Packet Status Register

Tucson Amateur Packet Radio Corporation

July 1987
Issue #28

Published by:
Tucson Amateur Packet Radio
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In This Issue...

President's Corner

by Lyle Johnson, WA7GXD

The ARRL Digital Committee met in Newington, CT, over the weekend of 23 May. Several issues were discussed, including packet frequencies for HF and VHF, the automated message handling STA for HF, changes to the AX.25 Level Two specification, message handling protocols, and progress reports on networking protocols.

Many of the above-mentioned items are under study by various subcommittees.

One point agreed upon is the means of identifying an HF packet frequency. In the past, many of us have simply used the display frequency when operating lower sideband with the "TAPR standard" HF modem tone pair of 1600/1800 Hz.

In the future, we will be referring to the center frequency of the actual transmitted energy.

Thus, 14.109 MHz of yesterday becomes 14,109,000 - ((1600 + 1800)/2) = 14.1073 MHz.

The disadvantage is that very few rigs have an FSK mode such that the dial reading corresponds to the energy being transmitted. The Great Social Equalization Factor (GSEF...) is that now everyone can be confused; there is no bias in favor of using "TAPR standard" 300 baud tones for a convenient dial reading!

To add fuel to the fire, yet another set of suggested frequencies has evolved for message forwarding use. (Especially on 20 meters, folks are encouraged to move their QSOs to the standard RTTY area, below 14.1 MHz.)

Message forwarding frequencies of 14.1023 and 14.1083 MHz are suggested in North America. A move to these frequencies will probably occur at the time of the HF STA. Please do not use these frequencies for casual QSOs — they are intended for message handling.

A number of inputs were received regarding modifications to the AX.25 Level Two protocol. They are currently under study and will be reported to the Committee at its next meeting, scheduled for the weekend of August 29 in Los Angeles in conjunction with the 6th ARRL Computer Networking Conference.

(That meeting took place at the Torrance Marriot Hotel. A special meeting is to be convened in early October in the Washington, D.C. area to work on AX.25 Level 2 Versions 2.1 and 3.0. 2.1 will likely be a "bug fix" interim specification, while 3.0 should provide an opportunity to add a whole slew of new bugs... Keep those suggestions coming in!)

Please note that the Committee meetings are open to observers. In fact, the May meeting had only 6 committee members present along with 10 observers!

On to other topics.

The first 200 units of the TAPR PSK Modem kit are in the hands of their builders. The complete kit costs $100 plus $10 Shipping and Handling in North America. Bare board sets with instructions will be available for $30. The second lot of 200 kits is now being

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President's Corner
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produced and should be in stock at the office by the end of September.

Naturally, there is no cabinet included in this kit...

TAPR Director Tom Clark proposed a joint AMSAT/TAPR project for Digital Signal Processing (DSP) applications back in February. Tom requested some seed money to get a number of Amateurs equipped with DSP co-processors for their PCs and clones to begin to develop some serious software for Amateur use. AMSAT has approved some funding for this enterprise and the TAPR Board is currently (mid-June) considering it.

DSP holds a lot of promise for Amateur packet radio, as well as other weak-signal digital modes, digital voice, etc. Please see the "Beginner's Corner" in this PSR for an introduction to hs technology.

Speaking of tutorials, several of you have contacted the TAPR office asking for the next installment of the State Machine article presented in PSR some months back. The follow-on is now being written. It may not make it in time for this issue, but should be done in time for the next PSR.

Finally, please check your mailing label. If your TAPR membership expires soon, please take a moment to renew now. Your membership is important.

See you on packet.
Lyle

An Introduction to TCP/IP

Millions of folks have used it in conventional commercial, military and government telecommunications applications. Few of them ever realized it, or really cared.

Since the introduction of TCP/IP into the packet radio world by Phil Karn, KA9Q, we are hearing it discussed more and more frequently. Being the type of folks that Amateurs are, they want to know more about it. Unfortunately up until June 1987 there was little easy-read material available on the subject, unless of course, you were a networking engineer, designer or writer of networking code.

In June Mr. Charles Hedrick at Rutgers University wrote a paper describing TCP/IP in terms that most of us can understand. For those wishing to dig deeper into TCP/IP Hedrick makes many references to documents (called RFC's) which permit one to explore as far as wanted.

A package of two diskettes "Introduction to TCP/IP" (MSDOS, 360K) is now available. They contain Hedricks paper (about 92k) and most of the RFC's he refers to. (as many as will fit in compressed format on 2 disks, unARC utility also provided).

To augment the Introduction paper Bdale Garbee, N3EUA, has prepared a Preface which introduces the reader to the amateur packet radio version of TCP/IP. Bdale is one of the writers of code for the packet radio application of TCP/IP.

In keeping with the Rocky Mountain Packet Radio Association charter of providing "information and education in amateur digital communications", one of the RMPRA founders is providing this service.

Send: Two dollars to cover costs (foreign add appropriate additional for foreign mailing costs, 2 oz., IRC ok).

A mailing label with your address on it.

To:

Andy Freeborn NØCCZ
5222 Borrego Drive
Colorado Springs CO
80918

DO NOT send mailers, diskettes or postage. But DO send the completed label.

Update on the the KA9Q TCP/IP Software

Announcing an update to the KA9Q TCP/IP software package release of 870526.0, bringing the current release date up to 870829.0. This update adds fixes bugs, and adds some minor functionality. A new release will occur in a couple of weeks with support for 4bsd and sysV unix machines, this version still supports only the PC and PC clone class of machines.

The changes:

- Improved KISS bits for the TNC1 from Gerard, PA0GRI.

- the ASCII text at the top of one of the TNC2 hex files is gone now.

- Minor tweaks to BM from Gerard, PA0GRI, Phil KA9Q, and yours truly. Biggest noticeable differences are that BM no longer looks at the hosts.net file at all, but instead passes symbolic hostnames to the smtp client in net... and we once again changed the text entry code. It's more like bsd Mail now. Default is a silly text entry routine, a "~e" gets you into your favorite editor, and a "~p" shows what you've typed so far.

- NET.EXE understanding of symbolic hostnames ala the hosts.net file has been extended. You now need to wrap numeric IP addresses in square brackets, as in "[44.32.0.16]", as you can use symbolic names anywhere you need to use an IP address (including in the autoexec.net
file!)

- Since BM *no longer* deals with IP addresses, a "gateway" command has been added to NET.EXE, so that it knows where to send mail that fails the lookup in hosts.net.

- Internal changes and a fix to the ftp server so that it now handles NLST command properly, all from Phil, KA9Q. Bugs that were in the 870526.5 interim release that was only distributed in a limited fashion apparently disappeared with the latest tweaks...

- documentation has (as usual) been updated somewhat.

- some other random tweaks I'm sure I've forgotten...

What to do once you have software, aka "getting an IP address":

Users of this software package become part of the "global IP internet", and as such need to obtain unique IP address assignments for each host they plan to put on the air, or "on the wire". Major metropolitan areas in the US, and countries with active TCP-using groups probably already have blocks of addresses in amateur radio 44.X.X.X block assigned to them. Ask around locally before you go any further.

If there is no local address block in your area, and/or no one is coordinating address assignments for your local net, contact Wally Linstruth WA6JPR. Wally is the global top-level address administrator for the ham radio 44.X.X.X

subnet. Wally may be reached by email at
wally%net1.ucsd.edu@sdcsvax.ucsd.edu
or wally@net1.ucsd.edu
or ...!sdcsvax!net1!wally

or via the new forwarding mechanism I have set up for those sites who know how to reply via mail to this message, but can't reach Wally's machine directly:

winfree!wally
or
wally@winfree.uucp
or
wally%winfree.uucp@flash.bellcore.com

How to obtain the KA9Q Internet software:

- Via uucp, the files are on winfree in tar archives as:

/usr/spool/uucppublic/pub/
ka9q_all.tar.Z 16 bit Compress 4.0

/usr/spool/uucppublic/pub/
ka9q_all.t12.Z 12 bit Compress 4.0

For Anonymous UUCP login, use phone number 303/593-0696, at 2400 baud (it will do 1200 if you send a return to rotate it down), "standard Unix login sequence", username of "Uanon", password of "notFTP". An example L.sys entry ala winfree's uucp would be:

winfree

Any ACU 2400 13035930696
login: Uanon
password: notFTP

I've never run an anonymous login for uucp before, so let me know if I got it wrong!

A reasonable command to issue to pick up the 12-bit distribution would be

uucp winfree!~/pub/ka9q_all.t12.Z /usr/spool/uucppublic

My BBS is currently down with a dead hard drive. If anyone has a spare drive they would be willing to donate to the cause, *please* get in touch with me ASAP! Cashflow around here is a joke... :-(

Normally,

Via Opus, log in to my BBS and download from the appropriate files area. There are several .ARC files for the full distribution, one for each of the directories. SeaDog file requests are ok. I have configured my BBS to allow first time users ample resources to download the full distribtuion at 1200 baud. The phone number is 303/593-0766.

If you have any trouble downloading from the BBS, please let me know. Speeds that are supported include 300, 1200, and 2400.

-Via US Snail, Andy Freeborn NØCCZ has agreed to make floppy copies. To get a copy from him, send $5 AND a completed return address mailing label (orders without a mailing label will be considered contributions to the BBS hard drive fund, see above... :-) to:

Andy Freeborn, NØCCZ
5222 Borrego Drive
Colorado Springs, CO 80918
USA

What you get for the $5: 5 floppies, including two of RFC's and IEN's that relate to the code, two that include the actual release, and one that is intended to be a sort of "plug and play" disk for getting on the air immediately...

For those who just want the RFC/IEN disks, Andy will send you just those two disks for $2 and a mailing label. If you want any particular RFC or IEN, contact Andy to find out what archive it is in (we have them all packed up, one ARC per 360k pc disk), and he will send you that RFC or IEN, along with many others, on a floppy for $1/disk. You can't mix and match, you get the block of documents that are in a given archive.

DO NOT SEND floppies, mailers, postage, etc... but DO send the mailinglabel!

Andy is also reachable as
winfree!andy or
andy%winfree.uucp@bellcore.com

If you need more information (?). Andy is within an on-air FTP of me, so we should be able to keep his bits up to date!

on the ARPAnet, or attached portions of the Internet, look on
louie.udel.edu

via anonymous FTP for the files in the directory
pub/ka9q

-Within a day or two of a new release, the code should also be available from the following additional secondary distribution points:

from Doug KD4NC in Atlanta, GA
uucp: winfree!kd4nc!dug

from Bob Hoffman N3CVL in Pittsburgh, PA
arpa: rbh@cadre.dsl.pittsburgh.edu
uucp: pitt!hoffman

from Wally Linstrugh WA6JPR in Santa Barbara, CA
arpa: wally@net1.ucsd.edu

from Brian Kantor at UCSD. (via anonymous FTP?)
arpa: tcp-group-request@sdcsvax.ucsd.edu
uucp: sdcsvax!tcp-group-request

Unreleased (read: under development) versions are often available on louie.udel.edu, generally alongside official releases...caveat emptor...

If anyone has any trouble getting hold of a copy of the code, please let me know!

How to contact me:

Bdale Garbee, N3EUA
1433 Territory Trail
Colorado Springs, CO 80919
303/590-2868w,
303/593-9828h

*** go easy on the phone calls please, I'm not getting much sleep! ***

uucp:
{bellcore,crash,hp-lsd,ncc,pitt,vixie}!winfree!bdale
arpa:
bdale%winfree.uucp@flash.bellcore.com
bdale@net1.ucsd.edu
fido: Bdale Garbee at 128/19, 303/593-0766, 300/1200/2400 baud, 24hrs (*DOWN*)
packet: n3eua @ k0hoa

Note from the Editor

I need your help. With *PSR* back on its own, I need material from packet groups around the country for sharing in *PSR*. If you've got news to share, articles to contribute, or just want to comment pro or con on something we're doing right or wrong, please send your material to me directly:

Scott Loftesness W3VS
16440 Rustling Oak Court
Morgan Hill, CA 95037

or send it to me via electronic mail:

Packet: W3VS@AA4RE
CompuServe: 76703,407
MCI Mail: SLoftesness
AT&T Mail: SLoftesness

Beginner's Corner: Digital Signal Processing

by Lyle Johnson, WA7GXD

Digital Signal Processing, or DSP, is a hot topic in the world of analog circuit design these days. And its becomin a ht tpic in he Amateur world (meaning that the costs are finally getting realistic).

This article is intended to be a very brief overview of DSP - what it is and how it may prove useful to packeteers and other segments of the Amateur community.

DSP - WHAT IT CAN DO

DSP is simply a means of processing a signal by digital means.

Analog processing applications that you may be familiar with include Audio CW filters, speech processors, two-tone generators for SSB transmitter testing and the 1200 baud modem in your TNC.

Some recent modem integrated circuits (ICs) include on-chip DSP. The AMD 7910/7911 "World Chip" modems, such as those used in the Kantronics Packet Communicators and the Pac Comm TNC-220, is an example of applying DSP to packet problems.

In general, anything you want to do to an audio signal, whether it be generation, modulation or filtering, can be done using DSP techniques.

The advantages of DSP include (1) uniformity and repeatability of a design and (2) one general-purpose hardware design can be reconfigured under software control to do many different tasks.

Software???

Yes, DSP allows software hackers to mess around with traditional hardware areas. Is nothing sacred?

Some of the guys playing with the AMSAT/TAPR DSP seed project (notably Tom Clark, W3IWI and Bob McGwier, N4HY) have already done some pretty amazing things. How about a PSK modulator to test the TAPR PSK modem demodulator? Or a PSK demodulator to check the PSK modem modulator? Or an audio spectrum analyzer? Or a weak signal detector so an OSCAR-10 class station can detect its own MOONBOUNCE signals! These applications have already been tested in at least a preliminary form by these two!

Want a tracking, adaptive HF modem? How about a WEFAX demodulator? Or a 2400 baud telephone modem? Or a 9600 baud packet modem that will work on your current voice radio?

The list of applications goes on and on.

DSP - WHAT IT IS

A DSP system design consists of an input filter, usually quite simple to perform a function called "anti-aliasing." This is simply to protect the following circuitry from signals far out of the design passband.

Following the filter is an analog-to-digital converter (ADC). This device samples the input signal and converts the amplitude to a digital number. While accuracy requirements of the ADC vary from application to application, a 10-bit ADC driven at about a 20 kHz sampling rate will probably suffice for the majority of Amateur DSP applications.

The output of the ADC goes to the microprocessor (uP). In this case, however, a standard, generalpurpose uP won't do. DSP requires the rapid execution of a small set of instructions.

What do I mean by rapid?

Well, the 6809 in a TNC 1 runs at a clock of 3.6 MHz and takes an average of about 4.5 microseconds (uS) to execute a typical instruction. The Z80 in a TNC 2 runs at 2.5 MHz and takes about the same amount of time to do something.

The Texas Instruments TMS32010 DSP runs at a clock of 20 MHz and can execute a complex multiply-and-accumulate instruction in 200 nanoseconds (nS). This is about 20 times faster than the general-purpose chips, and even faster when you consider the amount of work done in that special DSP instruction! The next-generation TMS320C25 does even better, taking only 100 nS, or 0.1 uS, to do the same thing.

Of course, like any other microprocessor, the DSP chip needs program and data memory. In your TNC, the program memory resides in EPROM (2764 or 27256, typically) while the data resides in RAM (8k, 16k, or 32k bytes in a typical TNC). The difference with the DSP chip is that it needsFAST memory to keep up with its fast clock.

The DSP system also needs a means of outputting the digitally massaged input information. This is usually in the form of an analog output via a digital-to-analog converter, or DAC. Like theADC, a DAC with 10 bits of accuracy and outputting data at a 20 kHz rate (200 kilo-bits/sec), will probably suffice for most Amateur applications.

In addition, an Amateur DSP system should have some sort of serial or parallel I/O to interface with TNCs, computers, etc.

CURRENT PROJECT

The DSP seed project, being sponsored by AMSAT and TAPR, will provide about 20 or 25 Delanco-Spry PC cards. These cards plug into an IBM PC or compatible, and include a TMS32010 processor, 48k bytes of high-speed, dual-ported memory, an input ADC and output DAC, and support circuitry. Normally nearly $1,000 each, Delanco-Spry is making us a special deal for between $500 and $600 per unit.

This project will, hopefully, serve as a software development bed. Tom Clark likens it to the early days of using 8080s in an S-100 bus computer runing CP/M. It isn't the ltaest or the greatest, but it is useful and the algorithms (approaches to solving a problem in software) developed should be useable in later-generation Amateur DSP devices.

Moving towards the front burner is a project to develop an Amateur DSP "engine" tailored to Amateur needs. Instead of expensive 16-bit ADCs and DACs that can clock at 50 kHz, 10-bit ADCs and DACs running at 20 kHz may suffice, saving many dollars. Likewise, including enough, but not too much, fast memory, will save more dollars. Finally, using volunteer engineering, we hope to develop a useful, general-purpose DSP device suitable for a broad spectrum of Amateur applications.

No details are yet avalable as to cost or exact configuration. My personal goal is to have a TMS320C25 with the aforementioned ADC and DAC capability, a minimum of 64 kbytes of memory, expandable to 128k bytes (the limit of the TMS320C25), sitting on a IBM PC card for about $500. Maybe less. This is about 1/5 of the cost of a comparable commercial DSP card.

This would be followed by a stand-alone box, with serial ports or perhaps a SCSI bus, probably for less.

Of course, I am a dreamer, and others tell me it would cost closer to $1,000.

As the technology progresses, the prices will drop.

Watch this space for further developments...

Digital Signal Processing and Amateur Radio

by Bob McGwier N4HY
15 Cherry Brook Lane, East Windsor, New Jersey 08520

In the past several years, digital signal processing and related areas have made a significant impact on the telecommunications industry and government communication facilities. To date amateur radio has not participated to the fullest possible extent in the benefits made possible by the techniques of digital signal processing mainly because it has been too expensive to include the techniques in our cache of communication tools. In the past few years, the silicon revolution has overtaken digital signal processing and have made it too inexpensive to let it pass us by without using it. Arguably, the most popular family of digital signal processing chips are those produced by Texas Instruments and are the TMS320 family but there are several others, most notably the DSP56000 family by Motorola.

These techniques and chips make possible a wide range of exciting capabilities. Changing modems is as quick as changing the software program you are running on board your computer. A JAS-1 PSK modem is only a software program on the TMS32010 rather than a couple of dozen IC's (TAPR/JAMSAT PSK modem). This same software with a minor modification can be made a m-ary PSK modem[1]. The major win in digital signal processing for modems comes in the ability to do adaptive equalization. This means that we can do something to ameliorate the bad things being done by our unconditioned radios and the path the signal takes in getting to our demodulator. In analog/oscilloscope parlance we can "open up the eye pattern". This process is independent of the radio as it will tune itself to the best pattern it can to clean up the bits being sent to our TNC's (for example).

This magic sounds so good that AMSAT/TAPR have again teamed for the benefit of amateur radio and packet. Tom Clark, W3IWI and I have been appointed chairmen of a project underwritten by AMSAT and TAPR. The project is to arrange a group purchase at a greatly reduced price of a board for PC-clones that allows digital signal processing software/hardware to be tested and to plan what we will need for the future.

The board we have selected is the Delanco Spry[2] Model 10. This board has a TMS32010 as its DSP "engine". This processor has a 160ns cycle time and has many features that are especially nice for the implementation of digital processing algorithms. This board has a small amount of very fast memory (8K), Analog to Digital and Digital to Analog conversion hardware capable of sampling at greater than 40000 times a second, and sits on a card that fits into a standard expansion slot on PC-clones.

The project is looking for a few proven producers who do not mind spending $525 for these boards to help the project produce nifty new things for amateur radio. You do not have to be a signal processor or a TMS320 assembler code hack. We would like those types of people to sign up for this project but we are also looking for people who can write applications software in "C" and assembler for the PC. We are currently emphasizing MSC, Turbo-C, and MASM as the development tools for the PC environment. We are even looking for a few proven "beta test" types. If you are one of the types who signed up for beta test packet boards without really understanding what was in them, we also need help from you.

