT) STRINGS THAN)
(WHAT ARE USED HERE, )
( FINDNAME MUST BE MODIFIED TO HANDLE THE
DIFFERENT STRINGS )
COPYINTO D#,KB6NVH Brian
COPYINTO E#,KB6NVH-15 Brian
COPYINTO F#,N6AS Phil
COPYINTO G#,N6AS-15 Phil
COPYINTO H#,N6PHJ-15 Ray
COPYINTO I#,W9KFB Ron
RETURN
(end)

```

I hope this inspires a few more to hook up a Macintosh(tm) on packet radio. Let me know how you were able to use any of these hints and how you like using Red Ryder on packet radio.

CUL- Ron, W9KFB @ W6IXU
[Note: this article available online in the HamNet DL9 Data Library]

PLEASE VOTE IMMEDIATELY!

Your TAPR Board of Directors Annual Election is now underway. For your vote to count, the official ballot inside the back cover of this issue must be received in Tucson by February 15th.

Please read the article describing the candidates' qualifications and get your ballot mailed to TAPR immediately!

Thanks ... from the TAPR Board!

PS-186 Project Status (01/01/88)

from Franklin Antonio, N6NKF

What is it?

The PS-186 is a 4-port high speed (>1Mbit/sec) packet switch designed by WB6HHV, KA6IQ, & N6NKF. Goal of the present prototype phase is to build eleven PS-186 boards, and deliver them (at no cost) to software developers. In the upcoming software development phase, our goal is to have software implementing many of the major amateur radio networking protocols on the PS-186 become widely available.

Status:

Nine prototype PS-186 boards are now built & tested. Two additional boards will be built in the next week or so.

Our work in recent weeks has focused on getting finished boards, debugger, documentation etc together and into the hands of the software developers.

The major news is that SIX completed PS-186 boards and documentation have now shipped to software developers (outside the N6NKF, KA6IQ, WB6HHV group). The software development phase is beginning! We hope the news on this project in the future will be about SOFTWARE developments and availability.

RS232 interface daughterboards arrived 11/20/87 from the PC board vendor, and were assembled and distributed to the software developers the next week. A TAPR-style modem disconnect interface daughterboard (with hardware timers) has been designed, but is not yet into layout. We're also considering a 1200 baud modem built entirely on one of the 2.75" x 3.75" daughterboards.

We stuffed a PS-186 with almost-all-CMOS and tested it in November. (Previous proto PS-186 boards were stuffed with higher power NMOS parts.) All parts were CMOS except for the PALs. This version worked as expected, and used 600 mA of +5V (with processor running @ 8 MHz). After we put in the CMOS PALs we

think the board will easily slip under our 2 watt goal. We plan to do some measurements soon on an a minimal configuration running at reduced clock frequency to see just how low the power consumption can go.

We borrowed some 128Kx8 static RAM hybrids and tested a board in the maximum memory configuration on 11/21. It worked fine. These 128Kx8 RAMs are still too expensive for us to buy, and they're hard as heck to get as free samples. (We've stuffed the proto PS-186 boards with the cheaper 32Kx8 chips.) The hardware design has now been tested in almost every imaginable configuration.

We've started the process of altering the CAD database for the board to fix several minor problems which have been discovered so far. Hope to have film for the next version (which we expect will become the production version) within a few weeks, then go out for another small round of boards to verify the changes.

Ron Raikes, WA8DED, reports that as of 12/12/87 an experimental version of NET/ROM is running on the PS-186. Fast work Ron! Ron was careful to point out that this software is experimental, and is NOT available from Software 2000 at this time.

Paul Williamson, KB5MU, has written an "Assemble" command for the debugger. It will be included in the next version of the PS-186 debugger ROMs.

More information:

The PS-186 is described in detail in WB6HHV-KA6IQ-N6NKF's paper in the ARRL 6th Computer Networking Conference. The paper includes the rationale for the project, specs, block diagram, detailed circuit descriptions and complete schematics. Collected papers from the conference are available from ARRL for \$10.00 plus \$2.50 p/h. A text-only copy of the paper has also been uploaded to CompuServe.

We are frequently asked "How much do they cost?". The prototypes are being made available to software developers at no cost. Unfortunately,

there are no units beyond the prototypes are available at this time. We are working to determine how production PS-186's will be made available, and will distribute this information as soon as it firms up.

73, N6NKF
(for N6NKF, KA6IQ, & WB6HHV)

Request for Information on BBS Software

I'm trying to compile a list of public domain packet radio BBS programs for any/all computer(s).

Specific information wanted is program name, what machine it runs on, does it support WORLI standard forwarding, who is (are) the author(s), and where/how is it available.

Additionally, does the program have any special features to make it more suitable for use as a "personal" mailbox? (By "personal mailbox" I'm referring to systems not intended for "users," rather for the individual running the program to have automatic forwarding/delivery of WORLI standard packet mail via a "host" PBBS.)

This information will be organized and then distributed to the Amateur Radio community via packet, CompuServe, USENET, publication, etc. Please send replies in any way convenient. Thanks and vy 73,

Andy Funk, KB7UV
14-23 31st Avenue, Apt 4A
Astoria, New York 11106

Packet: kb7uv@n2mh
CompuServe: 74756.2055
Phone: 718-956-0027
UUCP:
{sun|hoptoad,cmcl2!phri}ldasys1!kb7uv

Packet/Oscar/Preamp Control Box

by Ron Cox, W9KFB

This Packet/Oscar/Preamp control box was a recent weekend project for me. Some of the features of the design are as follows:

- 1) Switching between packet TNC or Mike including audio input and PTT
- 2) Switching between 145 MHz or 435 MHz ALL MODE XCVR and asso-

ciated ARR preamp with ARR T/R Sequencer

- 3) Normal operation with T/R sequencer (preamp control) off
- 4) Front panel Mike socket and controls, back panel sockets for all other system connections

The XCVR's used was a Kenwood 9130 and 9500. Please note that the "Up" and "Dwn" mike controls (also touch-tone power supply) were only wired for operation on 145 MHz. Also switching these lines would have required another three poles on the existing three pole switch or another switch.

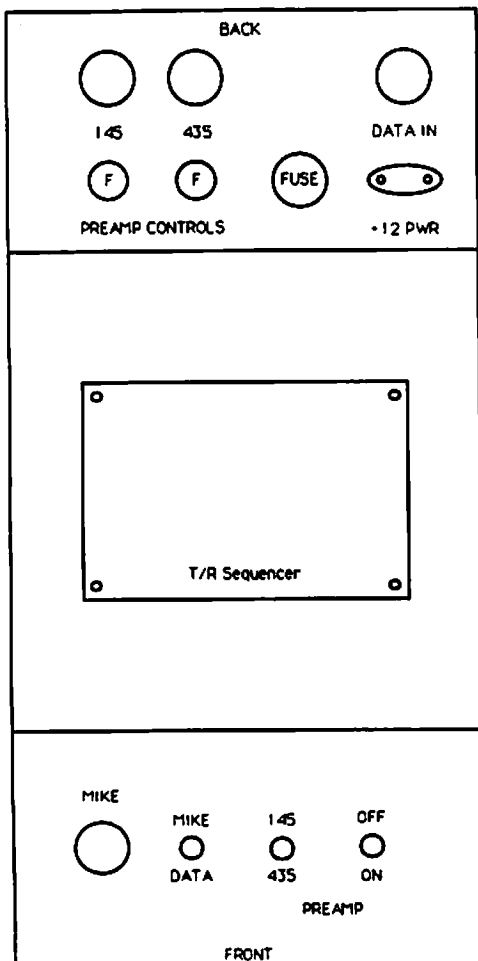
The following is a parts list and cost for the parts I purchased. I am sure that others may want to adapt the design for their own XCVR/preamp controls. I am also sure that many of the parts required may be found at lower cost or in your parts collections.

- 1 Power jack- Dowpack A0504 @ \$.79 = \$.79
- 1 Power plug - Dowpack A0414 @ \$.89 = \$.89
- 4 Microphone connectors - Philmore No. T616C @ \$ 2.62 = \$10.48
- 4 Microphone chassis sockets - Philmore No. P616C @ \$ 2.56 = \$10.24
- 15' of 5 conductor sheilded cable @ \$.45 = \$ 6.75
- 2 DPDT minature switches

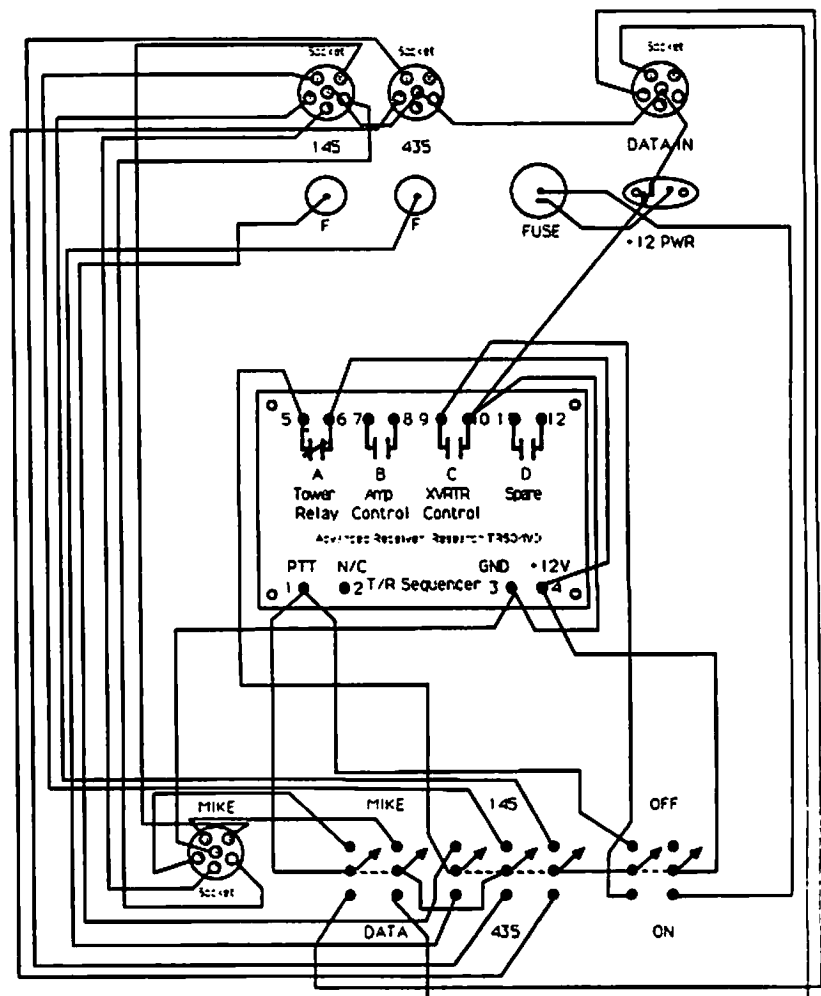
- @ \$ 3.17 = \$ 6.34
- 1 TPDT minature switch @ \$ 4.95 = \$ 4.95
- 2 "F" type chassis sockets @ \$.67 = \$ 1.34
- 1 Electronic chassis construction box 5"X2.5"X5.5" @ \$? = \$?
- 1 Fuse holder and fuse @ \$? = \$?
- 1 Advanced Receiver Research TRS04VD T/R Sequencer @ \$55.95 = \$55.95
- Total Cost (less any applicable tax) \$97.73

Please let me know if you have any problems with the design or have recommended changes.

73 de W9KFB @ W6IXU



Recommended Mounting Locations



Schematic Diagram

MPC402-OverView: 1 Jan 88:

by Lacy McCall, AC4X

[Editor's Note: This program is available for downloading from HamNet's DL9 Data Library]

McPaC...a terminal/bbs program for the PC...intended to be used by stations desiring a personal mailbox with Artificial Intelligence, and full forwarding capabilities from MBL BBS systems.

The program offers normal packet terminal functions, bbs mode, and a terminal mode, as well as file capture, programmable function keys and a command language.

The intent of this program was to combine some of the best features of several Public Domain Packet Radio Programs. Many have very good routines but none I've found have all the features I would like in a single program.....