The long range goals are the involvement of TAPR/AMSAT and some amateur industry leaders in the production of a digital processing product for amateur radio. We envision software that will run on this product to include (but not be limited to) modems of many varieties, optimal WEFAX-APT demodulation, voice encoding (LPC-10 and ADPCM for example), weak signal work, and test equipment. We are leaning towards a board with the TMS320C25 on board but the final decision has yet to be made and will probably be put off until we have more from those of you who "join up". We have already been approached by A.E.A. and Kantronics, who are expressing support and a desire to participate and more are sure to follow.

To date we have had some initial but very exciting success with these boards. Tom and I have seen each others echo's off the moon running Fast Fourier Transforms on these boards. Each of us was running an AO-10 class station without a lot of aluminum in the air. I have written a demodulator which locks to and tracks the JAS-1 PSK downlink quite well. I am putting a remodulator into the code so that JAS1 can be decoded by a stock TNC without modification. The FFT software also acts as a very valuable piece of test equipment, a spectrum analyzer. None of these things are completed and the others haven't even been started. DSP NEEDS YOU! Contact us via callbook address for W3IWI, AMSAT office, TAPR, or myself.

[1] *"DSP Modems"*, Robert W. McGwier, N4HY, 6-th ARRL Computer Networking Conference, Los Angeles, August, 1987.

[2] Delanco Spry, Suite 241, 2900 Connecticut Ave, N.W., Washington, D.C. 20088

[3] *"Digital Signal Processing and Amateur Radio"*, Thomas A. Clark, W3IWI and Robert W. McGwier, N4HY, 6-th ARRL Computer Networking Conference, Los Angeles, August, 1987.

[4] AMSAT-NA, Inc. P.O. Box 27, Washington, D.C. 20044

[5] TAPR, Inc. P.O. Box 22888, Tuscon, Az. 85734

In the Mailbox

by Roy Engehausen, AA4RE
780 Lisa Court
Gilroy, CA 95020

I saw a definition of a "committee meeting" as one where the attendees figure out who is absent and assign the work to them. I guess that's what happened in my case when I was asked to provide some news on BBS happenings.

Latest Software/Hardware

New releases of code have been made recently by W0RLI/VE3GYQ (Version 3.3), KA2BQE (95c), and WA7MBL (3.20). All three systems now support forwarding thru the various level 3 systems. The executable program and source code for the first two are available from the authors while K7PYK distributes the executable MBL system. All are free with a diskette and SASE mailer. The W0RLI/VE3GYQ program is also available from CompuServe (in the DL9 Data Library).

An interesting footnote is the fact that a feature has been removed. The current MBL code and the next W0RLI release

will have the fixed portion of the forward header built in. Too much software is now trying to deduce the origination point of a message via the headers to allow changes to the fixed fields. A header is shown below with just the fixed filed shown. Additional information such as frequency can follow these.

R:870903/0235z @:W0RLI Santa Cruz, CA #:8843 O:YB1BG

The TEXNET people are about to start distributing a combined Level 3 node and BBS system suitable for remote site installation. This is both hardware and software. A complete and thoroughly tested layer 3, 9600 baud network nodes is expected to cost about $650 to $700 for the entire node, radios (2), the NCP, parts, power supply and antennas excluding feedline. This cost does not include the BBS. Contact WD5HJP for details.

Developments

One of the biggest complaints I hear these days about BBS operation is that the mailbox is always busy. With forwarding every hour, multiple ports, etc, the availability of a BBS for a given user has been steadily decreasing. Both the W0RLI and KA2BQE systems have attempted to supply some relief by running two copies of the software using a multitasker like DoubleDos but this has always been a kludge.

On the West Coast, two multi-connect systems have been in operation. Mike, W6IXU (of NETROM fame) has had a system on a MacIntosh for several years while Eric, WD6CMU has been running one under OS/9 (a 68000 based UNIX clone) for a year or so. Needless to say, the hardware cost involved as compared to a Taiwan PC/XT clone has prevented wide spread acceptance of these mailboxes.

This is about to change. Using the MINIX operating system, Bill, N6FQR, has successfully adapted most of the WD6CMU program to the PC 8088 hardware family. This software will support both multiple ports and multiple connects per port. I have watched W6IXU and WD6CMU forward mail to each other (thru NETROM) simultaneously. The mailbox is not yet in production use nor is it ready for distribution but should be by year end.

Under the current implementation, the TNCs must use the WA8DED (also of NETROM fame) host mode protocol. This is available for both the TNC-1 and TNC-2 either from the author or CompuServe.

The MINIX Operating System is a variation of UNIX and was written by Andrew S. Tanenbaum as a teaching aid for his text book "Operating Systems: Design and Implementation" (ISBN 0-13-637406-9) published by Prentice Hall, Route 59 at Brook Hill Drive, West Nyack, NY 10995. The book sells for about $35. Both the executable code and source are also available from Prentice-Hall for another $80. Yes... I did say the source is available. The package also includes a simple "C" compiler. Updates to MINIX are free via USENET.

There is a dark lining in our silver cloud however. Unfortunately MINIX is its own operating system and will not run MS-DOS applications without extensive rewrite. It uses its own disk format and you will have to take care on how you organize your fixed disk if you wish to switch back and forth between MS-DOS and MINIX. In addition, Tanenbaum used direct interface to the hardware instead of BIOS so MINIX will not run on all the clone variations. This is being slowly rectified.

Food for Thought —One Man's Opinion

The most controversial issues facing BBS operators today is the universal addressing scheme both for regular inter-amateur mail and for NTS traffic. There seems to be two camps of thought: Telephone area codes and Postal zip codes.

One thing seems to be clear though: A separate system is needed for NTS traffic. It is an unfortunate fact of life that amateurs who are interested in NTS are few. Many mailboxes do not have someone who checks in regularly to deliver NTS messages in the local area. Thus the target mailbox for NTS to my home city of Gilroy and the mailbox used by the local hams are different. However we route inter-ham messages we must make provision for routing NTS differently.

At a meeting this summer attending by both packeteers and NTS people in the ARRL's Hudson Division, the scheme of NTSxxx (xxx = area code) was proposed. Discussion of this idea has taken place in many media: voice, mail, packet, and electronic conferences and alternatives of xxxxxN (xxxxx = postal zip code) and NTSxxx (xxx = first 3 digits of zip code) have appeared. I think the first conclusion is also obvious: whatever is selected for NTS should be used for a general scheme and vice versa so let's discuss a general scheme.

Let's square off zip code versus area code.

First: Zip code is a lot more selective. A single zip can contain a maximum of 30,000 to 50,000 people which would probably fall out to about 100 hams. That would be coverage for one or two BBS. Area codes can cover whole states. If you add the telephone exchange number (e.g. 408847) then you equal zip code's efficiency. The same addressing problem exists if you only use the first 3 characters of the zip code.

Second: Zip code is fairly logical. A station on the East Coast will simply have to know to route everything starting with "9" to the other coast. Both the WA7MBL and W0RLI BBS programs accept "wildcards" to allow this to be done efficiently.

Third: Zip code is in the Callbook. If you wanted to route a message to me, you would simply look up my address in the call book and send the message to AA4RE @ 95020. Thus we have our own "directory". In addition, you can purchase the zip code directory from the Postal Service which shows city and zip code. To find what Gilroy's telephone area code and exchange prefix are is not as easy.

The major disadvantage to zip code is the difficulty of addressing areas outside the US. It can be said that adding the telephone country prefix to the area code, we can address the world. I just tried to look up the prefix for Japan. My phone book says to call the operator for that information. I don't even know what the US prefix is so how can I give it out.

If we put an indicator on the front of the address to show the country, then it will be up to the hams there to decide on how they want to address messages. Lets see what a typical address would be:

W-95020

The W indicates the US. We all know and understand the amateur call sign system both for US and for DX. Lets use it. A Canadian address might be VE-6K7P1M. Some may argue that this exceeds the present day 6 character maximum limitation on the @BBS field but I am sure that the software experts

we have now can solve this problem given a few months.

This then is my opinion: a ten character @BBS field consisting of two parts: a country code and (for the US) a zip code. Country codes should be taken from the ITU amateur radio prefix list. Each country would select an internal addressing scheme. For the United States, we would use the postal zip code. The letter "N" would be appended to indicate that the message is NTS traffic.

Feedback

I would appreciate any comments regarding this article contents or suggestions for future articles. Send them to packet: AA4RE @ AA4RE, CompuServe: 76064,2107 or USMail: 780 Lisa Court, Gilroy, CA 95020.

TAPR PSK Modem Kit Preliminary Manual Errors

by Lyle Johnson, WA7GXD

I can't understand it!

There are actually some ERRORs in the TAPR PSK Modem Kit Preliminary Documentation (dated 05 July 1987).

Shucks, a lot of that manual was gathered together and edited at 2 AM. The sun wasn't even in my eyes!

Presented below is a list of the most blatant, confirmed errors. Please correct your manual to reflect these changes!

Page 2
- Change quantity of 0.01 COG capacitors from 10 to 9.
- Change quantity of 22k ohm resistors from 02 to 03.

Page 7
- The 2-pin header may interfer with mounting the board. You may want to use a wire jumper rather than a push on one here.

Page 14
- The two regulator ICs are oriented opposite each other.

Page 18
- S2 is upside down.
- S2 "pad 2" applies to TNC 1. For TNC 2 use "pad 3."
- "All Switches Front View" refers to the keyway diagram immediately below.

Page 29
- UHF Port DIN pins 1 and 3 are swapped. Pin 1 is Common and Pin 3 is Step Down.

Page 36
- Pad 2 is for TNC 1.
- Pad 3 is for TNC 2.

ADDENDA

Page "3"
Replace switch table with the following:

Switch Ref	Manual	Label
Transmit Mode		
S2	JAS/PSK	MAN/PSK
AFC		
S3	UP/DOWN	USB/LSB
Modem		
S4	PSK/FSK	ON/OFF
Receive Mode		
S1	VHF/UHF	JOINT/ SPLIT

SCHEMATIC

Sheet 1 of 3
- J4 - 1 is COMMON.
- J4 - 3 is DOWN.
- J4 - 5 is UP.

Sheet 2 of 3
- No errors reported!

Sheet 3 of 3
- See Sheet 2 of 3.

I want to thank the many Amateurs who wrote, called or got onto CompuServe and brought these errors to our attention. The new manual is being compiled and edited as this is written, and everyone who helped point out the errors in the preliminary one will get a courtesy copy.

I am sure there are more errors, but these should be enough corrections to get you on the air with PSK!

Thank you!

Coming Next Issue: A Letters to the Editor column. Be sure to send your comments on PSR, pro or con, to the W3VS at the address listed on the first page. We really do want to hear from you and to share your opinions with the TAPR membership.

Reducing HF RFI from the TAPR TNC 2

by Lyle Johnson, WA7GXD

A number of packeteers have reported interference from their TNC 2s, especialy on HF. The problem manifests itself as an unstable, buzzing sort of noise every several kHz throughout the spectrum.

This noise has been investigated and a number of possible solutions proposed. Many of these sugestions have been tried out and this article is a report on the more effective measures.

Even if you haven't had RFI problems, some of these suggestions may result in dropping your TNC's current consumption by several mA, perhaps as much as 20 or so! Read on!

FIRST STEPS

Check that all portions of your station are bonded together and grounded with a low-impedance grounding system. This can have dramatic results, and is just good engineering practice.

While doing all this grounding, be sure to electricaly connect the TNC 2 case to the ase of your radio.

Use a large toroid and wrap the end of your power cable through it for a few turns just as before it enters the TNC 2.

Similarly, wrap your RS-232 cable through a toriod at the TNC end.

A good toroid to use is the MFJ-701. This is an open-frame, square unit that can simply slip over your cable.

INSIDE THE TNC

Add bypass capacitors of 330 or 470 pF from serial port connector J1 to ground at the following pins: 3 (Rx Data), 5 (CTS) and 8 (DCD). This can be conveniently done on the bottom of the PC board.

Replace R1 (47 ohms) with a 10 uH inductor.

Add a 0.01 uF bypass capacitor from -V (negative terminal of C8) to normal TNC ground (C8 and C9 return to a special "B" ground, as shown on the TNC 2 schematic, page 3 of 3).

556 CHARGE PUMP MODS

Cut the trace joining U2 pin 5 to U2 pins 8 and 12 (pins 8 and 12 must still be joined). Add a 10 ohm series resistor from U2 pin 5 to U2 pins 8 and 12. Apparently, the 556 sections turn on simultaneously for a brief period of time, and this is the major cause of the noise heard at HF. The series resistance seems to delay the slave section enough to prevent this from occuring. The resistor value appears to be critical - much more than 10 ohms and the charge pump doesn't work properly, much less and the noise isn't reduced. Thanks to Eric, N7CL, for discovering this characteristic of the charge pump, as well as this cure.

If not already present, add 0.01 uF capacitors from U2 pin to pin 7 and pin to pin 7.

These mods will dramatically reduce RFI and also reduce current consumption by about 10 mA.

ALTERNATE TO 556

As an experiment, I replaced the 556 charge pump with a Siliconix Si7661 CMOS charge pump. Before you plunge in with this mod, be advised that the resulting current drain is about the same as the modified 556, presented above. And, a 7660 charge pump won't work; you must use the Siliconix part, as it is rated to operate at the input voltage range of the TNC 2.

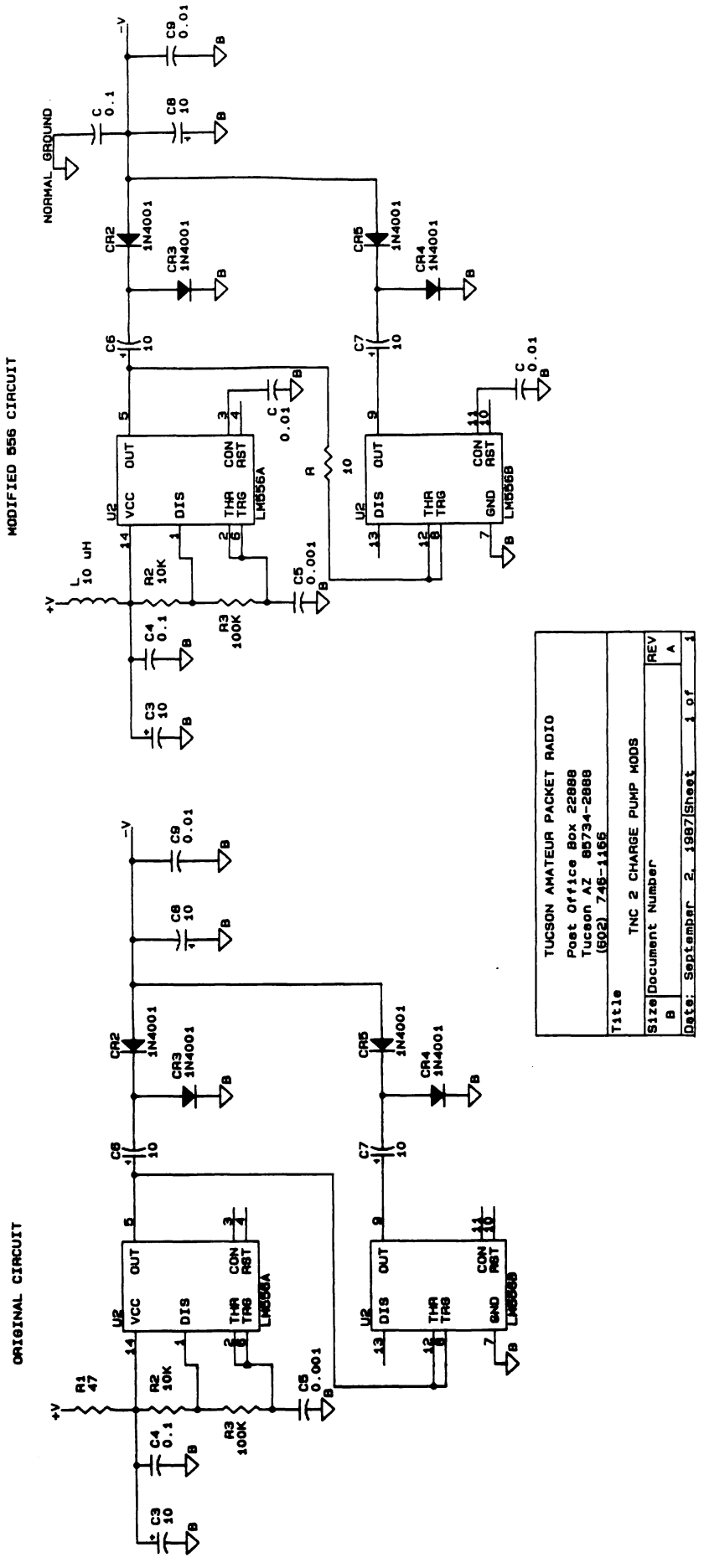
The circuit is that contained in the Siliconix Data Sheet. I simply rewired some of the socket at location U2 and patched in the Si7661. It works fine, but I haven't been able to verify its performance in a side by side test with Eric's 556 mods. If it turns out to be better, I'll supply the details here in PSR. Right now, the 556 mods look to be the best bet. The Si7661 current drain is about the same as the modified 556!

Caveat Emptor!

CONCLUSION

These mods are generally simple and inexpensive to perform. The results are dramatic. If you have experienced any sort of RFI from your TNC 2 on HF, these mods should fix it!

See you on a non-forwarding HF frequency!



TEXNET NEWS!

The Texas Packet Radio Society is very pleased to announce the availability of the TexNet Node Control Processor version 2.1 pc board. We're offering the pc board at our cost to the amateur radio community for non-commercial uses only. This pc board is the unique and primary hardware component for the TexNet 9600 baud layer 3 network system. The Texas members of TPRS will be installing this version of the board in TexNet nodes throughout the state. We have been operating 4 nodes on the air since October, 1986 using the same circuitry as this version 2.1.

Other groups and individuals who desire to install a layer 3, 9600 baud network system can order the pc board and documentation, and an EPROM set containing he system image software by mail. Order information is listed below.

The TexNet node is a stand-alone, totally pre-programmed-in-EPROM system. It is designed to be installed in remote tower locations. There are no user programmable parameters necessary to operate the network nodes. Nobody wants to climb a tower in the dark to replace a dead lithium battery!A local terminal connection to the node is not necessary. The design is of a fail-safe oriented system. A UPS allows the node to operate independently of AC mains for a limited period of about an hour. If the system batteries fail before AC power is restored, all operations return intact after power is restored. If the node software fails thru a fault due to a power circuit glitch (like a near lightning strike!), the node can be forced into a hardware reset via the network link. The only requirement for network link reset is that the network link radio still work and the modem section of the PC board still beoperational. A TexNet node will automatically re-build its routing table after power-on system reset.

The system components that are available include:

A> Node Control Processor version 2.1 pc board.

This NCP printed circuit board is offered without parts, it has been silkscreened and soldermasked with plated holes. It has the circuitry traces for a discrete CPU oscillator circuit, Z-80A CPU, 40K of static RAM(84256 & 6264), 24K EPROM (system ` software, 27C256), 2 Z-80A SIO-0's for three synchronous radio ports and one async terminal port, one 9600/4800 baud modem with state machine (2716 EPROM), one 1200 baud modem with state machine (2716 EPROM), a Z-80A CTC, network trunk hardware reset circuitry (2732 EPROM), modem connector pads and five control points.

Use of the third sync port requires the addition of another modem. Please note that each port can be strapped for 1200, 2400, 4800 or 9600 baud operation. From what we know of the system loading tests, the node can effectively support one 9600 baud network port and a number of slower speed user ports. The other two ports can be a combination of the other three speeds, 1200, 2400 or 4800 and can support either user or network connections.

We will NOT be offering a set of parts. All parts used are standard logic family parts, Z-80A, 74HCmos, 74LS, and CMOS static rams and EPROMs. Included with the pc board is documentation to assemble the board, tune the modem sections and interface the NCP modems to the RCA series 700 UHF transceiver and the 2m FM transceiver.

B> An EPROM set containing:

1) an un-coordinated network system software image (27256)

2) state machine image (2716), this is for both the 9600 and 1200 baudmodems.

3) reset logic image (2732)

4) documentation that describes procedures for: coordinating network nodes, programming node features, nodenames, node numbers, Packet Message Server routing, timing parameters, system digipeater access limits, aliases, connection responses, hardware reset programming procedure and greeting banners and prompts.

The EPROM set purchased by a system installer is registered with TPRS and support is granted only to registered system installers. System installers who have purchased the registered EPROM sets from TPRS receive update information. Included with the purchase is a license to make as many copies and coordinate as many nodes as is necessary for their system. Again, the constraint is this: the system must be installed and used non-commercially in an amateur radio operated and owned packet network system.
PLEASE NOTE!!! This is NOT source code. The code in the EPROM kit requires a central coordination effort by a group or club. To successfully use the TexNet system software requires the facilities of a personal computer equipped with an EPROM programmer, disk file utilities to read and edit EPROM images. Then software to program the coordinated EPROMs.

C> A daughter pc board containing circuitry for the Packet Message Server interface and 8 more control points. This board uses a Z-80A PIO, a 74LS244, a 74LS245 an a 74LS138 as an address decoder. It plugs into the Z-80 socket and the Z-80 is placed on the daughter board. This separate pc board comes with separate documentation.

Prices—

NCP version 2.1 pc board—$44 plus $4.00 shipping & insurance

Interface daughter board—$10 includes shipping

EPROM set & documents——$50 plus $4.00 shipping and insurance

These prices are subject to change. Shipping and insurance is First Class and insured for $50 via U.S. Mail. No UPS. Cashier's check, money order, or certified check made out to TPRS are all acceptable forms of payment. Personal checks will delay filling your order until they clear. To avoid undue delay, please order via the PO Box listed below, do not use the membership P.O Box number on the newsletter. Allow 6 to 8 weeks for delivery.

TPRS
P.O. Box 835136
Richardson, Texas 75083-5136

The Texas Packet Radio Society, Inc. is a non-profit charitable organization incorporated in the state of Texas. These printed circuit boards and software are offered only for use in other non-commercial, amateur radio owned and operated packet switching communica-

tions network systems. The buyers of the printed circuit boards and software are hereby notified that the system's performance is dependent on the assembly and installation expertise of the buyer and or installer and is therefore an experimental system and is offered "AS IS". No license for commercial use is implied or granted through purchase of any of the system components.

System Support

The Texas Packet Radio Society will be publishing notices of updates, modifications, or TexNet related components through the TPRS Quarterly Report. A subscription is $12 per year for at least four issues annually, some supplemental mailouts are made irregularly. Please address your subscriptions to the address listed below:

TPRS
P.O. Box 831566
Richardson, Texas 75083-1566

NET/ROM version 1.1 released 10 July 1987

Version 1.1 incorporates no new features, but corrects three relatively minor problems that were found in version 1.0. We do not feel that it is necessary to update nodes presently running 1.0, except for the relatively few places where one or more of these problems are causing significant difficulty.

Following is a description of the three problems fixed in 1.1:

(1) Destination table entry counter:

> When a destination node is deleted from the routing table (either manually or by the automatic obsolescense mechanism), the destination list entry is not deallocated immediately, but rather just marked as a deleted destination entry available for re-use. However, such deleted entries are deallocated when the node is warm-started (for example, if there is a power failure, or if the SYSOP issues a RESET). Version 1.0 has a "bug" whereby the destination table entry counter is not decremented when entries are deallocated during a warm-start. This can cause the count to become incorrect (too large). The count is used to limit the size of the destination table *in accordance* with PARMS parameter #1. Consequently, the "bug" can result in premature "Routing table full" messages, or failure to incorporate new nodes from a neighbor node's routing broadcast. WORKAROUND: this problem can be avoided either by (1) not warm-starting the node, or (2) setting the PARMS parameter #1 to a high value.

(2) RNR during deferred disconnect

> When two stations are connected via NET/ROM and one of them disconnects, NET/ROM's "deferred disconnect" logic causes any in-transit information frames to be delivered to the still- connected station until all such frames have been delivered or until a given period of time elapses (by default, 15 minutes) with no forward progress. Version 1.0 has a "bug" that causes this protective timeout to be ineffective if the connected station's TNC is refusing the information by returning a RNR status.

(3) Fast-learn of paths with two digipeats

> NET/ROM incorporates new nodes into its routing table by monitoring the source callsign field in the layer 3 header. Version 1.0 has a "bug" whereby layer 3 frames that arrive via two digipeats cause a routing table entry to be constructed with the digipeater list in reverse order. Version 1.1 fixes this problem, and checks for the existence of the entire path, not just the source callsign.

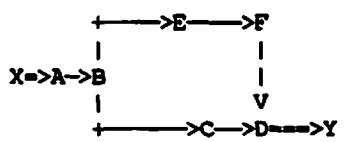
Clearly, these are rather esoteric problems, and have not caused significant operational problems. We do not feel that any wholesale updating of 1.0 nodes to 1.1 is warranted.

NET/ROM version 1.2 released 14 August 1987

Version 1.2 adds two important new features to the automatic routing system. There are no incompatibilities between version 1.2 and prior versions of NET/ROM. However, the new features in version 1.2 are significant enough that operators of nodes using prior versions may wish to consider upgrading to the latest firmware.

A new command, ROUTES, allows node control operators to fine-tune the automatic routing system by assigning explicit path quality values for individual neighbor nodes. (In prior versions, only a global channel quality value could be assigned by the control operator, and that value was assumed to apply universally to all neighbors on the channel.) A detailed description of the ROUTES command follows this summary.

NET/ROM's automatic routing algorithm has also been enhanced to prevent a node from getting stuck using a sub-optimal path for long periods of time. The enhancement is most easily explained by giving a specific example:



Suppose user X wants to connect to user Y. He uplinks to his local node A, requests a circuit to destination node D, and then downlinks to user Y. Node B has two alternate routes to D...via node C or via node E. The route through node C has higher quality than the route through node E. NET/ROM prefers to use the optimum route through C; however, if that route fails for some reason, it will use the alternative route through E.

In versions of NET/ROM *prior to* 1.2, once B starts routing D-traffic through E, it will not even attempt to try the path through C again until the crosslink between B and E is deactivated...which happens when there has been no traffic on the crosslink for (nominally) 15 minutes. In high- traffic areas, however, such a period of no activity might not happen for hours or even days! Thus, node B would become "stuck" using a sub-optimal route for long periods of time.

In version 1.2, the following enhancement has been made. When node B receives a routing broadcast from node C (typically once each hour), it takes a look at all destinations whose optimum (highest-quality) route is through node C. (In this case, node D is such a destination.) If node B discovers that it is using some other (sub-optimal) route to one of these destinations, it deactivates the sub-optimal route and tries the optimal route (through C) once again. Naturally, if the optimal route fails for any reason, it will try alternative routes in descending order of quality, as usual.

The following addition has been made to the NET/ROM manual (following

page 38):

ROUTES Command

The ROUTES command is used to display or modify the neighbor list of the node's routing table. To display the node's neighbor list, use ROUTES without any parameters:

```
ROUTES
LAS:K7WS-11} Routes:
> 1 K7WS-11 255 5
> 0 WA7GTU-1 192 17
  0 WA7GTU-2 0 15 !
  0 KA6AMT-3 via K7WS-4
      144 2
  0 WB7BNI-1 192 6
  0 AA6TN-1 192 7
```

For each neighbor list entry, the following items are displayed in sequence:

- ">" if an active crosslink exists to this neighbor
- port number (0=HDLC port, 1=RS232 port)
- path to this neighbor (callsign + any digipeaters)
- path quality to this neighbor (255 is best, 0 is worst)
- use count (number of routes via this neighbor)
- "!" if this neighbor list entry is locked

To display this information for just one particular neighbor list entry, use ROUTES followed by the port number and path:

```
ROUTES 0 AA6TN-1
LAS:K7WS-1} Routes:
> 0 AA6TN-1 192 27
```

Neighbor list entryies may be created automatically as the result of receiving an automatic routing broadcast, or manually by means of the NODES+ command. When a neighbor list entry is first created, it starts out unlocked and with a path quality equal to the default channel quality (see PARMS command). However, the control operator has the ability to "fine-tune" NET/ROM's automatic routing by modifying the path quality values for specific neighbors and by locking these modified entries.

The ROUTES command supports manual modifications to neighbor list entries, but this capability is available only to a control operator who has previously validated his credentials during this connection by successfully executing the SYSOP command. To modify neighbor list entries, the commands are:

ROUTES port nodecall [digicall...] + pathquality

ROUTES port nodecall [digicall...] - pathquality

The "+" version locks the neighbor list entry specified by the port, nodecall, and digicall parameters, and sets the path quality of that entry to the value pathquality (255 is best, 0 is worst). If there is no entry in the neighbor list that matches port, nodecall, and digicall, a new entry is created, locked, and initialized with the specified pathquality and a use count of zero.

The "-" version unlocks the specified neighbor list entry. If its use count is zero, the entry is deleted immediately. Otherwise, the entry remains in the neighbor list and its path quality is set to the value pathquality. If the use count of an unlocked neighbor list entry ever becomes zero, the entry is deleted.

The path quality for a neighbor is used by NET/ROM in its calculations of route qualities for all routes through that neighbor. By modifying the path quality using the ROUTES+ command, the control operator can encourage or discourage a node from using paths through a particular neighbor. By setting a neighbor's path quality to zero, the control operator can cause the node to ignore the existence of that neighbor altogether, even to the extent of disregarding the neighbor's routing broadcasts.

The Radio Amateur Telecommunications Society Information Bulletin 20 August 1987

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To: All Radio Amateurs
Fm: N2DSY @ KD6TH-4/201
Sb: COSI-Switch and RATS Update

The delays in getting out the COSI-Switch have been long and somewhat frustrating for everyone. Things are finally coming together.

What should be clear to everyone by now is that the originally announced X.25 Level 3 code has not arrived.

Something had to be done...

The project has been started from scratch by Tom Moulton, W2VY. He is getting consultation support from John Howell, N2FVN, Harlan Worchel, KB2CNL, and Gordon Beattie, N2DSY. All of these individuals have previously implemented X.25 switches or Packet Assembler/Disassemblers (PADs). We had a design review on the 14th of August and we are all quite pleased with the progress Tom has made. (Kudos to TOM !)

The revised delivery scedule is as follows:

Oct - Alpha testing of a completed COSI-Switch Level 3 module

Nov - Beta testing of a completed COSI-Switch machine - TNC-2/DR-200 (Any other hardware suggestions ?

Jan - Production shipment begins

All individuals and clubs that contacted RATS regarding this project will receive MS-DOS Disks and EPROMS with the code during each phase of the testing cycle. We got a good deal on diskettes and EPROMs so we will include everyone ! The production version will include SOURCE in "C".

As with all the SOURCE we distribute, it is free for non-commercial use.

Support contributions are accepted and commercial licensing arrangements can be made. Contact RATS for details. ALL proceeds go to the enhancement of the Packet Network.

Other happenings:

John Howell N2FVN has produced an implementation of the "Asynchronous Framing Technique (AFT) in "C". This is useful for providing error-checked, transparent HDLC links through asynchronous interfaces. AFT can be run over seven or eight bit networks and handles HDLC frames transparently. It is a nice building-block for the network.

This AFT is a generic implementation (accompanied by a "DOC" file) that includes code that runs under MS-DOS. Distribution of this code, in compressed form, will be via Amateur Packet Radio, Usenet and CompuServe HAMNET. The file name(s) will be based on the string "AFT10" for AFT version 1.0. It will be distributed in compressed form. We'll send it out with the first COSI-Switch test code.

John is working on a matching capability for the TNC-2. This would provide a error-checked link between PCs and

TNCs. Harlan Worchel, KB2CNL (yes, a NOVICE !) is working on porting the code to the Commodore 64.

Brian Riley's (KA2BQE) latest release of the Packet Radio MailBox System, version 95c, supports forwarding through COSI-Switch, GatorSwitch and NET/ROM. It also has the "KT" (kill traffic) feature that will automatically generate a service message when a traffic message is removed from the packet network. It is available from RATS, with the "C" SOURCE CODE. Send a message to N2DSY @ KD6TH-4/201 or KA2BQE @ KA2BQE-4/609 to get a copy of the code.

RATS is currently beta-testing the GLB Netlink 220 19.2 KBps modem/radios. So fast ! Sooo goood ! We are also burning-in eight PAC-COMM DR-200s. These will be deployed shortly.

RATS wishes to thank you for your patience. We're not real happy with how we got into the Level 3 COSI-Switch delay, but we think the effort is on the right track. If you have any questions call or send me a message.

Hang tough. We think you'll like the output !

Next update will be sent on or about 15 September.

Vy 73,
J. Gordon Beattie, Jr.

MAIL
Unix: ihnp4!houxm!hou2d!n2dsy
Amateur: n2dsy @ kd6th-4/201

TELEPHONE
Office: 201-615-2506
Home: 201-387-8896

NNC Project Update

by Dr. David Toth, VE3GYQ

It has been quite a while since members were brought up to date regarding the NNC (Network Node Controller). I think a brief recap of the project is in order.

It became obvious to many people that the packet revolution had arrived, and that we might become victims of our own success. What I mean is that we were likely to see packet fall apart because it was so popular. With the increase in activity, it was obvious that we needed two big things to build the network successfully:

1) HIGH SPEED RADIO MODEMS.

2) A DEVICE TO ROUTE PACKETS AROUND OUR MYSTICAL (MYTHICAL) NETWORK.

Where are we as of this moment in 1987? Well, we have 56 kilobaud modems. Everyone won't need one, but some of the bearded wonders (do Phil Karn and Bob McGwier have beards? nawwwww! oh well!) are reproducing the modem designed in Georgia, and you will be hearing big things about it soon.

That brings us back to the NNC. Well, Jay Nugent WB8TKL and his squad in Michigan (including N8BJX and WA1LRL) have got the SCSI interface working and talking to a hard drive. They also gave us a communications program , and that brought us the next major breakthrough. Bob McGwier, N4HY, has been porting the TCP/IP code over to the NNC and we hope to have something to test by the end of October. Our major stumbling block is the C compiler that Bob has to use. It was designed for a Z80, and is limited to the 64k architecture of that chip. The 64180 of the NNC can address more memory, so Bob is hand-patching the assembly code produced by his C compiler so that he can work with the larger memory.

So, if anyone has a lead on a cheap, and good, C compiler for the 64180 that does not use overlays, but indeed does support the 64180 completely, we would love to hear about it.

Bob feels that this can all be married with NET/ROM feeder links so that we can interface to existing parts of the network. Howie is talking with Phil Karn and Bob as to what can be accomplished with a melding of the Virtual Circuit technology with the Datagram stuff of TCP/IP and NET/ROM.

I think that we can safely say that we are beyond the days of squabbling as to whether datagrams are better than virtual circuits, etc. If one looks at the commercial world, one sees a happy smattering of both, and they co-exist. After talking to Howie, Phil, and Bob, I am assured by them that such will be the case in the amateur network.

And while I am discussing the network, I should advise you that the various BBS programs written by WORLI/VE3GYQ, WA7MBL, and KA2BQE are all being modified (constantly) to integrate them into an enhanced network.

I am presently meeting with Chris Sullivan VE3NRT, who has extensive network design experience, in order to design a specification for the next generation of BBSs. This specification will be presented to the software types for scrutiny and criticisms/comments.

So, if there is one message that I can leave you with, it is to go out and line up RF sites so that we can press onward with establishing connectivity. Dust off your copies of Tanenbaum's "Computer Networks" and see what constructive comments you can add.

73,
David B. Toth, M.D. VE3GYQ
NNC Project Manager

New WA8DED Firmware Available

Ron Raikes, WA8DED, recently uploaded the following new versions of his popular TNC firmware to the CompuServe HamNet DL9 Data Library.

TNC1FW.ARC: version 1.3 user firmware for the TAPR TNC-1 and clones. This version adds a full duplex command and a patchable location for 8-bit character sets in terminal mode.

TNC2FW.ARC: version 2.1 user firmware for the TAPR TNC-2 and clones. This version adds a full duplex command and a patchable location for 8-bit character sets in terminal mode. DWAIT channel arbitration has been replaced by P-persistence.

PK87FW.ARC: version 2.1 user firmware for the AEA PK-87. Changes are identical to those in TNC2FW.ARC.

Support TAPR! Renew Your Membership!

With *Packet Radio Magazine* no longer publishing, *PSR* is the only dedicated source of packet radio-related material. And *PSR* is only available as part of your membership in TAPR. Please check your membership expiration date (on the mailing label for this issue) and, if it's 7/87 or earlier, please RENEW! Use the membership renewal form on the back page.

Keep *PSR* coming to you! TAPR thanks you for your support!