Here's what I would like McPac to do, with a note as to whether or not the function is implemented in this particular version:

FEATURE	IMPLEMENTED
ASCII file send	yes
YAPP binary transfer (not enough room this ver)	no
Capture to File (selective connect only or all)	yes
Capture to Buffer	yes
CW Translator (translates packet data to cw)	yes
Write Buffer to File	yes
Offline Typing Buffer	yes
Tailored to PK232-PK87	yes
Time at programmed interval	yes
Help Screen	yes
Auto Set of TNC parameters (using *.tnc files)	yes
Auto Rotating Beacons/paths	yes
Auto Mail ID (at disc and when beacon rotated)	yes
Auto Set of baud etc	yes
Send Break	yes
Unix like Command Language partial (using *.cmd files)	yes
Auto Call directory (callist.dat now read only)	no
AI variable BBS prompts	yes
AI automatic responses (when talking to McPaC)	partial
ie: Intelligent BBS...	maybe

It is easy to see that the list is only partially completed..and many of the current routines have been written

several times, either to improve performance or because of a hard disk crash...

Equipment (TNC's) used for the program development are AEA's pk232 and pk87. Thanks to AEA and to W2JUP for assistance with info on the Host Mode and firmware developments.

This program was written on a COMPAQ PORTABLE II (286) machine, and speed sensitive elements are geared to the 8 mhz processor speed.

CREDITS...The language used here is Borland's Turbo Prolog (r). I guess the real reason I wrote the program to begin with is that I found the terminal program "SCP" ver 1.1 by Scott Loftness, on CompuServe several months ago while trying to learn Prolog, and wanted a "different" packet terminal program.

tnx/73...ac4x

Lacy R. McCall Jr
1818 Gillespie Dr.
Montgomery, AL 36106

Packet Radio MailBox System - PRMBS

by Brian B. Riley, KA2BQE & Dave Trulli, NN2Z

Whatsa PRMBS ?? It is a good running try at taking BBS technology (if you can call it that) to the limits in amateur packet radio.

Allowing that sysop burnout is the single biggest problem in BBS operation we launched this effort at making the system easier to run and self maintain. I believe we have achieved this. In one of the versions but a short while ago, the sysop KD6TH left the BBS unattended for almost 6 weeks. It was up and running with out being touched by anyone for 6 weeks, on line, never restarted nor re-booted (unless there were any power failures, in which case the code went down and came back up running!)

We have put many features in that you will read about in the voluminous documentation that has been included. The biggest addition is a true multi-user BBS that will permit two copies of the code to run on either side of DoubleDOS with but a

single MAIL and USER file. It means that among LANS where most systems are running PRMBS (as here in NJ) there is rarely a BUSY for mail forwarding, the mail forwarding is virtually invisible to the users, as the system is never mysteriously 'busy' on another port when the local access frequency is seemingly dead quiet.

It means that the sysop can take down his user side to do maintenance while the forwarding goes on or take down the mail side to do maintenance while his users keep accessing. No more 0300 nights staying up late to BBS maint so users do not lose the use of the system.

We are fast approaching the full release of V1.0. It will be posted to CompuServe's HamNet and disks will also be mailed as before. I am embarking on another packet related project shortly and will be devoting copious amounts of time to it, but PRMBS development will go on and bug fixes will be issued regularly.

This software is FREE for the asking. We will be happy to give you the source code as well, also FREE. The documentation is free too. Aaaahhhh, but you say "whoa, Brian, there's no such thing as a free lunch!" To which I must answer "yes!". Dave and I have put many hundreds of hours into this and the disks and xeroxing and mailer etc. cost. many have sent disks and postage already, to them I say thanks, but you should see the phone bills. We ask you no more than to think what it is worth to you and let your conscience be your guide. If you cannot come up with a figure we have said that \$20 is a nice donation. But that's your decision. Further development more or less depends on user support.

What can I promise you in return for your 'donation' ??? Not the world, but at least you will be top of the lists for updates, and will more likely than not get preferential treatment if you call for some guidance or with a problem ... oh yeah, I will get a warm feeling every now and then when I see your call go by!!

Brian B. Riley, KA2BQE
86 Burnt House Road
Indian Mills, NJ
609-268-9497
609-268-9597 24 hr bbs 300/1200

TAPR Board Election

by Lyle Johnson, WA7GXD

Tucson Amateur Packet Radio is a non-profit corporation licensed in the State of Arizona as a scientific and educational institution, and likewise recognized by the IRS as a 501(c)3 tax-exempt organization for these same purposes.

TAPR is run by a Board of Directors. There are fifteen members of the Board (we're bigger than General Motors!), each of whom serves a three year term. To lend some measure of stability to the organization, only five Directors are elected every year.

Current Board members and the expiration of their terms are:

Mike Brock, WB6HHV	Feb 1988
Tom Clark, W3IWI	Feb 1990
Andy Freeborn, N0CCZ	Feb 1988
Steve Goode, K9NG	Feb 1989
Bob Gregory, KB6QH	Feb 1990
Eric Gustafson, N7CL	Feb 1989
Skip Hansen, WB6YMH	Feb 1988
Lyle Johnson, WA7GXD	Feb 1989
Scott Loftness, W3VS	Feb 1989
Dianne Marshall, AL7FG	Feb 1990
Bob McGwier, N4HY	Feb 1989
Dan Morrison, KV7B	Feb 1988
Harold Price, NK6K	Feb 1990
Bill Reed, WD0ETZ	Feb 1988
Dave Toth, VE3GYQ	Feb 1990

What is expected of a Board member?

Come to the annual meeting and Board meeting in Tucson every year on his/her own nickel. Participate in the decision making process. Provide TAPR officers with guidance during their term. And be a current TAPR member!

In short, have a voice in what makes TAPR work and share in the responsibility (and reward) for what TAPR does.

The pay is the same as I get for being TAPR president - no money and a few angry letters!

The following folks, if elected, have agreed to spend the next three years of their lives helping you make packet radio achieve its true potential in the Amateur radio world.

We have a super lineup of nominees for the TAPR Board this year. All five incumbent directors are seeking

another three-year term, as well as several others seeking a first term.