NET/ROM Mini-Directory as of September 1, 1987

Location	Call	Ident.	Owner's Name and Callsign	
AK Anchorage	AL7CM-5		Pierce, Walt	AL7CM
AK Anchorage	AL7CM-6		Pierce, Walt	AL7CM
AL Birmingham	K4FUM-1		Sandidge, Jere T.	K4FUM
AL Birmingham	K4FUM-2		Sandidge, Jere T.	K4FUM
AL Birmingham	K4BAL-1		Wingate, Benry A., Jr.	K4BAL
AL Birmingham	K4BAL-2		Wingate, Benry A., Jr.	K4BAL
AL Birmingham	K4BAL-4		Wingate, Benry A., Jr.	K4BAL
AL Birmingham	K4BAL-5		Wingate, Benry A., Jr.	K4BAL
AR Evening Shade	KF5TL-1		McKenzie, Charles L.	KF5TL
AR Evening Shade	KF5TL-2		McKenzie, Charles L.	KF5TL
AR Evening Shade	KF5TL-3		McKenzie, Charles L.	KF5TL
AR Evening Shade	KF5TL-4		McKenzie, Charles L.	KF5TL
AR Little Rock	KC5JB-1		Reaves, Donald E.	KC5JB
AR Little Rock	KC5JB-2		Reaves, Donald E.	KC5JB
AZ Dewey/Mingus Mt.	KE7CZ-1	DEWEY	Oliver, Joe	WB7BNI
AZ Gilbert	WB7QGN-1		Schroeder, Mark S.	WB7QGN
AZ Gilbert	WB7QGN-6		Schroeder, Mark S.	WB7QGN
AZ Kingman	KB7AG-1		Hannan, Joe	KB7AG
AZ Phoenix	WB7BNI-1	PBX	Oliver, Joe	WB7BNI
AZ Phoenix	WB7BNI-11	#PBX	Oliver, Joe	WB7BNI
AZ Prescott/Mt. Unfon	WB7BNI-15	BNI	Oliver, Joe	WB7BNI
AZ Prescott/Mt. Union	WB7BNI-4	PRC	Oliver, Joe	WB7BNI
AZ Prescott/Mt. Union	WB7BNI-6	#PRC	Oliver, Joe	WB7BNI
AZ Show Low Greens Pk	N7GWP-1	SOW	Oliver, Joe	WB7BNI
AZ Show Low Greens Pk	N7GWP-6	#SOW	Oliver, Joe	WB7BNI
CA Bakersfield	N6GRR-1	BFL	Roux, Louis A.	N6GRR
CA Berkeley (Grisly Pk)	AK7B-1	GPK	Barlow, Chris	AK7B
CA Big Bear	AA6TN-1	TN	Neal, Terrance M.	AA6TN
CA Canoga Park	WA6SBV-1		Martin, William	WA6SBV
CA Canoga Park	WA6SBV-11		Martin, William	WA6SBV
CA Chatsworth	K6IYK-12		Fortney, James T.	K6IYK
CA Chatsworth	K6IYK-13		Fortney, James T.	K6IYK
CA Chatsworth	K6IYK-3		Fortney, James T.	K6IYK
CA Del Mar	N6NKF-1		Antonio, Franklin	N6NKF
CA Del Mar	N6NKF-2		Antonio, Franklin	N6NKF
CA Eureka	KA6NEO-1	EUREKA	Phegley, John W.	KA6NEO
CA Fresno	N6HAV-1		Post, William R.	N6HAV
CA Fresno	N6IFN-2	FRESNO	Lozano, T. J.	N6IFN
CA Garberville	N6AFT-1	GBV	Reinke, Vernon L.	N6AFT
CA Laguna Beach	WB6UUT-1		Taylor, Lynn W.	WB6UUT
CA Los Angeles	N6AMT-3	LAX	Pettus, Michael G.	WD6E
CA Magalia	KG6MS-1		Corbridge, Robert L.	KG6MS
CA Mountain View	WB6FFC-1	@WNORM	Westfall, Brian G.	K6OJM
CA Mt. Rasno	WB9RNW-2		Russell, John A.	WB9RNW
CA Mt. Vaca	WA6RDB-1	VACA	Humphrey, Dennis	WA6RDB
CA Mt. Vaca	WA6RDB-11	@VACA2	Humphrey, Dennis	WA6RDB
CA Mt. Wilson (L.A.)	WB9RNW-3		Russell, John A.	WB9RNW
CA Pacifica	KA6EYB-1	SSF1	Wysling, Roy	KA6EYB
CA Palo Alto	W6LOB-7	@PALO2	Burzard, Robert J.	W6LOB
CA Palo Alto	W6LOB-8	PALO4	Burzard, Robert J.	W6LOB
CA Palo Alto	W6LOB-9		Burzard, Robert J.	W6LOB
CA Paso Robles	N6AMT-1	PRB	Campbell, Gregory D.	WB6ASR
CA Paso Robles	N6AMT-11	@PRB2	Campbell, Gregory D.	WB6ASR
CA Red Bluff	N6AMT-7	RBL	Campbell, Gregory D.	WB6ASR
CA Red Bluff	N6AMT-8	@RBL2	Campbell, Gregory D.	WB6ASR
CA Riverside (RACES)	N6KZB-1	SBD	Burton, Mike	N6KZB
CA Sacramento	N6AK-1		Crandall, Keith	K6QIF
CA Sacramento	N6AK-10		Crandall, Keith	K6QIF
CA Sacramento	N6AK-4		Crandall, Keith	K6QIF
CA San Diego	K6KGS-1		Buaas, Robert A.	K6KGS
CA San Diego	N6AMT-4	SAN	Pettus, Michael G.	WD6E
CA San Jose	KA6YXS-1		Cronk, Scott	N7FSP
CA San Jose	N7FSP-11		Cronk, Scott	N7FSP
CA San Jose	N6AMT-0	SFO	Campbell, Gregory D.	WB6ASR
CA San Jose	N6AMT-10	@SFO2	Campbell, Gregory D.	WB6ASR
CA Santa Ana	N6AMT-5	SNA	Pettus, Michael G.	WD6E
CA Santa Barbara	KA6SOX-1	SOX	King, Thomas C. Jr.	KA6SOX
CA Santa Barbara	N6AMT-12	@SBA2	Bickerdike, Peter L.	WB6DAO
CA Santa Barbara	N6AMT-2	SBA	Bickerdike, Peter L.	WB6DAO
CA Ventura	WA6ESN-13		Sulphur Mtn. Rptr. Assn.	N6MA
CA Ventura	WA6ESN-3	VNTURA	Sulphur Mtn. Rptr. Assn.	N6MA
CA Ventura, South Mtn.	WA6ESN-6		Sulphur Mtn. Rptr. Assn.	N6MA
CO Boulder	KE6LT-1		Spinelli, Gene	KE6LT
CO Colorado Springs	KE9S-2	COS	Benton, Malcolm E.	KE9S
CO Colorado Springs	WB0OCJ-1	BAS	Barrett, Charles F.	WB0OCJ
CO Denver	KQ0J-2		Sheffield, Bill	KQ0J
CO Durango	KD0DI-1		Orlosky, Kit	KD0DI
CO Ft. Collins/Loveland	W0BJX-1	FNL	Selders, Samuel A.	W0BJX
CO Glenwood Springs	K0GUS-1	GWS	Carter, Stephen L.	K0GUS
CO Grand Junction	W0RRI-1	GJT	LeBaron, William J.	W0MTX
CO Kremmling	KQ0J-1	KRE	Sheffield, Bill	KQ0J
CO Manassa	N0FSH-1		Sigmon, Marcus	N0FSH
CO Pikes Peak	W0VI-1		Pikes Peak FM Assoc.	W0VI
CO Rifle	K0GUS-2		Carter, Stephen L.	K0GUS
CT Collinsville	WA1UQC-7		Faucher, Dave	WA1UQC
CT Collinsville	WA1UQC-8		Faucher, Dave	WA1UQC
CT Newington	W1AM-5	CENCT	Am. Radio Relay League	W1AM
CT Newington	W1AM-7		Am. Radio Relay League	W1AM
CT North Central	W1AM-6	NCCT	Am. Radio Relay League	W1AM
CT Putnam (Eastern)	KA1MUJ-1		Eastern Conn. ARA	WA1BYN
CT Putnam (Eastern)	KA1MUJ-7		Eastern Conn. ARA	WA1BYN
CT South Central	K1IKE-1	SCCT	Szczech, Joseph Jr.	K1KIE
CT South East	W1OPS 1	SECT	Cox, Howard B.	W1OPS
FL Apopka	AB4CQ 1		Williamson Gordon	AB4CQ
FL Apopka	AB4CQ 2		Williamson Gordon	AB4CQ
FL Boca Raton	WB4QBR 0		IBM ARC of Boca Raton	N4TL
FL Boca Raton	WB4QBR 1		IBM ARC of Boca Raton	N4TL
FL Boca Raton	WB4QBR 2		IBM ARC of Boca Raton	N4TL
FL Casselberry	KD4SB 7		[illegible]	KD4SB
FL Casselberry	KD4SB 9		[illegible]	KD4SB
FL Clearwater	N4JTT 0		[illegible]	N4JTT
FL Clearwater	N4JTT 1		[illegible]	N4JTT
FL Davie	WA4LRB 0		[illegible]	W4LRB
FL Davie	WA4LRB 1		[illegible]	W4LRB
FL Gainesville	K4DPI-1		Peterson, Richard K.	W4KEA
FL Hollywood	WA4WHD-2		Webb, Ed	W4FQM
FL Hollywood	WA4WHD-3		Webb, Ed	W4FQM
FL Homestead (N. Keys)	AA4TM-1	BST	Bertrand, William G.	AA4TM
FL Homestead (N. Keys)	AA4TM-2		Bertrand, William G.	AA4TM
FL Lake Wales	WB4PGB-1		McKenzie, William A.	WB4PGB
FL Miami	KB4VWA-1		Figueroa, Edward R.	KB4VWA
FL Miami	KB4VWA-2		Figueroa, Edward R.	KB4VWA
FL Naples	KC5YD-2		Voltaire, Paul	KC5YD
FL Naples	KC5YD-3		Voltaire, Paul	KC5YD
FL Naples	KC5YD-4		Voltaire, Paul	KC5YD
FL Orange Park	W5BUQ-2		Moore, John R.	W5BUQ
FL Orlando	K4ABO-1		Diggs, James W.	K4ABO
FL Orlando	K4ABO-2		Diggs, James W.	K4ABO
FL Orlando	WD4BIM-1		LaPointe, Bruce	WD4BIM
FL Orlando	WD4BIM-2		LaPointe, Bruce	WD4BIM
FL Orlando	WD4BIM-7		LaPointe, Bruce	WD4BIM
FL Sarasota	W4IE-0		Sarasota ARC	W4IE
FL Sarasota	W4IE-1		Sarasota ARC	W4IE
FL Stuart	K4NTA-1		Buf, Ted	K4NTA
FL Stuart	K4NTA-2		Buf, Ted	K4NTA
FL Tampa	KB4LBX-1		Evonosky, Alex	KB4LBX
FL Tampa	KB4LBX-2		Evonosky, Alex	KB4LBX
FL Tampa	KB4LBX-3		Evonosky, Alex	KB4LBX
FL West Palm Beach	WA4BXE-1		Felton, Joshua B., Jr.	WA4BXE
FL West Palm Beach	WA4BXE-2		Felton, Joshua B., Jr.	WA4BXE
GA Savannah	K4NLX-1		Goddard, Dan	K4NLX
GA Savannah	K4NLX-2		Goddard, Dan	K4NLX
HI Honolulu	DO1UJ-0		Manalo, Eduardo V.	DU1UJ
HI Honolulu	DO1UJ-1		Manalo, Eduardo V.	DU1UJ
HI Honolulu	DO1UJ-2		Manalo, Eduardo V.	DU1UJ
HI Honolulu	KH6GPI-10	BNL	Sprague, Arthur Y.	KB6GPI
HI Maui	KH6RS-9		Maui ARC	AB6GJ
HI Mt Haleakala, Maui	KH6RS-1	MAUI	Maui ARC	AB6GJ
HI Oahu	KH6GPI-11		Sprague, A. Y.	KB6GPI
HI Oahu	KH6GPI-9		Sprague, Arthur Y.	KB6GPI
IA Ames	KI0Q-1		Fitz, David C.	KI0Q
IA Ames	KI0Q-2		Fitz, David C.	KI0Q
IA Cedar Rapids	KOVM-1		Groff, Alvin	KOVM
IA Cedar Rapids	KOVM-2		Groff, Alvin	KOVM
IA Cedar Rapids	KOVM-3		Groff, Alvin	KOVM
IA Denison	WB0GGI-1		Crabb, Dennis, M.D.	WB0GGI
IA Des Moines	KOIQR-1	DSM	Evans, Robert A.	KOIQR
IA Garner	WD0EMI-1		Hall, Dave	WD0EMI
IA Manson	WB0NMM-1		Swartzendruber, John	WB0NMM
IA Marion	KC0OX-1		Breitwisch, Ron	KC0OX
IA Marion	KC0OX-2		Breitwisch, Ron	KC0OX
IA Sioux City	WB0YOW-1		Barbee, Loren	WB0YOW
IA Storm Lake	WA0UEI-1		Matthews, Jerry J.	WA0UEI
ID Boise	W7SC-0	BOI	Ahmann, Robert	W7SC
ID Boise	W7SC-1		Ahmann, Robert	W7SC
ID Boise (SW Idaho)	KK7A-1	BOISE	Larson, Jim	KK7A
ID Coeur d'Alene	KK7X-4		Ball, Dennis	KK7X
ID Coeur d'Alene	KK7X-5		Ball, Dennis	KK7X
ID Pocatello (SE ID)	W7XS-1	PIE	Servel, K. F.	W7XS
ID Rexburg	K7EWE-1	REX	Moss, Ronnie E.	K7EWE
ID Rupert	WA7UBM-1	BYI	Short, Harold	WA7UBM
IL Champaign-Urbana	KA9CAP-1	CMI	Berkman, Ronald E.	KA9CAP
IL Chicago	K9VXW-1		Bergstedt, C. R.	K9VXW
IL Chicago	K9VXW-2		Bergstedt, C. R.	K9VXW
IL Mt. Prospect	N9GBB-1		Chesner, James C.	N9GBB
IL Napierville	N9ATM-2		Milk, John R.	N9ATM
IL Napierville	N9ATM-3		Milk, John R.	N9ATM
IN Flora	KD9WB-1		Cosand, James H.	KD9WB
IN Fort Wayne	K9LSB-1	FWA	Forbing, Jack D.	K9LSB
IN Hebron	N9CVV-1		Burton, Ken	N9CVV
IN Lafayette	WB9QPG-1		Filmer, David L., Ph.D.	WB9QPG
IN Martinsville	WA9UGO-1		Earnshaw, John W.	WA9UGO
IN Plymouth	WA9IHM-1	PLY	Zehner, Wayne	WA9IHM
IN Terre Haute	N9UUU-0		Wabash Valley ARA	N9UUU
IN Valparaiso	WA9VMM-1		Czaja, Edward	WA9VMM
IN Westfield	N9IRX-1		NA	NA
IN Westfield	N9IRX-2		NA	NA
KY Ft. Mitchell	KA4BCD-1		Uckotter, Tim	KA4BCD
KY Independence	K4CO-1		Gouge, Ralph	K4CO
KY Independence	K4CO-6		Gouge, Ralph	K4CO
KY Lexington	W4AVI-1	LEX	Shepherd, W. R.	W4AVI
KY Lexington	W4AVI-2		Shepherd, W. R.	W4AVI
KY Versailles	WB9TPG-1	VER	Mitchell, Gary A.	WB9TPG
LA Alexandria	WB5ASD-2		Palko, Thomas	WB5ASD
LA Baton Rouge	KD5SL-1		McAnelly, Shelton	KD5SL
LA Monroe	AE5V-2		Scott, Benson	AE5V
LA New Orleans	WB5BEE-0		Rees, J. H.	WB5BEE
LA Pineville	W5BOF-2		Hayes, William I.	W5BOF
LA Sulphur	WA5VDM-15		Nelson, Sam	WA5VDM
MA Foxboro	WB1EMT-1		Foxboro Co. ARC	WB1EMT
MA Mt. Tom, Holyoke	K1SJB-1	MNA	Moorek, Jim	K1MEA
MD Baltimore	WJ1NI-10	#BNI2	Clark, Thomas A.	WJ1NI
MD Baltimore	WJ1NI-5	BNI	Clark, Thomas A.	WJ1NI
MD College Park	WA3YMH-1	UMD	Hamakos, Louis A.	WA3YMH
MD Elk Neck	WJ1NI-11	@ELK2	Clark, Thomas A.	WJ1NI
MD Elk Neck	WB4APR-6	ELK	Bruninga, Bob	WB4APR
MD Reisterstown	WJ1GXT-10		McClure, Lester L.	WJ1GXT
MD Reisterstown	WJ1GXT-5		McClure, Lester L.	WJ1GXT
MI Brighton	WA1LRL-3		Galipeau, Joseph E., Jr.	WA1LRL
MI Grand Rapids	KB8FK-1		Bosscher, Tom	WA8URE
MI Grand Rapids	KB8FR-2		Bosscher, Tom	WA8URE
MN Edina	WA0WLP-1	FBL	Moore, Dave	KI0S
MN Minneapolis	W0TN-1	MSP	Whiting, Rick	W0TN
MN Minnetonka	W0TN-2	MND	Whiting, Rick	W0TN
MO Rochester	W0MXW-1	RST	Dubke, Robert E.	K0SIR
MO Dixon	W0RQL-1	RQL	Hamilton, Jimmie J.	W0RQL
MO Springfield	NE0B 1		Christiano, David J.	NE0B
MS Clinton	WD4DDA 5		Jackson ARC Inc.	WD4DDA
MS Gulfport	WA5DVV 2		Fagan, Patrick J.	WA5DVV
MS Gulfport	WA5DVV 3		Fagan, Patrick J.	WA5DVV
MS Mendenhall	K5BYE-1	MDL	Statham, John C	K5BYE
MS Vicksburg	WB5SXK-4		Ford, Bill	WB5SXK
MS Vicksburg	WB5SXK-5		Ford, Bill	WB5SXK
NC Cary	K4ITL-1		Stephenson, Ed	AB4S
NC Charlotte	W4BFB-1		Mecklenburg ARS Inc.	W4BFB
NC Charlotte	W4BFB-2		Mecklenburg ARS Inc.	W4BFB
NC Fayetteville	WA4FLR-8		Chilcote, Robert L.	WA4FLR
NC Fayetteville	WA4FLR-9		Chilcote, Robert L.	WA4FLR
NC Fayetteville	WA8BFV-1		Edington, Ray J.	WA8BFV
NC Greensboro	WB4WOR-5		Layno, J. Charles	WB4WOR
NC Greensboro	WB4WOR-6		Layno, J. Charles	WB4WOR
NC Lumberton	KB4NOI-1		Inseo, Ron	KB4NOI
NC Lumberton	W4NBV-1		Macleod, James B.	W4NBV
NC Morrisville	WB8OUE-6		Cain, Tom	WB8OUE
NC Morrisville	WB8OUE-7		Cain, Tom	WB8OUE
NC Morrisville	WB8OUE-8		Cain, Tom	WB8OUE
NC Morrisville	WB8OUE-9		Cain, Tom	WB8OUE
NC Wilson	NE4J-1		Evans, Tommy	NE4J
NC Winston-Salem	KB4NBB-1		Warren, Bob	KB4NBB
NC Winston-Salem	KB4NBB-2		Warren, Bob	KB4NBB
NC Winterville	WD4JPQ-1		Ross, Wayne	WD4JPQ
NC Winterville	WD4JPQ-2	PGV	Ross, Wayne	WD4JPQ
ND Cathay	WB0VBM-1		Ockert, William R.	WB0VBM
ND Mayville	W0KZU-1		Lindaas, Elroy W.	W0KZU
ND Rocklake	W0GUV-1		Kurtti, Erling	W0GUV
NE Lincoln	WB0QIY-1	LNK	Buhrman, Douglass	WB0QIY
NE Omaha	KO8OY-1		Halbert, Doug	KO8OY
NE Omaha	KO8OY-5		Halbert, Doug	KO8OY
NE South Sioux City	NF0N-1		Nickolaus, Mike	NF0N
NE South Sioux City	NF0N-5		Nickolaus, Mike	NF0N
NH E. Kingston	W1KJ-1		New England PR Assn.	W1KJ
NH Kingston	K1TR-1		New England PR Assn.	W1KJ
NH Kingston	KA1OXQ-1		New England PR Assn.	W1KJ
NH Kingston	W1DC-0		New England PR Assn.	W1KJ
NH Kingston	W1HJF-4		New England PR Assn.	W1KJ
NJ Alpine (NNJ/NYC/LI)	K2LSX-6	ALPINE	Gubernard, John T.	K2LSX
NJ Alpine (NNJ/NYC/LI)	K2LSX-7	MAMARC	Gubernard, John T.	K2LSX
NJ Cape May	WB8OIF-2		Ott, Robert D.	WB8OIF
NJ Oakland	WA2SNA-2	WNJ	Anderson, Robert R.	K2BJG
NJ Oakland	WA2SNA-3	WNJ2	Anderson, Robert R.	K2BJG
NJ Palisades Park	W2NV-11		Mannino, Joseph F.	W2NV
NJ Palisades Park	W2NV-6		Mannino, Joseph F.	W2NV
NJ Palisades Park	W2NV-7		Mannino, Joseph F.	W2NV
NJ Palisades Park	W2NV-8		Mannino, Joseph F.	W2NV
NJ Palisades Park	W2NV-9		Mannino, Joseph F.	W2NV
NJ Palisades Park	W3CSG-1		Crocker, Royce F.	W3CSG
NJ South	WB2DRD-1		McNally, Thomas O.	WB2DRD
NJ South	WB2DRD-2		McNally, Thomas O.	WB2DRD
NJ South	WB2DRD-3	SNJ3	McNally, Thomas O.	WB2DRD
NJ South	WB2DRD-4		McNally, Thomas O.	WB2DRD
NJ Warren	KA9Q-1		Karn, Phillip R. Jr.	KA9Q
NJ Warren	W4HY-1		Karn, Phillip R. Jr.	KA9Q
NJ Wharton	KB2M-1		Minard, Harold	KB2M
NM Albuquerque	KC5DD-1		Falkowski, Edmond	KC5DD
NM Albuquerque	KD5TU-1		Rogers, Robert B.	KD5TU
NM Deming/Las Cruces	WD5EZC-0		Taylor, Joann	WD5EZC
NM Nogal	WB5NQC-1		Jones, Mike	WB5NQC
NV Ely	WB7WTS-1		Christensen, Joseph R.	WB7WTS
NV Ely	WB7WTS-2		Christensen, Joseph R.	WB7WTS
NV Gardnerville	WA6NGU-2		Tweedy, Stan	WA6NGU
NV Gardnerville	WA6NGU-3		Tweedy, Stan	WA6NGU
NV Gardnerville	WA6NGU-4		Tweedy, Stan	WA6NGU
NV Las Vegas	K7WS-1	LAS	Schenk, Wayne	K7WS
NV Las Vegas	K7WS-11		Schenk, Wayne	K7WS
NV Las Vegas	K7WS-2		Schenk, Wayne	K7WS
NV Las Vegas	K7WS-3		Schenk, Wayne	K7WS
NV Las Vegas	K7WS-4		Schenk, Wayne	K7WS
NV Reno	AK7B-14	RENO	Barlow, Chris	AK7B
NV Reno	AK7B-4		Barlow, Chris	AK7B
NV Silver City	AK7B-11		Barlow, Chris	AK7B
NY Bardonia	K2SK-1	RKL	Douglas, Robert M.	K2SK
NY Clove Mt., Unionvale	W2CJ-1	CLV	Dutchess Cty. Ofc of CD	W2CJ
NY E. Long Island	K2AAA-1		Merten, Donald J. S.	K2AAA
NY Mt. Beacon	WB2KMY-1	ENY	Mt. Beacon ARC	WB2KMY
NY Mt. Beacon	WB2KMY-11		Mt. Beacon ARC	WB2KMY
NY Mt. Beacon	WB2KMY-12		Mt. Beacon ARC	WB2KMY
NY New York City	WB2QBP-11		Berson, Mark	N2MB
NY New York City	WB2QBP-12		Berson, Mark	N2MB
NY New York City	WB2QBP-2		Berson, Mark	N2MB
NY New York City	WB2QBP-3		Berson, Mark	N2MB
NY New York City	WB2QBP-6	NYCVHF	Berson, Mark	N2MB
NY Northern Long Island	N1DL-6	NLINY	Geng, Karl B.	N1DL
NY Queens (NYC)	WB2QBP-7		Berson, Mark	N2MB
NY Schenectady	K2AE-0		Schenectady ARA	K2AE
NY Schenectady	K2AE-2		Schenectady ARA	K2AE
NY White Plains	WB2XII-9		Vydareny, Paul S.	WB2VUR
OH Athens	WD8OXK-1	ATH	White, Jeffrey H.	WD8OXR
OH Cambridge	K8AL-1		Day, Alan	K8AL
OH Cleveland	WB8CQR-0		Lake Erie ARA	WD8KIS
OH Dayton	N8NN-1		Garcia, Albert B.	N8NN
OH Dayton	N8NN-8		Garcia, Albert B.	N8NN
OH Elida	KB6ILT-1	PUT	Laus, Thomas	KB6ILT
OH Elida	KB6ILT-2		Laus, Thomas	KB6ILT
OH Findlay	N8FT-10		Laube, Frederick L.	AK8X
OH Findlay	N8FT-8		Laube, Frederick L.	AK8X
OH Findlay	N8FT-9		Laube, Frederick L.	AK8X
OH Middletown (SW OH)	WB8LV-2	MMO2	Dial Radio Club	WB8LV
OH Middletown (SW OH)	WB8LV-3	MMO3	Dial Radio Club	WB8LV
OH Middletown (SW OH)	WB8LV-4	MMO4	Dial Radio Club	WB8LV
OH Munroe Falls	WB8CXO-1		Young, Michael E.	WB8CXO
OR Klamath Falls	N6AFT-2	KLMTH	Reinke, Vernon L.	N6AFT
OR Newport	W7VTM-1	NPT	Wilson, Daron	W7BUR
OR Newport	W7VTM-11		Wilson, Daron	W7BUR
OR Portland	W7XI-1		McMurdo, Douglas S III	W7XI
OR Portland	W7XI 11		McMurdo, Douglas S III	W7XI
OR Portland	WA2TMP-7	@PDX	Rovner, Alan N	WA2TMP
OR Portland	WA2TMP-8	PDX	Rovner, Alan N	WA2TMP

PA East	KB3UD-1	EPA	Teel, Thomas C.	KB3UD	
PA East Bangor	KB3UD-8		Teel, Thomas C.	KB3UD	
PA Glenside	WA3DSP-5		Crompton, Doug	WA3DSP	
PA Glenside	WA3DSP-6		Crompton, Doug	WA3DSP	
PA Harrisburg	WA3KXG-5	BBG	Central Pa. Rptr. Assn.	K3IBN	
PA Hummelstown	AK3P-5		Hoffmann, Gary	AK3P	
PA Mt. Holly Springs	WA3KXG-6	MBS	Central Pa. Rptr. Assn.	K3IBN	
PA Philadelphia	WB2MNF-2		Pearce, Jon	WB2MNF	
PA Philadelphia	WB2MNF-3		Pearce, Jon	WB2MNF	
PA Phoenixville	N3RD-1		Hawes, R. David	N3RD	
RI Cumberland	KF1C-1		Sirois, Kenneth A.	KF1C	
RI Providence	K1AD-0		Healy, S. C.	NG1U	
SC Anderson/Greenv'lle	KA4YEA-1	AND	Nelson, N. A., Jr.	KA4YEA	
SC Anderson/Greenv'lle	KA4YEA-2		Nelson, N. A., Jr.	KA4YEA	
SC Anderson/Greenv'lle	KA4YEA-3		Nelson, N. A., Jr.	KA4YEA	
SC Charleston	WD4JEJ-3		Kronick, Richard A.	WD4JEJ	
SC Charleston	WD4JEJ-8		Kronick, Richard A.	WD4JEJ	
SC Florence (East SC)	W4ULB-1		O'Neil, Donald W.	WA4SZK	
SC Florence (East SC)	W4ULB-2		O'Neil, Donald W.	WA4SZK	
SC Goose Creek	WD4NUN-9		Ott, Vince	WD4NUN	
SC Heath Springs	K4NJR-1		Marshall, Delrey M.	K4NJR	
SC Heath Springs	K4NJR-2		Marshall, Delrey M.	K4NJR	
SC Heath Springs	K4NJR-3		Marshall, Delrey M.	K4NJR	
SD Rapid City	AA0F-1		Schwenle, Donald	AA0F	
SD Rapid City	AA0F-2		Schwenle, Donald	AA0F	
SD Rapid City	AA0F-3		Schwenle, Donald	AA0F	
TN Johnson City	WX4S-1		Ingraham, Edward R.	WX4S	
TN Kingsport	K4VZE-1		Smith, Gary E.	K4VZE	
TN Knoxville	AA4KS-1		Spille, Richard F.	AA4KS	
TN Knoxville	WB4JSD-1		Thompson, David S.	WB4JSD	
TN Oliver Springs	KB4NK-1		Argo, Bobby E.	KB4NK	
TX Abilene/Midland	AG5F-3	ABTEX	McAtee, Robert	AG5F	
TX Daisetta	N5DMG-1	DAS	Hale, Jim	N5DMG	
TX El Paso	WD5ETQ-0		Camp, David B., Sr.	WD5ETQ	
TX Houston	K5VMX-1	IAB	Houston Area FRS	WD5GAE	
TX Lubbock	KA5EJX-1	LBB	Buckabay, Rod	KA5EJX	
TX Lubbock	WA5TBB-1		Reid, Cranston	WA5TBB	
TX Lubbock	WA5TBB-2		Reid, Cranston	WA5TBB	
TX Midland/Odessa	KE5PL-1	MAF	McDaniel, B. John	KE5PL	
TX San Angelo	WA5JBN-2	SAG	Elliott, Donald R.	WA5JBN	
TX West Houston	WA5F-1	BOU	Dillard, Johnny K.	WA5F	
UT Blue Mt. (Eastern)	KD7OD-1	BLU	Anderson, Kelly B.	KD7OD	
UT Castle Dale	KD7YG-1		Mills, Richard Bret	KD7YG	
UT Castle Dale	KD7YG-2		Mills, Richard Bret	KD7YG	
UT Cedar City	WA7GTU-1	CEDAR	Blanchard, Don	WA7GTU	
UT Logan	WA7MBL-1	LOGAN	Jacobsen, Jeffry B.	WA7MBL	
UT Logan	WA7MBL-2		Jacobsen, Jeffry B.	WA7MBL	
UT Orem	KD7YK-1	OREM	Huish, E. A.	KD7YK	
UT Orem	KD7YK-12		Huish, E. A.	KD7YK	
UT Orem	KD7YK-13		Huish, E. A.	KD7YK	
UT Orem	KD7YK-14		Huish, E. A.	KD7YK	
UT Orem	KD7YK-3		Huish, E. A.	KD7YK	
UT Orem	KD7YK-4		Huish, E. A.	KD7YK	
UT Orem	KD7YK-5		Huish, E. A.	KD7YK	
UT Orem	KD7YK-6		Huish, E. A.	KD7YK	
UT Price	WA7LEG-1		Mills, Richard Bret	KD7YG	
UT Price	WA7LEG-2		Mills, Richard Bret	KD7YG	
UT Salt Lake City	K7EA-1	SLC	Bradford, William	K7EA	
UT Salt Lake City	K7EA-2		Bradford, William	K7EA	
UT Snowbird/SLC	KD7YK-2	SNOW	Huish, E. A.	KD7YK	
UT West Central	WA7GTU-2	FRISCO	Blanchard, Don	WA7GTU	
VA Alexandria	N4EXV-1		Phillips, Charles O.	N4EXV	
VA Alexandria	N4EXV-2		Phillips, Charles O.	N4EXV	
VA Alexandria	N4EXV-3		Phillips, Charles O.	N4EXV	
VA Alexandria	N4EXV-4		Phillips, Charles O.	N4EXV	
VA Arlington	K3AF-0		AFCC % Arnold, E. H.	K3AF	
VA Arlington	K3AF-1		AFCC % Arnold, E. H.	K3AF	
VA Chantilly	K4UW-2	IAD	Hadron, Inc.	K4UW	
VA Chantilly	K4UW-3		Hadron, Inc.	K4UW	
VA Chantilly	K4UW-4		Hadron, Inc.	K4UW	
VA Chantilly	K4UW-5		Hadron, Inc.	K4UW	
VA Chantilly	W4JFS-1		Hadron, Inc.	K4UW	
VA Chantilly	W4JFS-2		Hadron, Inc.	K4UW	
VA Fancy Gap (SW)	WA4LWE-1	FGAP	Thomas, Walter B., Jr.	WA4LWE	
VA Front Royal	WA4FRB-3		Malta, V. Michael	WA4FRB	
VA Front Royal	WA4FRB-4		Malta, V. Michael	WA4FRB	
VA Max Meadows	KC4VR-1	WYTHE	Faries, Mike	KC4VR	
VA Onancock	KJ4AG-1		Davis, Austin C.	KJ4AG	
VA Onancock	KJ4AG-2		Davis, Austin C.	KJ4AG	
VA Onancock	KJ4AG-3		Davis, Austin C.	KJ4AG	
VA Richmond	K4ARO-1	RIC	Cogle, Arthur Carter	K4ARO	
VA Roanoke	N4FBL-1		Burch, Ben A., III	N4FBL	
VA Virginia Beach	WA4KXV-1	VAB	Burkett, Wallace E.	WA4KXV	
VA Virginia Beach	WA4KXV-2		Burkett, Wallace E.	WA4KXV	
VA West Central	W4BLD-1	BRDN	Kerby, Robert B.	W4BLD	
VA Williamsburg	W4NTG-4		McNutt, George R.	W4NTG	
WA Deer Park	W7EFS-7		Baselett, Steve	W7EFS	
WA Deer Park	W7EFS-8		Baselett, Steve	W7EFS	
WA Everett	KA7VEE-10		Lucier, Ralph Jr.	KA7VEE	
WA Everett	KA7VEE-7	#EVT	Lucier, Ralph Jr.	KA7VEE	
WA Everett	KA7VEE-8	EVT	Lucier, Ralph Jr.	KA7VEE	
WA Everett	KA7VEE-9		Lucier, Ralph Jr.	KA7VEE	
WA Longview	K7SVV-7	#LSO	Hart, Michael D.	K7SVV	
WA Longview	K7SVV-8	LSO	Hart, Michael D.	K7SVV	
WA Lynnwood	W7BTI-3		AEA, Inc.	W7MXL	
WA Lynnwood	W7BTI-4		AEA, Inc.	W7MXL	
WA Lynnwood (demo)	AEA-10		AEA, Inc.	W7MXL	
WA Lynnwood (demo)	AEA-11		AEA, Inc.	W7MXL	
WA Lynnwood (demo)	AEA-8		AEA, Inc.	W7MXL	
WA Lynnwood (demo)	AEA-9		AEA, Inc.	W7MXL	
WA Richland	WB7CNJ-7		Wright, Robert. B.	WB7CNJ	
WA Richland	WB7CNJ-8		Wright, Robert. B.	WB7CNJ	
WA Seattle	N7FSP-1	SEATAC	Cronk, Scott	N7FSP	
WA Seattle	N7FSP-10	SEA220	Cronk, Scott	N7FSP	
WA Seattle	WW7AMR-7	#SEA	NW Amateur PR Assn.	WB7FBC	
WA Seattle	WW7AMR-8	SEA	NW Amateur PR Assn.	WB7FBC	
WA Seattle	KB7DS-7	#SEAN	NW Amateur PR Assn.	WB7FBC	
WA Seattle (West)	KB7DS-8	SEAN	NW Amateur PR Assn	WB7FBC	
WA Seattle (West)	K3GPJ-7		Wildman, Charles H	K3GPJ	
WA Yakima	K3GPJ-8		Wildman, Charles H	K3GPJ	
WA Yakima	W7BBU-7		Ambrogio, Richard W	W7BBU	
WA Yakima	W7BBU-8		Ambrogio, Richard W	W7BBU	
WI Cedarburg	WD9DBI-9		Lang-Ing, Gregg	WD9DBI	
WI Dousman	WA9KEC-2				
WI Dousman	WA9KEC-3				
WI Dousman	WA9KEC-4				
WI Dousman	WA9KEC-5				
WI Eastern	WF9R-1				SHE
WI Eastern	WF9R-2				SHE
WI Eastern	WF9R-3				SHE
WI La Crosse	WA9FIO-1				LSE
WI Madison	KD9UU-9				
WI Middleton	WA9SOU-2				NFR
WI Milwaukee	WA9POV-9				MKE
WI Milwaukee	WB9TYT-7				
WI Milwaukee	WB9TYT-8				
WI Milwaukee	WB9TYT-9				SLG
WI Tomahawk	N9CLE-1				
WV East Central	KA8EXP-3				ECWV
WV Moundsville	WB8ETV-1				
WV North Central	KA8EXP-1				NCWV
WV Ravenswood	WA8USO-1				
WV Ravenswood	WA8USO-2				
WY Casper	W7VWJ-0				
WY Rawlins	W7KF-1				RWL
WY Riverton	K7MM-5				COP
-AUSTRALIA	VK2IN-6				
-AUSTRALIA	VK2IN-7				
-AUSTRALIA	VK2IN-8				
-AUSTRALIA N.S.W.	VK2RPB-0				
-AUSTRALIA N.S.W.	VK2RPN-0				
-AUSTRALIA N.S.W.	VK2RPS-0				
-AUSTRIA Bregenz	OE9ELB-2				
-AUSTRIA Bregenz	OE9ELB-7				
-AUSTRIA Bregenz	OE9XPI-2				
-AUSTRIA Bregenz	OE9XPI-7				
-AUSTRIA Riezlern	OE9ATI-0				
-BELGIUM	ON1UI-1				
-BELGIUM	ON4AMT-2				
-BELGIUM	ON4AMT-7				
-BELGIUM	ON7EU-2				
-BELGIUM Brussels	ON7RC-0				
-BELGIUM Brussels	ON7RC-2				
-CANADA Br. Columbia	VE7LAB-1				
-CANADA Br. Columbia	VE7LAM-2				
-CANADA Br. Columbia	VE7LAM-3				
-CANADA Br. Columbia	VE7LAM-4				
-CANADA Manitoba	VE4MMS-2				
-CANADA Manitoba	VE4PKT-0				
-CANADA Manitoba	VE4SEM-0				
-CANADA Nova Scotia	VE1AOE-1				
-CANADA Nova Scotia	VE1CDN-1				
-CANADA Ontario	VE3GKM-1				ABURG
-CANADA Ontario	VE3GKM-2				
-CANADA Ontario	VE3GKM-3				
-CANADA Ontario	VE3LSR-3				
-CANADA Ontario	VE3TTT-3				
-CANADA Pr Edward Is.	VE1CRA-0				
-ENGLAND	G4RFG-0				
-ENGLAND	G4RFG-1				
-ENGLAND	G8GGI-1				
-ENGLAND	G8GGI-2				
-ENGLAND	G8RBE-1				RBE1
-ENGLAND	G8RBE-2				RBE2
-ENGLAND	GB3AP-1				
-ENGLAND	GB3XP-0				
-ENGLAND Cambridge	GB3PX-0				
-ENGLAND Daventry	G4RFG-2				
-ENGLAND Daventry	G4RFG-3				
-ENGLAND Kent	G4LEV-0				KENT
-ENGLAND Leeds	G0BSX-1				
-ENGLAND Sussex	G4VQS-0				
-ENGLAND Ware/Herts	G9TTD-0				
-INDONESIA Semarang	YB2AG-0				
-ITALY Milan	I2KBD-3				
-ITALY Milan	I2KBD-4				
-JAPAN Fukushima	JE7QPB-11				
-JAPAN Fukushima	JE7YJL-11				
-JAPAN Kanagawa	JE1YBN-11				
-JAPAN Kanagawa	JE1YBN-12				
-JAPAN Kanagawa	JE1YBN-9				
-JAPAN Kyoto	JA3BQL-0				
-JAPAN Kyoto	JA3BQL-1				
-JAPAN Kyoto	JH3BJN-5				
-JAPAN Kyoto	JH3BJN-6				
-JAPAN Kyoto	JH3BJN-7				
-JAPAN Nagano City	JA0ZYV-11				
-JAPAN Nagoya	JF2PSE-4				
-JAPAN Nagoya	JF2PSE-5				
-JAPAN Nagoya	JI3YJK-0				
-JAPAN Nagoya	JI3YJK-1				
-JAPAN Nagoya	JI3YJK-2				
-JAPAN Okayama	JH4ERV-0				
-JAPAN Okayama	JH4ERV-1				
-JAPAN Osaka	JA3USA-1				NARD
-JAPAN Osaka	JA3USA-2				IKOMA
-JAPAN Shizuoka	JF2YMO-11				
-JAPAN Shizuoka	JF2YMO-12				
-JAPAN Tochigi	JH1YRU-11				
-JAPAN Tochigi	JH1YRU-12				
-JAPAN Tokyo	JA1YJR-12				
-JAPAN Tokyo	JE1BYR-10				
-JAPAN Tokyo	JE1BYR-11				
-JAPAN Tokyo	JE1NAI-11				
-JAPAN Tokyo	JE1NAI-12				
-JAPAN Tokyo	JH3XCU-4				
-JAPAN Tokyo	JH3XCU-5				
-JAPAN Tokyo	JJ1YYP-11				
-JAPAN Tokyo	JJ1YYP-12				
-JAPAN Tokyo	JR1VMX-11				
-JAPAN Tokyo	JR1VMX-12				
-NETHERLANDS Breda	PA0BMB-1				
-NORWAY	LA5QR-0				
-NORWAY	LA5XR-0				
NORWAY	LA6DR-0				
NORWAY Duken	LA4YS-5				