Please read the information below, supplied by each candidate. Then, select five (5) from the ballot form and mail your ballot to:

Tucson Amateur Packet Radio, PO Box 22888, Tucson, AZ, 85734-2888 and mark the envelope "BALLOT". Please mail it so that it reaches the office not later than 15 February so we can notify the new board members in time for them to catch a plane to Tucson.

If possible, fill out your ballot now and mail today!

FRANKLIN ANTONIO, N6NKF

Franklin is a member of the PS-186 Packet Switch design team (with KA6IQA & WB6HHV), and co-authored the paper describing the PS-186 in the ARRL 6th Computer Networking Conference. His writings can also be found in recent issues of PSR (suggested AX.25 changes, 10/87 PSR), and Gateway. Franklin is Exec V P of the San Diego Packet Radio Association (SANDPAC), editor of the SANDPAC Newsletter, and a member of ARRL, TAPR, AMSAT, and LWCA.

Goal: Making high-performance digital communications technology available to the amateur radio community. Special technical interests include: modem design, DSP, data compression, and error-correcting coding.

Franklin was employed by MACOM-LINKABIT for 13 years (1972-85), under various titles, finally Asst V P of Engineering. His work there involved all aspects of the design and implementation of digital satellite communications systems. He was project engineer for the world's first software digital-signal-processing satellite modem (the Air Force MD-1035, circa 1974), worked on the development of MACOM's video scrambling system (VideoCipher), and taught the company's internal VLSI design course.

Since 1985, he has been V P Advanced Engineering at QUALCOMM, Inc, where he has worked primarily on commercial mobile satellite communications.

MIKE BROCK, WB6HHV

Mike has been involved with packet radio and TAPR since the Beta test days of the TAPR TNC 1 when he was the Beta site coordinator for San Diego. Later he helped form the San Diego Packet Radio Association (SANDPAC) and held the office of technical vice president. He is currently a SANDPAC director at large, a Southern California Digital Communications Council technical committee member, and TAPR director.

Mike designs highly intelligent computer peripheral controllers professionally and applies that knowledge to amateur packet radio. One of the latest results of this ability and his desire to significantly improve the packet radio network is the development of the PS-186, a high speed packet switch.

Mike desires to help TAPR move towards the development of high performance network resources and tools with which the amateur community can build an effective packet radio network.

JOHN CONNER, WD0FHG

John has been involved with TAPR since 1983. He was actively involved in the Beta testing phase of the TNC 1, providing invaluable technical assistance to the regional Beta testing team. He performed documentation and assembly evaluations on both the TNC 1 and TNC 2 prototype kits. In addition, he is the person responsible for the design of the infamous ALJ-1000 (but not the hype).

As an electronics engineer, responsible for both hardware and software facets of worldwide programs, he has been able to apply this expertise to the amateur packet radio programs with which he has been associated. John is a charter member of the Rocky Mountain Packet Radio Association, and an original member of the Board of Directors.

He designed and constructed the first high altitude (low orbit :-) (14,000 feet+) digipeater using a TNC 1 Beta test board.

He is presently actively involved in the construction and beta testing of the 56 kilobaud modems. He is an active tester of KA9Q TCP/IP software and vitally concerned with the future of packet radio networking. He is a

member the TAPR/AMSAT Digital Signal Processing Project.

ANDY FREEBORN NØCCZ

Andy first became associated with TAPR activities in 1982 when he became the TAPR Beta site coordinator in the Colorado area. He was elected to the TAPR Board of Directors in 1985. He was an organizer of the Rocky Mountain Packet Radio Association, RMPRA, and has functioned continuously in a leadership role in that organization.

Andy is a 30 year retiree from the U.S. Air Force. During WWII he was a combat fighter pilot in the European theatre. In later years he commanded five Communications-Electronics organizations in the U.S., Philippines and North Africa.

He has filled a continuing need within TAPR to perform largely administrative and support tasks, thus relieving those that are better qualified to devote their efforts to technical development work. He makes no claims as to technical expertise in either electronics or software but has a firm understanding of the amateur community needs in these areas.

TAPR has provided the amateur community with a great start in packet radio with its introduction of the TNC-1 and TNC-2. He feels that there is much yet to be done in the areas of high speed networking and signal processing. He hopes to help guide TAPR to meeting the needs of the amateur community toward those ends.

BDALE GARBEE, N3EUA

Bdale is a relative newcomer to amateur radio, but has long been involved in networking activities. It was packet radio that finally provided him with the incentive to become a ham, and he hasn't slowed down since! Bdale was an early member of MAPRC, and has been an active member of RMPRA since moving to Colorado Springs in 1986. He has made presentations at several RMPRA gatherings, had two papers published in the most recent ARRL Digital Networking Conference proceedings, and currently serves on the board of the Pike's Peak Radio Amateur Association, PPRAA.

Bdale has been an integral part of the KA9Q effort to develop a TCP/IP

protocol suite for use in amateur radio. He authored the original SMTP client and the "Bdale's Mailer" BM mail user interface. In addition, he has for over a year served as the central integrator/tester and distribution point for the KA9Q package. His current efforts include beta-testing the WA4DSY 56kb modems, writing an improved mail client and router for the KA9Q package, and developing higher performance facilities for the packet radio network in Colorado.

Bdale recognizes and applauds TAPR's achievements in amateur packet radio, and hopes to be allowed to contribute to TAPR's future endeavors.

SKIP HANSEN, WB6YMH

Skip's primary reason for running for another term on the TAPR Board is to help with the technical advancement of Amateur packet radio, especially in Digital Signal Processing. He also feels there is much work to be done in the high speed modem area.

Here, in no particular order, are some of his past accomplishments and and qualifications:

1. Second person on the air with packet in the Los Angeles area (1982), charter member of TAPR, participated in TNC 1 and TNC 2 Beta tests.
2. Run the oldest PBBS on the air in the Los Angeles area. (Software and hardware are of Skip's design.)
3. Past member of the L.A. area frequency coordination council (TASMA) as a representative of packet.
4. Has been licensed and active continually since 1967, currently holding an Extra Class license.
5. Involved in designing/building/operating ham repeater systems since 1971. This includes an open 2 meter repeater system for "computer data exchange" prior to packet becoming popular.
6. Electronic consultant by profession, holding BSEE and MSEE degrees.

PHIL KARN, KA9Q

Phil Karn, KA9Q, is 31 years old, has been a licensed Amateur since 1971, and held the Extra Class license since

1973. He holds BSEE (Cornell) and MSEE (Carnegie Mellon) degrees.

He is presently employed by Bellcore in Morristown, New Jersey as a Member of Technical Staff. Before the breakup of AT&T, Phil worked for Bell Labs in Naperville, Illinois and Murray Hill, New Jersey. His professional activities include research into extremely high speed packet switching and the planning and construction of Bellcore's internal computer network based on Ethernet and the TCP/IP protocols.

Phil has long been heavily involved in amateur satellite and packet radio technical development activities, with an emphasis on software. He developed orbit determination software that located the AMSAT Oscar-10 satellite after its kick motor firing in 1983. He is also active in the PACSAT, Phase IV and DSP design efforts. For the past three years, Phil has led the development of ARPA Internet Protocols ("TCP/IP") protocol software designed specifically for amateur packet radio use.

DAN MORRISON, KV7B

Dan Morrison has been actively involved with TAPR beginning weeks after its inception. He participated in the design of several aspects of the Beta TNC, TNC1, and TNC2. In addition, he has written several articles on packet radio, including a two-part series in collaboration with Margaret Morrison, KV7D, and Lyle Johnson, WA7GXD.

He was coordinator of the Beta TNC test sites, and was treasurer of TAPR for a year.

Currently, he is helping in the design of a TMS320C25 based system, which TAPR hopes will provide a dramatic signal processing and computing capability for packet radio systems in the future.

Dan hopes to continue working closely with TAPR, a major player in Amateur R&D, and is very excited by the possibilities just opening up in this most exciting area.

BILL REED, WDØETZ

Bill has been a member of TAPR since June, 1982 and a member of the board of directors since 1983. He was a TAPR Beta test participant and an

organizer of the St Louis Amateur Packet Radio group. He put one of the early CPM based BBS's on the air in St Louis. Since then he has moved to Dallas where he co-founded the Texas Packet Radio Society and has been involved with their TEXNET networking project. Bill was heavily involved in the construction of the engineering model of the DCE aboard Oscar-11 and organized the group that did the PC board layouts for that project. He is a ground station for Oscar-11 and presently active on the JAS-1 digital mode.

Bill is an engineer for General DataComm and consequently involved in numerous commercial networking projects including X.25 networks.

Be Sure to Vote! Your BALLOT is inside the back cover of this issue. It must be received in Tucson by February 15th to count in the election.

Software Offerings from the TAPR Office

Diskette

All diskette software is IBM PC DOS 2.0 or later format, on 5-1/4" diskettes. Please send a return mailer with postage and \$2 for copying. If you desire TAPR to provide the diskettes, the charge is \$1 for mailer and

postage for up to two diskettes, plus \$0.75 per diskette.

- o WORLIVE3GYQ C BBS (1 diskette)
- o TCP/IP (KA9Q) (3 diskettes)
- o Intro to TCP/IP (2 diskettes)
- o TNC 1 Source Code (1 diskette)

EPROM

- o TNC 2 release 1.1.5 (27C256)
- o TNC 2 1.1.5 w/loader(27C256)
- o TNC 2 WA8DED release(27C256)
- o TNC 2 KISS (27C256)
- o TNC 1 WA8DED release(2 x 2764)
- o TNC 1 KISS (2764)

We will program your EPROM(s) for \$2 per TNC-worth plus a prepaid return mailer. If you choose to buy EPROMs from TAPR, we will include the mailer and postage (but not the programming charge) in the purchase price of the blank EPROM.

TNC 2 release 1.1.5 requires 32k RAM in your TNC 2. If you haven't already upgraded, 32k RAM chips are available from TAPR for \$20 post-paid. Current blank EPROM prices are \$10 for 27C256 and \$5 for 2764 (may be 27C64, depends on availability).

NOTE: There is currently an availability problem with 27C256 EPROMs, so

there may be a delay in filling your order for blank units. We do have some stock as of this writing, and will advise you if there will be more than a 30-day delay in sending you blank units.

TNC 2 1.1.5 includes documentation update.

WA8DED software includes printed documentation. KISS and loader software does not include documentation - refer to the TCP/IP source code and user documentation diskettes.

TAPR would like to extend its thanks and appreciation to Ronald Raikes, WA8DED, for allowing us to provide his TNC code. If you are wanting to run AX25L2 Version 2.0 (required for FUJIVOSCAR 12), or use a TNC 1 or Beta TNC for a digipeater, etc., then Ron's code is your only option. TAPR has not yet succeeded in bringing the much ballyhooed version 4.0 to light (don't hold your breath on this one).

If you use the WA8DED host mode, or prefer that all your TNCs have the same user interface, we also offer the TNC 2 version of Ron's code.

Note that Ron has donated this code to Amateur use. He doesn't receive any compensation for his TNC software.

1988 TAPR ANNUAL MEETING RESERVATION FORM

Complete and Mail Immediately to the TAPR, PO Box 22888, Tucson, AZ 85734
Hotel Reservations must be made separately (Inn at the Airport has special rates).

Name _____ Call _____

Address _____

City, State, ZIP _____

Number in party _____ Number wanting lunch _____

Since I am not in favor of starting at the tube on Friday night, having gone to a lot of trouble to get to Tucson, I am interested in attending a Pizza Bash and/or racing at the Malibu Grand Prix. To help me digest my Saturday evening meal, I prefer the Sons of the Pioneers or a Mexican Mariachi band.

Meeting is Saturday (9-5) and Sunday (9-1), February 20-21, at the Inn at the Airport.

OFFICIAL BALLOT

1988 TAPR Board of Directors Election

Please vote for five (5) of the following candidates:

<input type="checkbox"/> Franklin Antonio, N6NKF	<input type="checkbox"/> Bdale Garbee, N3EUA
<input type="checkbox"/> Mike Brock, WB6HHV	<input type="checkbox"/> Skip Hansen, WB6YMH
<input type="checkbox"/> John Conner, WDØFHG	<input type="checkbox"/> Phil Karn, KA9Q
<input type="checkbox"/> Andy Freeborn, NØCCZ	<input type="checkbox"/> Dan Morrison, KV7B
<input type="checkbox"/> Bill Reed, WDØETZ	

Please fold at line, staple and mail immediately. Ballots must be received by February 15th to count!