Hawkins, Roy	WA9KEC
Hawkins, Roy	WA9KEC
Hawkins, Roy	WA9KEC
Hawkins, Roy	WA9KEC
Martell, Alan	NF9R
Martell, Alan	NF9R
Martell, Alan	NF9R
Elston, A. C. V.	WA9FIO
Davis, Patrick G.	KD9UU
Corstvet, A. J.	WA9SOU
Knaus, David	WA9POV
Bolander, Daniel R.	KB9YTT
Bolander, Daniel R.	KB9YTT
Bolander, Daniel R.	KB9YTT
Dieter, Walter T.	N9CLE
Ramesan, G. Dave	KA8IXP
Knollinger, Donald E.	KB9ITV
Ramesan, G. Dave	KA8IXP
Earley, Emmett J., Jr.	WA8USO
Earley, Emmett J., Jr.	WA8USO
Casper ARC	N7VNJ
Kangas, William M.	N7KF
Ransom, Dan	K7MM
Australian Amat. PRA	VK2AAAB
Australian Amat. PRA	VK2AAAB
Australian Amat. PRA	VK2AAAB
Australian Amat. PRA	VK2AAAB
Australian Amat. PRA	VK2AAAB
Australian Amat. PRA	VK2AAAB
Longhi, Harald	OE9RLB
Longhi, Harald	OE9RLB
IPA % Bertoldi Herbert	OE9XPI
IPA % Bertoldi Herbert	OE9XPI
Fritz, Alfred	OE9ATI
Alderweireldt, Erik	ON1UI
Packet Work Group	ON4AMP
Packet Work Group	ON4AMP
Packet Work Group	ON4AMP
Radio Club RTBF	ON7RC
Radio Club RTBF	ON7RC
BC FM Comm. Assn.	NE7LAN
BC FM Comm. Assn.	NE7LAN
BC FM Comm. Assn.	NE7LAN
BC FM Comm. Assn.	NE7LAN
Sanders, Michael A.	VE4AMS
Bowman, Bill	VE4GTO
Knowles, J. M.	VE4JK
Boland, Donald M.	VE1AOE
Buges, Neil	VE1CDN
Menzies, Robert	VE3GKM
Menzies, Robert	VE3GKM
Menzies, Robert	VE3GKM
Morris, Len	VE3FJB
Toth, David B.	VE3GYQ
MacKay, Ron	VE1AIC
Theodorson, J.	G4BFG
Theodorson, J.	G4BFG
Geddes, Bob	G8GGI
Geddes, Bob	G8GGI
Smith, Robert	G8EBE
Smith, Robert	G8EBE
Witts, Andrew	GB3AP
Geddes, Bob	G8GGI
Miller, James R.	G3RUB
Theodorson, J.	G4BFG
Theodorson, J.	G4BFG
Brazington, Keith	G4LSV
Meiring, Peter de Vos	GOBSX
Oakley, J. M.	G4VQZ
Hewitt, Rod	G6TTD
Djahari, M. A.	YB2AG
Bagni, Alberto E.	I2KBD
Bagni, Alberto E.	I2KBD
Honda, Nataru	JR7OPB
Kudo, Hideo	JA7EPK
Ikutoku Technical Univ.	JA1YPZ
Ikutoku Technical Univ.	JA1YPZ
Ikutoku Technical Univ.	JA1YPZ
Nakane, Sumio	JE3BJN
Nakane, Sumio	JE3BJN
Nakane, Sumio	JE3BJN
Nakane, Sumio	JE3BJN
Nakane, Sumio	JE3BJN
Fukase, Shinichi	JA0QJC
Kondo, Hirofumi	JF2PZE
Kondo, Hirofumi	JF2PZE
Kondo, Hirofumi	JF2PZE
Kondo, Hirofumi	JF2PZE
Kondo, Hirofumi	JF2PZE
Murakami, Shinobu	JA4GVA
Murakami, Shinobu	JA4GVA
MARD, Inc.	JA3USA
MARD, Inc.	JA3USA
Itoh, Mitsuru	JA2QDX
Itoh, Mitsuru	JA2QDX
Ochiai, Eitoshi	JA1PYZ
Ochiai, Eitoshi	JA1PYZ
Kataoka, Hajime	JA1ERA
Ibuta, Kazumasu	JE1BYR
Ibuta, Kazumasu	JE1BYR
Yonezawa, Masaaki	JE1WAZ
Yonezawa, Masaaki	JE1WAZ
Kambayashi, Joly Hideo	JR3XCU
Kambayashi, Joly Hideo	JR3XCU
Yamazaki, Takesi	JJ1YYP
Yamazaki, Takesi	JJ1YYP
Inoue, Kazuyuki	JR1VMX
Inoue, Kazuyuki	JR1VMX
Meijers, Hans T.S.M.	PA0HMB
Boland, Torfinn	LA7SP
Norsk Radio Relae Liga	LA5XR
Boland, Torfinn	LA7SP
Osdegaard, Knut B.	LA4YS
-NORWAY Harstad	LA8XR-0
-NORWAY Oslo	LA4LN-5
-NORWAY Oslo	LA8GR-0
-NORWAY Oslo	LA9GR-0
-NORWAY Sandnes	LA6XR-1
-NORWAY Sandnes	LA6XR-2
-NORWAY Skien	LA5PR-0
-NORWAY Skien	LA6OCA-7
-NORWAY Skien	LA6OCA-8
-NORWAY Skien	LA6OCA-9
-NORWAY Skien	LA9PR-0
-SWITZERLAND	HB9BFB-0
-W. GERMANY	DB0II-0
-W. GERMANY (NE)	DB0FC-0
-W. GERMANY (NE)	DB0FC-7
-W. GERMANY (NE)	DB0FD-0
-W. GERMANY (NE)	DB0FD-7
-W. GERMANY (NE)	DB0FE-0
-W. GERMANY (NE)	DB0FE-7
-W. GERMANY (NE)	DD6CV-0
-W. GERMANY Auerbach	DA1NP-2
-W. GERMANY Auerbach	DA1NP-7
-W. GERMANY Hamburg	DB0DF-0
-W. GERMANY Kiel	DB0OQ-0
-W. GERMANY Kiel	DC6LK-0
-W. GERMANY Kleve	DB0KV-0
-W. GERMANY Krefeld	DB5JT-2
-W. GERMANY Lichenau	DB0AX-3
-W. GERMANY Oberhaus.	DB0OZ-0
-W. GERMANY Oberhaus.	DB0OZ-1
-YUGOSLAVIA	YU3APR-1
-YUGOSLAVIA	YU3APR-2
-YUGOSLAVIA	YU3APR-3
End of NETROM.LST	

Harstadgruppen NNRL		LA1B
Segalstad, Tom V.		LA4LN
Segalstad, Tom V.		LA4LN
Segalstad, Tom V.		LA4LN
Stokkeland, Oystein		LA7QI
Stokkeland, Oystein		LA7QI
Karlberg, Kjell		LA6OCA
Karlberg, Kjell		LA6OCA
Karlberg, Kjell		LA6OCA
Karlberg, Kjell		LA6OCA
Karlberg, Kjell		LA6OCA
Sigg, F.		HB9BFB
Boymanns, Karl	MGL	DJ2MB
Kneisner & Doering		DB0FC
Kneisner & Doering		DB0FC
Kneisner & Doering		DB0FC
Kneisner & Doering		DB0FC
Kneisner & Doering		DB0FC
Kneisner & Doering		DB0FC
Kneisner & Doering		DB0FC
Bouser, Kenneth D.		DA1MP
Bouser, Kenneth D.		DA1MP
Semmelhack, Marita		DL3BCM
Schnoor, Hans-Hermann		DB1LAB
Schnoor, Hans-Hermann		DB1LAB
Kopp, Georg		DB0KV
Furch, Bernd		DB5JT
Cordes, Heinz-J.		DL2YAF
Kostelnik, Hans G.		DK4JM
Kostelnik, Hans G.		DK4JM
Radio Club Triglav		YU3APR
Radio Club Triglav		YU3APR
Radio Club Triglav		YU3APR

Please send corrections to Mike Busch, W6IXU (CompuServe 76337,727). We particularly need more accurate information on node locations and mnemonic identifiers.

9/1/87

USA-PBBS.09A
Revised 1 September 1987
By K4NGC

The following is a list of Packet Digipeaters and Packet Bulletins Boards reported to be on Packet Radio in the United States. Only those Digipeaters which are operational 24-hours a day, or those who are known to have purchased a copy of NETROM, and those PBBS's which use WORLI/WA7MBL/WB4APR Mail Forwarding protocol are listed below. A digipeater may be a personnel station or a dedicated TNC that is operational 24-hours a day, 365 days a year.

Call Sign	City	Sta	Frequency	Updated
KL7GNG	FAIRBANKS	AK	14.1070	870605
KL7GNG	FAIRBANKS	AK	145.0100	870605
KL7GNG	FAIRBANKS	AK	145.0900	870605
KL7HFI	JUNEAU	AK	14.1090	870707
KL7HFI	JUNEAU	AK	145.0500	870707
KL7JFU	WASILLA	AK	145.0100	870605
M4EXO	ANNISTON	AL	145.0500	870811
M4HY	AUBURN	AL	145.0100	861101
WA5RAX	BESSEMER	AL	145.0100	870605
WA5RAX	BESSEMER	AL	145.6700	870605
K4BFT	MADISON	AL	145.0100	870724
WB4ZKX-1	MADISON	AL	145.0100	861101
W4AP	MONTGOMERY	AL	145.0100	870605
WB4OZN	MONTGOMERY	AL	145.0100	861101
KB4FSK-2	OPP	AL	145.0100	870605
N1SC	BATESVILLE	AR	145.0100	870701
KF5TL	EVENING SHADE	AR	145.0100	870701
K5VR	FORT SMITH	AR	145.0100	870716
WD5B	LITTLE ROCK	AR	7.0930	870701
WD5B	LITTLE ROCK	AR	14.1090	870701
WD5B	LITTLE ROCK	AR	145.0100	870701
WD5B	LITTLE ROCK	AR	145.0900	870301
KC5JH	LITTLE ROCK	AR	145.0100	870814
N5EDH	CAMP VERDE	AZ	7.0930	870605
N5EDH	CAMP VERDE	AZ	14.1070	870605
N5EDH	CAMP VERDE	AZ	145.0100	870605
KE7CZ	DEWEY	AZ	7.0930	870701
KE7CZ	DEWEY	AZ	14.1070	870701
KE7CZ	DEWEY	AZ	145.0100	870701
WB7BNI	PHEONIX	AZ	144.5500	870701
WB7BNI	PHEONIX	AZ	145.0100	870701
N7GLL	PHEONIX	AZ	145.0100	870701
WB7BNI	PHOENIX	AZ	144.5100	870701
K7BUC	PHOENIX	AZ	7.0940	870701
K7BUC	PHOENIX	AZ	14.1030	870701
K7BUC	PHOENIX	AZ	145.0100	870701
KOOTZ	SCOTTSDALE	AZ	7.0930	870701
KOOTZ	SCOTTSDALE	AZ	144.1100	870701
KOOTZ	SCOTTSDALE	AZ	145.0100	870701
WIFJI	SCOTTSDALE	AZ	145.0100	870701
WIFJI	SCOTTSDALE	AZ	145.5100	870701
K7PYK	SCOTTSDALE	AZ	7.0930	870701
K7PYK	SCOTTSDALE	AZ	10.1490	870701
K7PYK	SCOTTSDALE	AZ	14.1090	870701
K7PYK	SCOTTSDALE	AZ	145.0100	870605
KA5S	SEDONA	AZ	7.0930	870701
KA5S	SEDONA	AZ	14.1090	870701
KA5S	SEDONA	AZ	145.0100	870701
KC7CG	TUCSON	AZ	7.0930	870605
KC7CG	TUCSON	AZ	14.1070	870605
KC7CG	TUCSON	AZ	145.0100	870605
N7DME-1	TUCSON	AZ	145.0100	860101
WB7TLS	TUCSON	AZ	145.0100	870701
WA7HRA	YUMA	AZ	145.0500	870701
WA7HRA	YUMA	AZ	145.0900	870701
KD6SQ	ALTA LOMA	CA	14.1110	870701
KD6SQ	ALTA LOMA	CA	145.3600	870701
W6IXU	ARROYO GRANDE	CA	145.0100	870701
W6IXU	ARROYO GRANDE	CA	145.0500	861201
WB6KAJ	BREA	CA	14.1090	870605
WB6KAJ	BREA	CA	145.0100	861130
WB6KAJ-1	BREA	CA	145.3600	870605
WD6BFM	BURBANK	CA	145.0100	861201
N6LUC-1	CAMARILLO	CA	145.0300	870701
N6LUC-1	CAMARILLO	CA	145.3600	870701
N6BGW	CARSON	CA	145.0100	870701
N6BGW-9	CARSON	CA	145.0500	861201
N6BGW-9	CARSON	CA	145.0900	861201
N6BGW-9	CARSON	CA	146.7450	861201
K6IYK	CHATSWORTH	CA	223.5800	870701
WA6RDH	DIXON			
WA6RDH	DIXON			
N6IYA	FELTON			
N6IYA	FELTON			
WB6RIE	FRESNO			
WB6RIE	FRESNO			
N6HAV	FRESNO			
N6HAV	FRESNO			
N6HAV	FRESNO			
AA4RE-1	GILROY			
AA4RE-1	GILROY			
N6CUS-1	HACIENDA HEIGHTS			
KE6BX	HOLLISTER			
N6CQN	LAKESIDE			
WB6CFO-1	LIVERMORE			
WA6YHJ-1	LIVERMORE			
K6RD	LOS ANGELES			
KA6ERF	MAPA			
WA6NWE-1	NORTH HIGHLANDS			
WA6NWE-1	NORTH HIGHLANDS			
WB7QKP-1	NUEVO			
WB7QKP-1	NUEVO			
W6LOH	PAL ALTO			
N6IIU-1	PALO ALTO			
WB6YMH-2	PALOS VERDES			
WB6YMH-2	PALOS VERDES			
WB6YMH-2	PALOS VERDES			
WB6YMH-2	PALOS VERDES			
WB6YMH-2	PALOS VERDES			
WB6YMH-2	PALOS VERDES			
WB6KQY	POMONA			
WD6BFC	REDDING			
WD6BFC	REDDING			
NK6K-2	REDONDO BEACH			
NK6K-2	REDONDO BEACH			
N7EQN-1	REDWOOD CITY			
N7EQN-1	REDWOOD CITY			
WD6CMU-1	RICHMOND			
WD6CMU-1	RICHMOND			
W6CUS-1	RICHMOND			
W6CUS-1	RICHMOND			
W6CUS-1	RICHMOND			
KD7XG-1	RIVERSIDE			
N2DME	SACRAMENTO			
N2DME	SACRAMENTO			
N6MVS	SAN BERNARDINO			
WA2QMI	SAN DIEGO			
W6PW-3	SAN FRANCISCO			
W6PW-3	SAN FRANCISCO			
WB6RSA	SAN JOSE			
WB6RSA	SAN JOSE			
NV6Z	SAN JOSE			
NV6Z	SAN JOSE			
WORLI	SANTA CRUZ			
WORLI	SANTA CRUZ			
WORLI	SANTA CRUZ			
WORLI	SANTA CRUZ			
WB6VSL	SANTEE			
K7PYK	SCOTTSDALE			
KB6IRS	SOQUEL			
KB6IRS	SOQUEL			
KB6IRS	SOQUEL			
KB6IRS	SOQUEL			
N4CHV	SUNNYVALE			
N4CHV	SUNNYVALE			
N4CHV	SUNNYVALE			
N4CHV	SUNNYVALE			
AJ6F-1	TORRANCE			
AJ6F-1	TORRANCE			
KA6IQA	TORREY PINES			
KA6IQA	TORREY PINES			
W1HAB	BOULDER			
W1HAB	BOULDER			
W1HAB	BOULDER			
W1HAB	BOULDER			
KE6LT	BOULDER			
WA8ZIA	BOULDER			
WA8ZIA	BOULDER			
WA8ZIA-1	BOULDER			
KOTIV	CARBONDALE			
WBOBLV	COLORADO SPRINGS			
WBOBLV	COLORADO SPRINGS			
KOHOA	COLORADO SPRINGS			
KOHOA	COLORADO SPRINGS			
KOOOI	DURANGO			
KAOUCZ-1	GRAND JUNCTION			
WA6ERB	LAKEWOOD			

CA	145.0100	870701	WA6ERB	LAKEWOOD	CO	145.0100	870701
CA	223.5800	870701	WA6ERB	LAKEWOOD	CO	145.0500	870701
CA	145.0900	870701	KOVLD	LOVELAND	CO	145.0100	870605
CA	441.5000	870701	KOVLD	LOVELAND	CO	145.0300	870120
CA	145.0300	861201	KOGUZ	RIFLE	CO	145.0100	870605
CA	145.0500	870111	WDOESY	STERLING	CO	145.0100	870625
CA	144.9900	870701	NOBAZ-1	THORNTON	CO	145.0500	861018
CA	145.0100	861201	NOBAZ-1	THORNTON	CO	145.0700	861018
CA	223.5800	870701	KCOQJ	WALSENBURG	CO	14.1090	870701
CA	144.9900	870807	KCOQJ	WALSENBURG	CO	145.0100	870701
CA	223.5800	870807	N1API-4	MERIDEN	CT	145.0500	870701
CA	145.0300	870701	N1API-6	MERIDEN	CT	145.0100	870701
CA	144.9900	870807	KE3Z	MIDDLETOWN	CT	145.0100	870701
CA	145.0500	870701	W1AW-4	NEWINGTON	CT	145.0100	870701
CA	145.0700	861201	W1AW-4	NEWINGTON	CT	221.1100	870701
CA	145.0700	870701	WA2FTC-1	NEWINGTON	CT	14.1090	870103
CA	145.0300	861201	WA2FTC-1	NEWINGTON	CT	145.0100	860204
CA	145.0900	861201	N1CUI	RIDGEFIELD	CT	145.0700	870701
CA	145.0900	870701	NE1H	WEATOGUE	CT	145.0100	860803
CA	223.5800	870701	NE1H	WEATOGUE	CT	145.0700	860803
CA	145.0500	870722	K1CE	WEST HARTFORD	CT	145.0100	870701
CA	145.3600	870701	KA1ZT-1	BIG PINE KEY	FL	145.0100	870815
CA	145.0100	870807	KA1ZT-1	BIG PINE KEY	FL	145.0900	870815
CA	223.5800	870807	W4NVC	BOCA RATON	FL	145.0300	870815
CA	145.0100	861201	W4NVC	BOCA RATON	FL	220.5700	870815
CA	145.0300	861201	WA4ZLW	BOCA RATON	FL	145.0300	870815
CA	145.0500	861201	K4GBB	CEDAR COVE	FL	145.0100	870815
CA	145.0900	861201	K4GBB	CEDAR COVE	FL	145.0300	870815
CA	145.3600	870701	W4DPH	CLEARWATER	FL	145.0500	870815
CA	220.9500	870701	W4DPH	CLEARWATER	FL	220.5700	870815
CA	145.3600	870701	W4DPH-1	CLEARWATER	FL	7.0930	870815
CA	145.0100	870701	W4DPH-1	CLEARWATER	FL	10.1490	870701
CA	223.5800	870701	W4DPH-1	CLEARWATER	FL	220.0500	870701
CA	145.0100	870701	N4IPY	FLORAL CITY	FL	145.0300	870815
CA	145.3600	870701	KB4FO	FORT LAUDERDALE	FL	145.0300	870815
CA	144.9700	870701	KB4FO	FORT LAUDERDALE	FL	220.5700	870815
CA	223.5800	870701	WB8LGH	FT PIERCE	FL	7.0935	870815
CA	145.0900	870701	WB8LGH	FT PIERCE	FL	14.1075	870815
CA	223.5800	870701	WB8LGH	FT PIERCE	FL	145.0300	870815
CA	7.9300	870807	WD4EPK	GAINESVILLE	FL	145.0100	870815
CA	145.9700	870807	WD4EPK	GAINESVILLE	FL	145.0900	870815
CA	223.5800	870807	AA4TM-1	HOMESTEAD	FL	145.0300	870815
CA	145.0500	870701	AA4TM-1	HOMESTEAD	FL	145.0700	870815
CA	145.0700	870701	WD4BIW	JACKSONVILLE	FL	145.0100	870815
CA	223.5800	870701	WA3QFN	MARGATE	FL	145.0100	860204
CA	145.0500	870701	N2WX-1	MELBOURNE	FL	145.0100	870815
CA	144.7600	870111	KO4BY	MIAMI	FL	14.1090	870815
CA	144.9900	870701	KO4BY	MIAMI	FL	145.0900	870815
CA	223.5800	870701	NK4K	MIAMI	FL	145.0100	860413
CA	14.1070	870701	N4LDG	MIAMI	FL	145.0300	870815
CA	223.5800	870701	N4LDG	MIAMI	FL	220.5700	870815
CA	145.0700	870807	W4NVU	MIAMI	FL	145.0300	870815
CA	223.5800	870807	K4TKU	MIAMI	FL	145.0300	870815
CA	14.1090	870701	K4TKU	MIAMI	FL	145.0900	870815
CA	144.9100	870701	K4TKU-1	MIAMI	FL	14.1110	870815
CA	145.0900	870701	KC5YD	NAPLES	FL	145.0500	870815
CA	223.5800	870701	K4OZS	OCALA	FL	145.0100	870815
CA	145.0500	870605	K4OZS	OCALA	FL	145.0100	870815
CA	147.7000	870701	K4OZS	OCALA	FL	145.0300	870815
CA	14.1110	870807	WB4BNC	ORANGE PARK	FL	145.0100	870815
CA	144.9300	870807	WB4BNC	ORANGE PARK	FL	145.0700	870815
CA	145.0900	870807	K4AHO	ORLANDO	FL	145.0700	870815
CA	441.5000	870807	K4AHO	ORLANDO	FL	220.5700	870815
CA	14.1110	870807	WB4HYP	ORLANDO	FL	145.0100	870815
CA	10.1490	870807	WB4HYP	ORLANDO	FL	145.0700	870815
CA	144.9700	870807	K4OZM	ORLANDO	FL	145.0100	860204
CA	145.0900	870807	KD4EQ-1	PANAMA CITY	FL	7.0930	870815
CA	145.0700	870701	KD4EQ-1	PANAMA CITY	FL	145.0100	870815
CA	145.3600	870701	KB4CIA	PORT CHARLOTTE	FL	50.0900	870815
CA	145.0100	870120	KB4CIA	PORT CHARLOTTE	FL	145.0100	870815
CA	145.0500	861201	KB4CIA	PORT CHARLOTTE	FL	220.5700	870815
CO	14.1090	870701	WD4KAV	PORT ST. LUCIE	FL	145.0100	870815
CO	145.0100	870701	WD4KAV	PORT ST. LUCIE	FL	145.0300	870815
CO	145.0900	870701	N4HAP	SARASOTA	FL	145.0900	870815
CO	446.8000	870701	N4HAP	SARASOTA	FL	220 5700	870815
CO	145.0100	870701	W4NWP	SARASOTA	FL	14.1070	870815
CO	145.0900	870701	W4NWP	SARASOTA	FL	145.0100	870815
CO	446.8000	870701	W4NWP	SARASOTA	FL	145.0900	870815
CO	145.0100	870120	N4HND	SHALIMAR	FL	145.0100	870815
CO	145.0100	870701	WD4BAF	STUART	FL	145.0100	870815
CO	145.0100	870701	K4NTA	STUART	FL	7.0930	870815
CO	145.0900	870701	K4NTA	STUART	FL	145 0300	870815
CO	14.1110	870701	K4NTA	STUART	FL	220 5700	870815
CO	145.0100	870701	W1BEL	TAMPA	FL	145 0100	870815
CO	145.0100	870701	WD4NKZ	VENICE	FL	145 0100	870815
CO	145.0100	870120	WD4LHF	WEST PALM BEACH	FL	145 0100	860413
CO	14.1050	860204	KA4NOF-1	WEST PALM BEACH	FL	145 0100	860204