Place
Stamp
Here

**TUCSON AMATEUR PACKET RADIO
PO BOX 22888
TUCSON, AZ 85734-2888**

MEMBERSHIP APPLICATION

Tucson Amateur Packet Radio Corporation
PO Box 22888, Tucson, AZ 85734

Name: _____

Call _____ License _____
Sign: _____ Class: _____

Address: _____

City & _____ ZIP _____
State: _____ Code: _____

Home _____ Work _____
Phone: _____ Phone: _____

If you wish to have any of the above information
deleted from publication in a membership list,
please indicate which items you wish suppressed:

I hereby apply for membership in TAPR. I enclose
\$15.00 dues for one year's membership dues.

Signature: _____ Date: _____

The Tucson Amateur Packet Radio Corporation is a non-profit, scientific research and development corporation. TAPR is chartered 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 required during and obtained from such research.

The officers of the Tucson Amateur Packet Radio Corporation are:

Lyle Johnson, WA7GXD	President
Tom Clark, W3IWI	Executive Vice President
Dianne Marshall, AL7FG	Secretary
Terry Price, N6HBB	Treasurer

The *Packet Status Register* is the official publication of the Tucson Amateur Packet Radio Corporation. Second-class postage paid at Tucson, AZ and additional mailing offices. **POSTMASTER: Please send address changes to TAPR at the address shown below.** Explicit permission is granted to reproduce any material appearing herein, providing credit is given to both the author and TAPR.

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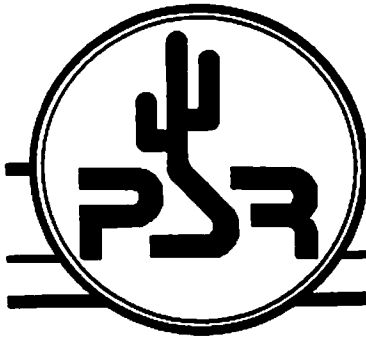
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**Check your address label for membership expiration date. Your renewal is important!
TAPR Board of Election Ballot Enclosed - Requires Your Immediate Attention!!!**



Packet Status Register

Tucson Amateur Packet Radio Corporation

January 1988
Issue #30

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President's Corner

by Lyle Johnson, WA7GXD

WEATHER (everyone talks about it)

We actually had a white Christmas this year. It snowed. In Tucson. Three inches of white stuff, which turned to wet, muddy stuff in a couple of days. Now I know why folks move out here...

Still, it was good to be back, after spending most of December on the edge of the Simpson Desert in Western Australia, with daytime temperatures around 106 Fahrenheit!

BIRTHDAY

As I mentioned in the last PSR, TAPR was founded more than six years ago! The Amateur packet landscape has changed radically in those six years, and I don't think there are many who would dispute the assertion that TAPR has had a strong influence on that change. And the best is yet to come.

NEW BLOOD

In February, 1983, I was elected TAPR President. This February will mark five years for me at the helm of the organization. I am grateful for the opportunity to have been closely involved with TAPR, and I am likewise grateful for the support and encouragement I have received during these years.

This year, at the TAPR Annual Meeting (see elsewhere in this PSR for a meeting announcement), you will meet your new President. I have informed the Board of Directors, which elects all TAPR officers, that I will not be a candidate for President this year. It is time for new blood and new leadership.

FUTURE DIRECTIONS

What direction will the organization take? Of course, I don't know, but I think we have done a good job at getting packet into the hands of every ham. We need to direct energy and resources into Level 1.

Yes, you read correctly. Level 1. Modems.

In my opinion, we (as Amateur packeteers, not "we" as in "TAPR") have a workable Level Two protocol that is being refined via the ARRL Digital Committee. We have several Networking protocols being used and/or developed, including NET/ROM, TEXNET and TCP/IP.

Nearly all of this is running at 1200 bauds, on two-meter FM channels. Useable by almost everyone, but slow and inefficient. Long-haul traffic is handled on HF at 300 bauds, using direct FSK (or equivalent). Much more efficient, but slow.

Digital Signal Processing (DSP) offers a possible solution for low and medium speed

Continued on page 2

President's Corner
Continued from Page 1

modems that may significantly contribute to packet throughput. As reported before, TAPR and AMSAT are joining forces under a project spearheaded by Tom Clark and Bob McGwier to bring DSP technology to the radio Amateur.

N4DSY has developed a 56 kbps modem for Amateur use, and prototypes are under construction and testing now. Hopefully, there will be a status report on this effort at the February meeting. Perhaps TAPR can participate in some way to help bring this kind of technology to the forefront.

GLB has some prototype radios running at 19.2 kbps and several links are up and running. AEA has announced a 19.2 kbps radio for 220 MHz as well. I haven't been told of the number of prototypes running, or if any units have shipped. Both radios were shown at Dayton last April; neither appears to be in production yet.

To me, the implication is that high speed RF gear isn't as easy as it looks, or the manufacturers would be cranking them out by the thousands. There is certainly plenty of pent-up demand!

I have noticed that a number of radio manufacturers are paying attention to packet these days, though. ICOM carefully points out the turnaround time of their latest models, and Kenwood seems to have moved a few poles from their audio response curves to allow data to more easily pass. I suspect the "DCS" system is responsible for this (I won't pass judgment on DCS here).

Of course, networking is still a hot topic. I mentioned three efforts a few paragraphs above. Hardware to run networking protocols is appearing. The TAPR NNC project produced hardware and put it into the hands of software developers in mid-1986. That project is still on the active list, but is not receiving further funding pending results of the software effort. A group of three hams in the San Diego area have developed a board called the PS186, a much more powerful networking engine than the NNC, and it has reached the hands of software developers in the last couple of months.

The next few months should prove to be exciting!

TNC SOFTWARE

A new release of TNC 2 software, release 1.1.5, is now available. It adds a command for BBS operators, fixes a bug in the DWAIT operation, fixes a bug in the HDLC send routine that would allow the TNC to hang, and adds a counter in the health group to monitor the hang fix.

A version of this software with a hex loader program is also available, for those folks who run "KISS" code. A version with the KISS code included will be available at a later date, along with a possible version that includes both the KISS code and the hex loader.

A standalone KISS EPROM is also available.

Finally, and by no means least, WA8DED software is also available for the TNC 2 through the TAPR office. The latest version at this writing is 1.3.

For the TNC 1 folks, KISS EPROMs and WA8DED software (version 2.1) is available. If you prefer the TAPR user interface, 3.3 code is still available. TAPR 3.3 is AX25 Version 1; the 4.0 code effort is presently derailed and I can offer no predictions as to when it may see the light of day. Beta boards can use TNC 1 software provided that they have been upgraded to include more memory. There is no longer separate software support for Beta boards that have not been upgraded, although the KISS and WA8DED code MAY run satisfactorily on non-upgraded units.

TAPR BOARD

Ballots and a list of candidates appear elsewhere in this PSR. There will be no balloting at the Annual Meeting as the Board meeting will be held the day before the Annual Meeting.

ANNUAL MEETING

The TAPR Annual Meeting will be held on Saturday, February 20th, 1988 at the Inn at the Airport, in Tucson, Arizona. A half-day session is also scheduled for Sunday, the 21st. See the announcement and reservation form elsewhere in this PSR.

If you want to speak at the meeting,

please let the office know so we can plan things a bit better and help ensure that you get the time you need!

CLOSING REMARKS

I have enjoyed serving you the past five years as your President. Packet radio has come a long way, and none of it could have happened without you. I am proud of what we have done, together, to make packet radio a tool available to anyone who needs its unique capabilities.

May each of you have the best year of your life in 1988 — and may 1989 be even better!

73,

Lyle

New Packet Book Available

The ARRL has just published a new book covering Packet Radio. It's titled "Your Gateway to Packet Radio" and is written by Stan Horzepa, WA1LOU. Stan is the editor of the ARRL's *Gateway Packet Radio Newsletter* and the author of the FM/RPT and Online columns in *QST Magazine*.

The book provides a brief history of packet radio development, it's practical application today and a glimpse into the future. Seven appendices provide a complete reference to current TNC commands along with a complete packet radio glossary. Many illustrations help highlight the technical information in the book.

The book can be ordered directly from the ARRL.

PLEASE VOTE!

The TAPR Board of Directors election is now underway. See the article in this issue containing information about the qualifications of each candidate. With Lyle announcing his desire to not continue as president, this election is especially important!

Your BALLOT is inside the back cover of this issue. To be counted, it must be received in Tucson by February 15th.

PLEASE complete it and MAIL IT TODAY!

Beginner's Corner - An NRZ \leftrightarrow NRZI Alternative

by Lyle Johnson, WA7GXD

We discussed State Machines last issue. This issue, I want to present an alternative circuit that I saw published in CQ-Ham Radio's April, 1987 issue, page 272 (the April part is irrelevant to this article). A portable TNC 2-based design was presented by JA2GSV. The article was written in Japanese, so I couldn't read it, but the schematic was in English, so I investigated it...

The prototype unit in the article was shown, with rechargeable battery pack, next to a Kenwood pocket-HT, and the TNC was smaller than the HT!

JA2GSV's circuit consists of three 74HC series parts, and the entire TNC draws under 30 mA including everything. Let's take a closer look at his approach to NRZ/NRZI data conversion.

See Fig. 1 (page 7) for the transmit NRZ to NRZI converter schematic.

A 1x clock is applied to the SIO chip's TxCA input, providing a transmit clock.

Transmit data is applied to an input of an exclusive-or (EXOR) gate, and that gate's output applied to the data input of a D flip-flop, which is clocked by the 1x clock. The Q output of the flip-flop is used as NRZI transmit data, and the IQ (inverted Q) output is applied as the other input to the EXOR gate.

How does this encode NRZ to NRZI?

Recall that a zero (0) in NRZI is sent as a change in output state (high-to-low or low-to-high) while a one (1) is sent as no change (output remains HIGH or LOW). In NRZ, a zero is a LOW and a one a HIGH. The truth table for an EXOR gate is shown below:

INPUTS		OUTPUT	
A	B	Q	
0	0	0	0
0	1	1	1
1	0	1	1
1	1	0	0

Thus, if the A input to an EXOR gate is held LOW, it will act as a buffer for the data on the B input. On the other hand, if we hold the A input HIGH, the EXOR gate will act as an inverter for the data at the B input.

This buffer/inverter attribute is used in the NRZ to NRZI converter. If we are sending a logical one (no change of state), the A input is held high, the EXOR gate acts as an inverter and complements (inverts) the IQ (Inverted) output from the flip-flop. Thus, the data at the D input remains the same as it was the previous clock cycle, and the output doesn't change. On the other hand, if the A input is held at a zero level by the TxDA output, the EXOR gate acts as a buffer, passing the IQ output back to the D input of the flip-flop, causing it to toggle, or change states, at the clock pulse.

Just what the doctor ordered!

Now, let's examine the operation of the circuit in decoding NRZI data to a clock stream and NRZ data.

See Fig. 2 (page 7) for the receive NRZI to NRZ schematic.

Incoming data is applied to EXOR gate 1 with a simple R-C delay circuit in one leg. This ensures that the EXOR output will produce a pulse at every change of state in the received data stream, synchronizing the 1x clock via the CLEAR (or reset) input of the divide-by-16 divider.

The 1x clock output is inverted and applied to the RxCA input of the SIO chip (the inversion is for proper phasing of the received data NRZ sample). The 1x clock is also applied to the clock inputs of a pair of D flip-flops.

Receive data is applied to the data input of flip-flop 1 (FF1). The Q output from FF1 is applied as the data input to flip-flop 2 (FF2), as well as to an input of EXOR gate 2. EXOR gate 2 gets its other input from the complemented output of FF2. The output of EXOR gate 2 is applied to the SIO RxDA input as NRZ data to be sampled by the inverted 1x clock from the inverter mentioned previously.