W4QO	ATLANTA	GA	145.0300	870701
WA4UMV	ATLANTA	GA	7.0930	870701
WA4UMV	ATLANTA	GA	145.0100	870701
WA4UMV	ATLANTA	GA	145.0300	870701
WA4UMV	ATLANTA	GA	146.7300	870701
K4TQL	CARTERSVILLE	GA	145.0900	870701
WQ4B	CHICKAMUGA	GA	145.0100	870701
WQ4B	CHICKAMUGA	GA	145.0900	870701
W4KAU	COHUTTA	GA	145.0100	870605
W4KAU	COHUTTA	GA	145.0900	870701
N4CI	CONYERS	GA	14.1050	860413
N4CI	CONYERS	GA	145.0100	860413
KA4OVX	CONYERS	GA	145.0100	861101
KF4JF	HAHIRA	GA	14.1030	870419
KF4JF	HAHIRA	GA	14.1070	870103
KF4JF	HAHIRA	GA	145.0100	870103
K4ICT	MACON	GA	145.0100	870605
KD4NC-1	MARIETTA	GA	145.0100	861101
K14XO	MARIETTA	GA	14.1090	870605
K14XO	MARIETTA	GA	145.0100	870605
K14XO	MARIETTA	GA	145.0300	870605
K14XO	MARIETTA	GA	146.1300	870605
WB4ZMW	MOULTRIE	GA	145.0100	860206
WA4BRO	ROSWELL	GA	145.0100	861101
KF4JF-1	TIFTON	GA	14.1070	860413
AH6GJ	KAUPO, MAUI	HI	14.1070	870701
AH6GJ	KAUPO, MAUI	HI	145.0100	870701
KH6GPI	MANOA, OAHU	HI	145.0100	870701
KH6WY	MILILANI, OAHU	HI	14.1030	870701
KH6WY	MILILANI, OAHU	HI	14.1070	870701
KH6WY	MILILANI, OAHU	HI	14.1090	870605
KH6WY	MILILANI, OAHU	HI	145.0500	870701
NAOP	AMES	IA	145.0100	860204
K1OQ	AMES	IA	145.0100	870701
K1OQ	AMES	IA	147.5550	860815
NAOS	AMES	IA	147.5550	860815
WAORGV	CEDAR FALLS	IA	145.0100	870701
WAORJT	CEDAR RAPIDS	IA	145.0100	870701
WAORJT	CEDAR RAPIDS	IA	145.0500	870701
WAOJFS-1	DES MOINES	IA	145.0100	870701
WAOJFS-1	DES MOINES	IA	147.5550	860815
NOKME	FORT MADISON	IA	145.0100	870701
KMOM	INDEPENDENCE	IA	145.0100	870701
NOAM	MCCALLSBURG	IA	14.1090	870701
NOAM	MCCALLSBURG	IA	145.0100	870701
AIOZ	NOLAND	IA	145.0100	870701
KA7RMA-1	BOISE	ID	145.0100	870605
K7JD	HAYDEN LAKE	ID	145.0100	870701
K9HHO	GOODFIELD	IL	145.0100	870605
K9HHO	GOODFIELD	IL	147.5550	870324
WD9CZI	HILLSBORO	IL	145.0100	870701
K9KYK	HILLSBORO	IL	145.0100	870605
W8LVM	LAKE FOREST	IL	145.0100	870806
W92TK	MENDOTA	IL	145.0700	870701
WB9MJM	NAPERVILLE	IL	144.9500	870605
WB9MJM	NAPERVILLE	IL	145.0100	870605
WD9DOU	NORTHLAKE	IL	145.0100	870605
N3AIA	SCHAUMBURG	IL	145.0500	870806
KJ9L	SKOKIE	IL	145.0500	870806
KJ9L	SKOKIE	IL	145.0100	870806
KD4PS	TRENTON	IL	145.0500	870701
W9CD	URBANA	IL	10.1490	870701
W9CD	URBANA	IL	145.0100	870701
K9CW	URBANA	IL	145.0100	870701
K9CW	URBANA	IL	145.5550	870701
K9JA	URBANA	IL	145.0100	870701
K9JA	URBANA	IL	145.0900	870701
WA9DZS	VERNON HILLS	IL	145.0100	870605
WA9IVB	ANDERSON	IN	145.0100	870701
WA9IVB	ANDERSON	IN	147.5550	870701
WA8YVA	BLOOMINGTON	IN	145.0100	870605
WA8YVA	BLOOMINGTON	IN	145.0500	870701
KM9D-1	DELPHI	IN	145.0100	870701
KM9D-1	DELPHI	IN	145.0500	870605
N4XI	EVANSVILLE	IN	14.1110	870701
N4XI	EVANSVILLE	IN	145.0100	870701
KA9LQM	EVANSVILLE	IN	145.0100	870701
KA9LQM	EVANSVILLE	IN	145.0500	870701
KB8MH	FORT WAYNE	IN	145.0100	870701
N9BAC	FORT WAYNE	IN	145.0100	870701
N9BAC	FORT WAYNE	IN	145.0500	870701
WB7QWG	INDIANAPOLIS	IN	14.1070	870605
WB7QWG	INDIANAPOLIS	IN	145.0100	870605
WB9CNE	INDIANAPOLIS	IN	145.0100	870701
WB9CNE	INDIANAPOLIS	IN	145.0300	870701
K9JAI	INDIANAPOLIS	IN	145.0100	860204
KD9HT	INDIANOPLIS	IN	145.0100	870701
KD9HT	INDIANOPLIS	IN	145.0100	870701
KD9QB	NOBLESVILLE	IN	145.0100	870701
KD9QB	NOBLESVILLE	IN	145.0100	870701
KD9LP	PERU	IN	145.0100	870701
KD9LP	PERU	IN	146.7300	870701
KB9JD	TERRE HAUTE	IN	145.0900	870701
WA9UXP	VALPARAISO	IN	145.0100	870605
WA9UXP	VALPARAISO	IN	145.0900	870701
W92RX	WESTFIELD	IN	145.0100	870605
W92RX	WESTFIELD	IN	145.0900	870701
W92RX	WESTFIELD	IN	14.1050	860413
NOFFM	CLAY CENTER	KS	145.0100	861101
NXOR	DOWNS	KS	14.1030	870419
NHON	HAYS	KS	14.1070	870103
NODOT	JUNCTION CITY	KS	145.0100	870103
WBOAEX	OLATHE	KS	145.0100	870605
N5DKQ-1	WICHITA	KS	145.0100	870605
KD9PU	ELSMERE	KY	145.0100	861101
KD9PU	ELSMERE	KY	14.1090	870605
K14UH	FLORENCE	KY	145.0100	870605
K14UH	FLORENCE	KY	145.0300	870605
KF4NB	LEXINGTON	KY	145.0100	860206
KF4NB	LEXINGTON	KY	146.1300	870605
WA4UMA	LOUISVILLE	KY	145.0100	861101
KA4BCD	PARK HILLS	KY	14.1070	860413
KA4BCD	PARK HILLS	KY	14.1070	870701
WA9TPG	VERSAILLES	KY	145.0100	870701
WB9TPG	VERSAILLES	KY	145.0100	870701
KD5SL	BATON ROUGE	LA	14.1030	870701
KD5SL	BATON ROUGE	LA	14.1070	870701
WS5X	BATON ROUGE	LA	14.1090	870605
WB5AAA	BREAUX RIDGE	LA	145.0500	870701
WA5VDM	LAKE CHARLES	LA	145.0100	860204
W5DDL	LAYFAYETTE	LA	145.0100	870701
W5DDL	LAYFAYETTE	LA	147.5550	860815
AE5V	MONROE	LA	147.5550	860815
WB5BZE	NEW ORLEANS	LA	145.0100	870701
WB5BZE	NEW ORLEANS	LA	145.0100	870701
N5KMB-1	SHREVEPORT	LA	145.0500	870701
WA1RAJ	ACTON	MA	145.0100	870701
WA1RAJ	ACTON	MA	147.5550	860815
KA1JJM	AGAWAM	MA	145.0100	870701
K1BOG	ATTLEBORO	MA	145.0100	870701
K1BOG	ATTLEBORO	MA	14.1090	870701
N1ACA	BEDFORD	MA	145.0100	870701
K1OJH	BILLERICA	MA	145.0100	870701
N1BGG	BOSTON	MA	145.0100	870605
N1BGG	BOSTON	MA	145.0100	870701
K3MC	BOSTON	MA	145.0100	870701
W1GOH	BROOKLINE	MA	145.0100	870701
WB1DZK-4	DUDLEY	MA	145.0100	870605
WB1DZK-4	DUDLEY	MA	145.0100	870806
K1MEA	EAST HAMPTON	MA	145.0700	870701
WA1WLV-1	LAWRENCE	MA	144.9500	870605
WA1WLV-1	LAWRENCE	MA	145.0100	870605
K1BC	LEXINGTON	MA	145.0100	870605
K1BC	LEXINGTON	MA	145.0500	870806
WA1CWG	MANOMET	MA	145.0500	870806
AA1A	MARSHFIELD	MA	145.0100	870806
W1ZHC	MATTAPOISETT	MA	145.0500	870701
W1ZHC	MATTAPOISETT	MA	10.1490	870701
W1ZHC	MATTAPOISETT	MA	145.0100	870701
KA1MGO	METHUEN	MA	145.0100	870701
KA1MGO	METHUEN	MA	145.5550	870701
KA1MGO-1	METHUEN	MA	145.0100	870701
W1OW	NORFOLK	MA	145.0900	870701
K1UGM	WAKEFIELD	MA	145.0100	870605
WA3TAI	ACCOKEEK	MD	145.0100	870701
W3VPR	ANNAPOLIS	MD	147.5550	870701
W3VPR	ANNAPOLIS	MD	145.0100	870605
W3ZM	ANNAPOLIS	MD	145.0500	870701
WB4ARP	ANNAPOLIS	MD	145.0100	870701
WB4APR	ANNAPOLIS	MD	145.0500	870605
WB3EFG	BALTIMORE	MD	14.1110	870701
WA3HQX	BALTIMORE	MD	145.0100	870701
K3VPZ	BALTIMORE	MD	145.0100	870701
K3VPZ	BALTIMORE	MD	145.0500	870701
W3IWI	CLARKSVILLE	MD	145.0100	870701
W3IWI	CLARKSVILLE	MD	145.0100	870701
W3IWI	CLARKSVILLE	MD	145.0500	870701
W3IWI	CLARKSVILLE	MD	14.1070	870605
N3CHS	CLINTON	MD	145.0100	870605
KA3OGG	COLUMBIA	MD	145.0100	870701
KA3OGG	ELLICOTT CITY	MD	145.0300	870701
KA3DBK	FORT WASHINGTON	MD	145.0100	860204
KA3DBK	FORT WASHINGTON	MD	145.0100	870701

IN	145.0300	870701	KA3KIW	FORT WASHINGTON	MD	145.0300	860925
IN	145.0100	870605	K3AEE	GLEN BURNIE	MD	145.0100	860925
IN	145.0300	870605	K3AEE	GLEN BURNIE	MD	145.0500	860201
IN	145.0100	870701	N2FB	GLENWOOD	MD	145.5900	870810
IN	145.0900	870701	WB3FFV	MIDDLE RIVER	MD	145.5500	870810
IN	145.0100	870605	WB3FFV	MIDDLE RIVER	MD	221.0100	870716
IN	145.0100	870605	W3TMZ	MOUNT AIRY	MD	14.1050	861021
IN	145.0700	870605	W3TMZ	MOUNT AIRY	MD	145.0100	860204
IN	7.0930	870701	W3TMZ	MOUNT AIRY	MD	145.0500	870701
IN	14.1090	870701	KA3T	MT. AIRY	MD	145.0900	870810
IN	145.0100	870701	KA3T	MT. AIRY	MD	221.0100	870701
KS	145.0100	870701	WA3YOH	PIKESVILLE	MD	145.0500	870810
KS	145.0100	870701	KB3MY	SILVER SPRING	MD	14.1090	861121
KS	145.0100	870701	KB3MY	SILVER SPRING	MD	145.0500	861021
KS	14.1050	870605	N4QQ	SILVER SPRING	MD	145.0300	870810
KS	145.0500	870701	N4QQ	SILVER SPRING	MD	221.0100	870701
KS	145.0100	870701	K3OZP	WESTMINSTER	MD	145.0300	870810
KY	144.9500	870605	WA3PKX	WHEATON	MD	145.0500	870810
KY	145.0100	870605	N1AHH	BANGOR	ME	145.0100	870701
KY	145.0100	870703	N1AHH	BANGOR	ME	145.0300	870701
KY	145.0100	870701	WA1OJB-1	BOWDOIN	ME	145.0100	870701
KY	145.0100	870707	WA1OJB-3	BOWDOIN	ME	145.0300	870701
KY	145.0900	870707	WA1OJB-4	BOWDOIN	ME	446.8200	870701
KY	145.0100	870701	WA1OJB-6	BOWDOIN	ME	28.2750	870701
KY	144.9500	870803	N1AKA-3	CUMBERLAND CENTER	ME	145.0300	870701
KY	145.0100	870803	N1AKA-3	CUMBERLAND CENTER	ME	446.8200	870701
KY	14.1090	870707	K1MDM	SCARBOROUGH	ME	145.0500	870701
KY	145.0100	870707	WA2YUL-4	SOUTH FREEPORT	ME	145.0100	870701
LA	14.1110	870701	WA2YUL-4	SOUTH FREEPORT	ME	145.0300	870701
LA	145.0100	870701	AD8Y	ANN ARBOR	MI	145.0100	860204
LA	145.0100	861130	WA1LAL	BRIGHTON	MI	14.1110	870701
LA	145.0500	870605	WA1LAL	BRIGHTON	MI	145.0100	870701
LA	145.0100	870605	N8BMA	DETROIT	MI	145.0100	870701
LA	145.0100	870701	N8BMA-1	DETROIT	MI	220.5200	870605
LA	145.0500	870701	N8BMA-1	DETROIT	MI	221.0100	870701
LA	145.0100	870701	K8HLD	FRASER	MI	144.9300	870605
LA	145.0100	870701	N8BUX	GRAND RAPIDS	MI	144.9300	870605
LA	145.0300	870701	WA8URE	GRAND RAPIDS	MI	144.9300	870701
LA	145.0100	870724	WA8URE	GRAND RAPIDS	MI	145.0100	870701
MA	145.0900	870701	KJ8C	HOLLAND	MI	145.0100	870701
MA	221.1100	870701	KJ8C-1	HOLLAND	MI	147.5600	870701
MA	145.0500	870701	WB0LE	MARQUETTE	MI	145.0100	870701
MA	145.0500	870701	KE8DN	MASON	MI	145.0100	870701
MA	221.1100	870701	KA8POG	PINCONNING	MI	145.0100	870701
MA	145.0100	861130	WB8WKA	SOUTHFIELD	MI	145.0100	860204
MA	145.0100	860102	KE8X	TRENTON	MI	145.0500	870701
MA	145.0100	870605	W8KOX	WALLED LAKE	MI	145.0500	870701
MA	145.0500	870605	W8KOX	WALLED LAKE	MI	220.5200	870701
MA	145.0100	870329	NT8R	WHITE PIGEON	MI	144.9300	870701
MA	145.0100	870701	NT8R	WHITE PIGEON	MI	145.0100	870701
MA	145.0100	870605	WA0COG	APPLE VALLEY	MN	7.0930	870701
MA	145.0500	870605	WA0COG	APPLE VALLEY	MN	14.1110	870701
MA	145.0900	870701	WA0COG	APPLE VALLEY	MN	145.0500	870701
MA	14.1110	870605	WL7AIT	LITTLE FALLS	MN	145.0100	870701
MA	221.1100	870605	WL7AIT	LITTLE FALLS	MN	145.0300	870701
MA	145.0900	870605	WD0GNK	ROCHESTER	MN	145.0100	870605
MA	221.1100	870605	WD0HEB	ROCHESTER	MN	145.0100	870605
MA	145.0500	870701	WA0CJU	WASECA	MN	145.0100	870810
MA	145.0100	870701	WB0GDB	WOODBURY	MN	145.0100	870605
MA	145.0100	861130	WB0GDB	WOODBURY	MN	145.0500	870605
MA	145.0500	870605	K0PFX	BRIDGETON	MO	145.0500	870722
MA	221.1100	870605	N0GGU	GRAHAM	MO	145.0100	870722
MA	14.1070	870701	WB0OIZ	INDEPENDENCE	MO	145.0300	870722
MA	221.1100	870701	N0GGZ	JOPLIN	MO	145.0100	870722
MA	145.0700	870701	WB0AEX	KANSAS CITY	MO	145.0100	870722
MA	221.1100	870701	WB0JAJ	KANSAS CITY	MO	145.0500	870722
MA	145.0700	870701	W0KTT	NEWBERG	MO	145.0100	870722
MA	221.1100	870701	NV0O	PLEASANT HOPE	MO	145.0100	870701
MD	145.0300	870810	K0CM	SPRINGFIELD	MO	14.1070	870701
MD	145.0900	870420	K0CM	SPRINGFIELD	MO	145.0100	870722
MD	221.0100	870420	WD0CZI	ST. LOUIS	MO	145.0500	870722
MD	145.0500	870810	N5BSL	BASTROP	MS	145.0100	870701
MD	10.1490	870420	N5DWU	ELLISVILLE	MS	145.0100	870605
MD	145.0500	870420	KD5B	GAUTIER	MS	14.1110	861130
MD	145.6600	870701	WA5DUV	GULFPORT	MS	7.0930	870301
MD	145.5500	870810	WA5DUV	GULFPORT	MS	14.1090	870701
MD	145.0500	870701	WA5DUV	GULFPORT	MS	145.0100	870701
MD	14.1030	861021	WA5DUV	GULFPORT	MS	145.0900	870701
MD	14.1110	870701	KF5IZ	JACKSON	MS	145.0100	870605
MD	145.0100	870810	WB5SXK	VICKSBURG	MS	145.0100	870701
MD	145.0500	870810	AJ5P	WESSON	MS	145.0100	870822
MD	221.0100	870810	WA8YWH	WEST POINT	MS	7.0930	870701
MD	145.0300	861021	N7ATT	BILLINGS	MT	145.0100	870701
MD	145.0500	870810	K4IWW	CARY	NC	145.0100	870530
MD	145.0700	870701	KK4L	CHARLOTTE	NC	14.1110	870701
MD	145.0300	860925	KK4L	CHARLOTTE	NC	145.0100	870701
MD	145.0500	860925	KK4L	CHARLOTTE	NC	145.0500	870701