Let's assume that that an NRZI ONE is being sent. This means that the received data (RxD) will be the same level as the previous level. The 1x clock will clock the two flip-flops, transferring the output state of FF1 to FF2. FF1 will assume the state of the RxD signal. Since, by definition, the RxD signal will be the same as previously, FF1 and FF2 will have identical contents. However, EXOR gate 2 takes the inverted output of FF2 as one of its inputs, so the output from EXOR gate 2 will be a HIGH state, or NRZ logic level ONE.

Note that it didn't matter if the RxD signal was a HIGH or a LOW, only that it didn't change. Thus, we can convert an NRZI ONE to an NRZ ONE.

Next, let's examine the case when the input signal level changes state. According to NRZI definition, this means that the data bit being received is a ZERO.

The RxD signal is sampled by the 1x clock. If a change in state has occurred, FF1 will latch the current state of RxD, while FF2 will have the opposite information. Since EXOR gate 2 is connected to the complemented output of FF2, its inputs will match, causing its output to be a LOW, or NRZ ZERO (see EXOR truth table, above).

Thus, we can decode an NRZI ZERO into an NRZ ZERO.

The actual implementation of JA2GSV's design requires the use of only three HCMOS parts: one each 74HC86, 74HC175 and 74HC393. This is cheap in terms of parts cost (less than 2 dollars) and PC board real estate.

What are the drawbacks?

The fact that the receive clock synchronizes on every edge of RxD limits its utility in a noisy signal environment. Most DPLL designs, such as those integrated in the Intel 8273, Western Digital 1933/1935 and the Zilog 8530 chips, include provision to limit the update phase of the clock recovery circuit to guard against such

noise susceptibility.

In addition, if the same divide-by-16 section of the 74HC393 chip is used for both Tx and Rx clock generation, the transmitted data may be subject to jitter from the RxD signal. This may be a problem for the distant receiving station, especially if a full-duplex link were attempted across a noisy path.

In practical operation, using strong-signal two-meter FM channels, this circuit is probably quite adequate.

In fact, this approach to NRZ/NRZI signal conversion is used in at least two commercial TNC 2-based products. I have used both and found them completely adequate for casual operation. I didn't attempt to wring them for the last dB on a noisy path, but neither has had problems decoding off-the-air signals on two meters.

The products in question are the Pac-Comm TINY-2 and the TASC0 Telereader TNC u21. The Pac-Comm unit looks like a good, low-cost TNC; the TASC0 unit is shirt-pocket sized, and includes internal NiCd batteries!

PHILIPPINE PACKET INFORMATION NETWORK (PPIN)

The first NET/ROM in the Philippines DU-land Packeteers recently had a grand time after the installation of the much awaited first NET/ROM (version 1.2) in the Philippines. It went on the air last December 1, 1987. Art, DU1AUL drove up to Tagaytay, a mountainous part of Luzon about an hour's drive from Metro Manila, and installed the NET/ROM with an ICOM IC-28H radio and an omni antenna. Benjie, 4F1ANX was the first station who used the NET/ROM together with Eddie, DU1UJ who generously donated the equipments. The NET/ROM will cover the whole area of Metro Manila while awaiting the installation of the same in Cebu, a province in the Visayas, after which the whole Philippines will then be linked via Packet. The NET/ROM is operational on 144.09 MHz and is open 24 hours a day.

Happy Packeting de Glenn DU1FGAI

TCP/IP Update

On December 25th the newest revision to the KA9Q TCP/IP software was released. The release numbered 871225.0 is unofficially known as 87XMAS.0.

Phil Karn, the author has incorporated a great number of refinements and major improvements to the code.

Among the most significant from the user standpoint is the new capability to operate normal AX.25 packet and TCP/IP from within the same program. Not only that but you can also have multiple AX.25 connections going while simultaneously transferring files and/or forwarding mail under TCP/IP. This part of the program is a result of work done by Jon Bloom, KE3Z and as massaged by Phil.

The development work on the code has been done on IBM PC's and their clones. As a result most of the current use of the software is limited to owners of this gear. With this release there is now support for the Macintosh and the Amiga, thanks to the efforts of Mikel Matthews. Code for these machines is included in the distribution. Phil has taken great pains to make the code as transportable as possible. As a result we can expect to see it ported to other machines in the future.

Dave Trulli, NN2Z has made major enhancements to Bdale Garbees, N3EUA, mail modules and the user interface. It is pretty neat to be able to set down at your computer, call up the mail program, answer the TO: and SUBJECT: queries, key in the message and let the system take care of putting the message on the recipients machine.

A few of the other changes include a new recording capability, a new ASCII upload capability, modifications to the command interpreter, driver for the Eagle I/O card and an update to the mail/PBBS software by WA3PXX.

Bdale Garbee has taken on the task of integrating all of the earlier documentation into an all-in-one Users Manual. The manual is based on existing documents by Phil and Brian Lloyd,

WB6RQN and other README files formerly accompanying the code.

Ok! So how do I get involved in this new exciting aspect of packet radio? Its easy. The following article tells how to get the code via BBS, the internet, and on floppies.

The floppy distribution comes on three disks. Two of them contain the code, executibles and sources. The other one is a Plug and Play disk. The P&P contains the necessary executibles and samples of the necessary configuration files. Just follow the instructions contained within each of the configuration files and in the README.1ST file. I have completely revised the P&P since the last version in an effort to protect the first time user from networking terms that might be unfamiliar to him. Once the new user is on the air the documentation will provide a wealth of information on networking per se and on the KA9Q package.

Andy Freeborn NØCCZ

HOW TO GET THE TCP/IP CODE

ON DISKETTES:

The floppy distribution handled by Andy, NØCCZ for the last version has now been taken over by TAPR. All diskette software is IBM PC DOS 2.0 or later format, on 5 1/4" diskettes. Please send return mailer with postage and \$2 for copying. If you desire TAPR to provide the diskettes, the charge is \$1 for mailer and postage, then add \$0.75 per diskette

- o TCP/IP including Plug and Play (3 diskettes)
- o Introduction to TCP/IP (2 diskettes)
- o TNC 1 Source Code (1 diskette)

Send orders to TAPR at address on page 1.

VIA BBS:

From the N3EUA Opus system. Log in to the BBS and download from the appropriate files area. There are several .ARC files for the full distribution, one for each of the directories.

Bdale has configured his BBS to allow first time users ample resources to