WA8HGL	FAYETTEVILLE	NC	145.0100	870701	
WD4AMQ-1	GREENSBORO	NC	145.0100	870701	
K4QO	GREENVILLE	NC	145.0100	870701	
KF4WQ-2	LUMBERTON	NC	145.0100	870701	
KF4WQ-3	LUMBERTON	NC	14.1070	870701	
KF4NJ	MONROE	NC	10.1490	870701	
KF4NJ	MONROE	NC	145.0100	870701	
AA4L	RALEIGH	NC	145.0100	870120	
WA4LPD-1	RALEIGH	NC	145.0100	870701	
WA4LPD-1	RALEIGH	NC	147.5400	870701	
WA5S2L-1	RALEIGH	NC	145.0100	861101	
WBØUHW	DEVILS LAKE	ND	14.1070	870701	
WBØUHW	DEVILS LAKE	ND	145.0100	870701	
WRØLRE	GRAFTON	ND	145.0100	870701	
WRØLRE	GRAFTON	ND	146.7000	870701	
WØLHS	WEST FARGO	ND	14.1070	870701	
WØLHS	WEST FARGO	ND	146.7000	870701	
AGØN	BAYARD	NE	145.0100	870825	
AGØN-5	BAYARD	NE	14.1070	870825	
WRØPXW	HASTINGS	NE	145.0100	870803	
WBØKBK	LINCOLN	NE	145.0100	870803	
WBØKBK	LINCOLN	NE	145.0700	870803	
KØTAJ	MCCOOK	NE	145.0100	870605	
KØBØY	OMAHA	NE	145.0100	870803	
NFØN-2	SIOUX CITY	NE	145.0100	870701	
NFØN-2	SIOUX CITY	NE	145.0100	870605	
NFØN-2	SIOUX CITY	NE	147.5550	870522	
WB1DSW	EAST KINGSTON	NH	14.1090	870605	
WB1DSW-1	EAST KINGSTON	NH	7.0930	870605	
WB1DSW-1	EAST KINGSTON	NH	145.0500	870605	
WB1DSW-1	EAST KINGSTON	NH	221.1100	870605	
KE1G-1	GOFFSTOWN	NH	145.0100	860102	
WA1FHB	MARLOW	NH	145.0100	870701	
N1DRK-1	SALEM	NH	145.0100	870605	
N1DRK-1	SALEM	NH	145.0700	870605	
W1PW	WINDHAM	NH	221.1100	870701	
KC2TM	ATCO	NJ	14.1090	870701	
KC2TM	ATCO	NJ	145.0100	860204	
KC2TM	ATCO	NJ	145.0300	870701	
K3IHA	BARGAINTOWN	NJ	145.0900	870701	
N2DSY-4	BERGENFIELD	NJ	145.0700	870701	
N2DSY-4	BERGENFIELD	NJ	441.0000	870701	
WA2VKH	CARLSTADT	NJ	145.0100	860204	
K3GYS	CROFUT	NJ	145.0100	870701	
K3GYS	CROFUT	NJ	220.0100	870701	
KF4TT	EAST BRUNSWICK	NJ	145.0100	870701	
WB2EHA	EAST WINDSOR	NJ	145.0100	870701	
WB2EHS	EAST WINDSOR	NJ	223.4000	870701	
K2ADJ	EDGEWATER	NJ	145.0100	870701	
WB2ORD	EGG HARBOR	NJ	145.0900	870701	
WB2PAG	EMERSON	NJ	145.0100	870701	
WA2SHA-1	HAWTHORNE	NJ	145.0100	870701	
WA2SHA-1	HAWTHORNE	NJ	221.0100	870701	
KA2BQE-1	INDIAN MILLS	NJ	145.0700	870701	
KA2BQE-1	INDIAN MILLS	NJ	221.0100	870701	
WB2HBZ-1	KINNELON	NJ	145.0500	870605	
KV2D-2	LITTLE SILVER	NJ	145.0100	870701	
WB2MNF	MEDFORD	NJ	145.0100	870301	
WB2MNF	MEDFORD	NJ	145.0300	870701	
WB2MNF	MEDFORD	NJ	221.0100	870701	
NN2Z-1	NEPTUNE	NJ	145.0500	870605	
NN2Z-1	NEPTUNE	NJ	221.0100	870605	
KB1BD-1	PLAINSBORO	NJ	145.0700	870701	
KB1BD-1	PLAINSBORO	NJ	221.0100	870701	
WB2GWD	READINGTON	NJ	145.0100	870701	
WB2GWD	READINGTON	NJ	221.0100	870701	
WB2COP-2	RED BANK	NJ	145.0300	870701	
WB2COP-2	RED BANK	NJ	221.0100	870701	
N2EVW-1	TRENTON	NJ	145.0700	870701	
N2EVW-1	TRENTON	NJ	145.5700	870701	
WB2AVW	TRENTON	NJ	145.0100	870605	
W2VY-1	UNION	NJ	145.0100	870605	
W2VY-1	UNION	NJ	145.0500	870605	
N1JS-1	VINELAND	NJ	10.1490	870701	
N1JS-1	VINELAND	NJ	144.9700	870701	
N1JS-1	VINELAND	NJ	145.0900	870701	
WB2AVX	VOORHEES	NJ	145.0100	870605	
WB2AVX	VOORHEES	NJ	220.0100	870605	
KA9Q-1	WARREN	NJ	145.0100	870701	
WB2VXT-1	WATERFORD MILLS	NJ	145.0700	870701	
WB2VXT-1	WATERFORD MILLS	NJ	221.0100	870701	
KD6TH	WYCKOFF	NJ	221.0100	870424	
KD6TH-1	WYCKOFF	NJ	145.0700	860803	
WB2ARS	ALBUQUERQUE	NM	145.0500	870701	
KA5BEM-1	ALBUQUERQUE	NM	145.0100	870701	
KM5D	CORRALES	NM	7.0930	870716	
KM5D	CORRALES	NM	14.1090	870716	
KM5D	CORRALES				
N5ICC	LAS CRUCES				
KA5ZEC-1	LAS CRUCES				
KEØJC	LOS ALAMOS				
WS5A	ROSWELL				
N5BGC	SANTA FE				
W7LHØ	SANTE FE				
W7LHØ	SANTE FE				
KD7PK	LAS VEGAS				
N2EZG	ALPINE				
N2EZG	ALPINE				
N1BCK	BALDWINSVILLE				
N1BCK-4	BALDWINSVILLE				
K2APL-4	BRIARWOOD				
K2APL-4	BRIARWOOD				
WB2VPH-2	BROCKPORT				
N2EPØ	CHURCHVILLE				
KC2AZ	ELMIRA				
NA2AZ	ELMIRA				
KC2EQ	ELMIRA				
WA2VPY	ELMIRA				
W2DUC	FAIRPORT				
W2HPM	FARMINGVILLE				
W2HPM	FARMINGVILLE				
W2HPM	FARMINGVILLE				
W2HPM	FARMINGVILLE				
W2JUP	FARMINGVILLE				
W2JUP-4	FARMINGVILLE				
W2JUP-4	FARMINGVILLE				
W2JUP-4	FARMINGVILLE				
W2JUP-4	FARMINGVILLE				
W2JUP-4	FARMINGVILLE				
W2JUP-4	FARMINGVILLE				
W2JUP-12	FARMINGVILLE				
AI2Q-4	FREEPORT				
AI2Q-12	FREEPORT				
KC2PH	HERKIMER				
N2AUK-1	HOWARD BEACH				
N1DL	HUNTINGTON				
N1DL	HUNTINGTON				
N1DL	HUNTINGTON				
WA2AKN-2	HYDE PARK				
WA2AKN-2	HYDE PARK				
WA2AKN-2	HYDE PARK				
WA2AKN-2	HYDE PARK				
KD2GB	JOHNSON CITY				
NA2B	MASSENA				
NA2B	MASSENA				
K2AAA-4	MONTAUK				
K2AAA-4	MONTAUK				
K2AAA-4	MONTAUK				
K2AAA-4	MONTAUK				
WB2ACV	NEW BERLIN				
N2MH-4	NEW YORK CITY				
N2MH-4	NEW YORK CITY				
W2ICZ	NIAGARA FALLS				
W2ICZ	NIAGARA FALLS				
KA2BHB	ROCHESTER				
KA2BHB	ROCHESTER				
WA2UMX	SARATOGA SPRINGS				
WA2UMX	SARATOGA SPRINGS				
KC3BQ	SKANEATELES				
KC3BQ	SKANEATELES				
N2AYY-1	SOUTH GLENS FALLS				
N2AYY-5	SOUTH GLENS FALLS				
WA2TVE-4	UTICA				
WA2PUV	VALATIE				
WA2PUV	VALATIE				
WA2PUV	VALATIE				
WB2QJA-4	WHITE PLAINS				
WB2QJA-4	WHITE PLAINS				
WA2EXE-4	WOODSIDE				
WA2EXE-4	WOODSIDE				
WA8ERQ	BLANCHESTER				
KC8TW	CINCINNATI				
KC8TW	CINCINNATI				
AD8I	CIRCLEVILLE				
AD8I	CIRCLEVILLE				
AD8I	CIRCLEVILLE				
AD8I	CIRCLEVILLE				
KB8CI	CLEVELAND				
KB8CI	CLEVELAND				
KB8CI	CLEVELAND				
W8CQK	COLUMBUS				
N8ACV	DAYTON				
N8HM	DAYTON				
N8HM	DAYTON				

NM	145.0100	870605		W8QLS	DELAWARE	OH	144.9300	870701
NM	145.0100	870605		WB9ANQ	ENON	OH	145.0100	861130
NM	145.0100	870120		N8ET	FINDLAY	OH	145.0100	870701
NM	145.0100	861130		WA8JXM	FOREST PARK	OH	144.9100	870701
NM	145.0100	870701		WA8JXM	FOREST PARK	OH	145.0100	870701
NM	145.0100	861130		WA8JXM	FOREST PARK	OH	221.1100	870701
NM	145.0100	870605		N8FIS	FREMONT	OH	145.0100	870701
NM	145.0500	870605		NK8T	LOVELAND	OH	144.9500	870701
NU	145.0100	870605		NK8T	LOVELAND	OH	145.0100	870701
NY	145.0100	870805		W8WE-1	MANSFIELD	OH	145.0100	870701
NY	145.0700	870805		KA8CDM	MARTIN'S FERRY	OH	145.0100	870701
NY	145.0100	870605		WB8LVP	POLAND	OH	14.1030	860204
NY	145.0900	870605		WB8LVP	POLAND	OH	145.0100	870701
NY	145.0500	870701		W8GAG	SHAKER HTS.	OH	145.0500	870701
NY	441.0000	870701		KC8JM	WINTERSVILLE	OH	145.0100	870605
NY	145.0100	870805		WB5AOH-1	FORT GIBSON	OK	145.0100	870716
NY	145.0300	870805		WB5AOH-1	FORT GIBSON	OK	145.0900	870716
NY	145.0100	870805		WB5RZX	NORMAN	OK	145.0100	870701
NY	145.0700	870805		KF5UY	ROFF	OK	145.0100	870710
NY	145.0700	870605		N5WX-1	TULSA	OK	7.0930	870716
NY	145.0700	870701		N5WX-1	TULSA	OK	145.0100	870716
NY	145.0100	860102		K7IFG	PORTLAND	OR	7.0930	870807
NY	7.0930	870701		K7IFG	PORTLAND	OR	14.1070	870807
NY	14.1110	870701		K7IFG	PORTLAND	OR	145.0100	870807
NY	145.0700	870701		W7XI	PORTLAND	OR	145.0100	870120
NY	221.1100	870701		KS7Y-1	PRAIRIE PEAK	OR	145.0100	870120
NY	7.0930	870603		N3ET	ALLENTOWN	PA	145.0100	870813
NY	14.1110	870701		N3ET	ALLENTOWN	PA	221.0100	870813
NY	144.9700	870603		KB3L	BEAVER FALLS	PA	145.0300	870701
NY	145.0100	870701		WA3DQI	BERWICK	PA	145.0300	870701
NY	145.0700	860803		WA3DQI-1	BLOOMSBURG	PA	145.0100	870701
NY	221.1100	870701		KB3UD	EAST BANGOR	PA	144.9700	870701
NY	441.0000	870701		KB3UD	EAST BANGOR	PA	145.0100	870701
NY	1297.5000	870603		KB3UD	EAST BANGOR	PA	221.0100	870701
NY	145.0100	870701		W2XO	GIBSONIA	PA	145.0100	870605
NY	221.0100	870701		W2XO	GIBSONIA	PA	145.0300	870605
NY	145.0500	870805		WB3AFL-1	GREENSBURG	PA	145.0100	870701
NY	441.0000	870701		AK3P	HAMELSTOWN	PA	145.0100	870701
NY	14.1090	870701		AK3P	HAMELSTOWN	PA	145.0500	870701
NY	145.0100	870701		WB3EYB	HARRISBURG	PA	145.0500	870701
NY	441.0000	870701		AK3UP	HARRISBURG	PA	145.0100	870322
NY	145.0100	870701		WA6YBT	HARRISBURG	PA	145.0500	870701
NY	145.0700	870701		KB3ZW	HOMESDALE	PA	145.0100	870415
NY	220.5500	870701		KB3ZW	HOMESDALE	PA	145.0500	870515
NY	221.1100	870701		KB3ZW	HOMESDALE	PA	145.0900	870419
NY	145.0700	870805		WA3TSW	HORSHAM	PA	145.0900	870716
NY	14.1110	870805		WA3TSW	HORSHAM	PA	221.0100	870716
NY	145.0100	870805		N3ERE-15	LAPORTE	PA	145.0100	870701
NY	14.1090	870103		K3DSM-5	MALVERN	PA	145.0700	870701
NY	145.0100	870701		K3DSM-5	MALVERN	PA	221.0100	870701
NY	145.0700	860803		KA3ORW	PITTSBURG	PA	145.0100	870605
NY	221.1100	870701		KA3ORW	PITTSBURG	PA	145.0300	870701
NY	145.0700	870805		W3UC	PITTSBURG	PA	145.0100	861130
NY	145.0100	870605		N3ACL	RED HILL	PA	145.0100	870701
NY	441.0000	870701		K3PGB	ROSLYN	PA	145.0100	870701
NY	7.0970	870701		K3PGB	ROSLYN	PA	145.0500	870701
NY	145.0100	870605		N3ACL	ROYERSFORD	PA	145.0500	870701
NY	145.0100	870414		N3CHX	ROYERSFORD	PA	145.0500	870605
NY	145.0300	870701		WA7SSO	STATE COLLEGE	PA	145.0100	870701
NY	145.0100	870324		AG3F	TOWANDA	PA	14.1110	870701
NY	145.0500	870322		AG3F	TOWANDA	PA	145.0100	870701
NY	145.0100	870805		WA3CYO	WASHINGTON	PA	145.0100	861101
NY	445.5500	870701		WA3UAT	WASHINGTON	PA	145.0100	870605
NY	145.0100	870605		K3RLI	WILKES-BARRE	PA	145.0100	870701
NY	145.0500	870605		K3RLI	WILKES-BARRE	PA	145.0500	870701
NY	145.0500	870805		K3RLI	WILKES-BARRE	PA	221.0100	870416
NY	7.0930	870814		KB3UN	WILLIAMSPORT	PA	145.0100	861015
NY	145.0100	870814		W3GWS	YORK	PA	144.9500	870701
NY	145.0500	870814		N1DKF	CRANSTON	RI	145.0700	870605
NY	145.0500	870605		N1DKF	CRANSTON	RI	221.1100	870605
NY	221.0100	870605		N1SW	WARWICK	RI	146.0700	870701
NY	145.0500	870701		KA4YEA	ANDERSON	SC	145.0100	870701
NY	221.0100	870701		WA4SZK	FLORENCE	SC	14.1090	870701
OH	145.0100	870701		WA4SZK	FLORENCE	SC	145.0100	870701
OH	144.9100	870605		KA4YEA	GREENVILLE	SC	145.0700	870701
OH	145.0100	870605		KF4EF	MONCKS CORNER	SC	145.0100	870701
OH	7.0930	870701		WOPUF	RAPID CITY	SD	14.1070	870825
OH	14.1090	870701		WOPUF	RAPID CITY	SD	145.0100	870825
OH	145.0100	870701		WD4OQC	CLEVELAND	TN	145.0100	870701
OH	145.0500	870701		WD4OQC	CLEVELAND	TN	145.0900	870701
OH	14.1070	860204		KJ4KA-1	GERMANTOWN	TN	145.0100	861118
OH	145.0100	870701		WB7BOX-1	JACKSON	TN	145.0100	870701
OH	145.0500	870701		WX4S	JOHNSON CITY	TN	145.0100	870701
OH	144.9300	870605		WX4S	JOHNSON CITY	TN	145.4800	870701
OH	145.0100	870701		K4EID	KNOXVILLE	TN	7.0870	870701
OH	145.0100	870701		K4EID	KNOXVILLE	TN	14.1110	870701
OH	145.0700	870701		K4EID	KNOXVILLE	TN	145.0100	870701

W4HHY	NASHVILLE	TN	145.0100	870701
KB4MK	OLIVER SPRINGS	TN	145.0100	870710
K4MJM	PIKESVILLE	TN	145.0100	870710
KC4QI	POWELL	TN	145.0100	870701
KC4QI	POWELL	TN	147.4800	870701
KD4MC	SWEAT MTN	TN	145.0100	860204
AE5I	ABILENE	TX	145.0100	870710
KB5PM	AUSTIN	TX	145.0100	870701
WA5ZQS	BRYAN	TX	145.0100	870102
KA5KTH	CLEAR LAKE CITY	TX	145.0100	870806
WB5PUC	DALLAS	TX	145.0100	870710
WA5JXV-1	EL PASO	TX	145.0100	870701
WA5JXV-1	EL PASO	TX	145.0500	870701
WA5MWD	GARLAND	TX	10.1450	870710
WA5MWD	GARLAND	TX	145.0100	870710
W5XO	GAUSE	TX	7.0930	870701
W5XO	GAUSE	TX	14.1090	870701
W5XO	GAUSE	TX	145.0100	870701
WB5BBW	HOUSTON	TX	145.0100	870806
WB5BBW	HOUSTON	TX	145.0900	870806
WD5JLI	HOUSTON	TX	145.0100	860204
KF5SE	PALESTINE	TX	145.0100	870701
AF5U	RICHARDSON	TX	145.0900	870710
KC5FK	SAN ANTONIO	TX	149.0900	870701
W5IFP	SAN ANTONIO	TX	145.0700	870724
W5IFP	SAN ANTONIO	TX	145.0900	870724
N5LL	SAN ANTONIO	TX	145.0100	870701
WA5QZI	SAN ANTONIO	TX	7.0930	870701
WA5QZI	SAN ANTONIO	TX	14.1110	870701
WA5QZI	SAN ANTONIO	TX	145.0100	870701
WA5QZI	SAN ANTONIO	TX	145.0900	870701
WA4EWV	SPRING	TX	14.1070	870806
WA4EWV	SPRING	TX	145.0900	870806
KA7PTY	BLANDING	UT	14.1070	870701
KA7PTY	BLANDING	UT	145.0100	870701
N7MQK	CEDAR CITY	UT	145.0100	870120
WA7MBL	LOGAN	UT	145.0100	870803
WA7MXZ-2	LOGAN	UT	145.0100	870410
KE7AU	OREM	UT	145.0300	870111
WB7BEG	PROVO	UT	145.0300	870111
WB7TRX	SALT LAKE CITY	UT	145.0100	870701
WA7UZO	SALT LAKE CITY	UT	145.0100	870120
WA4TF2-2	CHARLOTTESVILLE	VA	145.0100	870802
K4MGC	DALE CITY	VA	145.0100	870802
K4MGC-1	DALE CITY	VA	145.0700	870802
K4MGC-2	DALE CITY	VA	221.0100	870802
WB4D	FRONT ROYAL	VA	145.0100	870802
WA4OHX	HAMPTON	VA	145.0100	870802
WA4RTS	LYNCHBURG	VA	145.0100	870802
WA4RTS	LYNCHBURG	VA	145.0500	870802
WA4TSC	MIDDLEBURG	VA	145.0900	870802
WA4TSC-1	MIDDLEBURG	VA	145.0100	870802
K8MMO	OAKTON	VA	14.1110	870802
K8MMO	OAKTON	VA	145.0700	870802
WA4ONG-10	RICHMOND	VA	145.0100	870819
WA4ONG-10	RICHMOND	VA	145.0500	870819
WB4QOJ	ROANOKE	VA	145.0500	870802
WD4MIZ	VIRGINIA BEACH	VA	145.0100	870802
WD4MIZ	VIRGINIA BEACH	VA	145.0500	870802
N4KZL	WYTHEVILLE	VA	145.0100	870802
N4KZL	WYTHEVILLE	VA	145.0900	870802
KD1A-1	MILTON	VT	145.0100	870701
WB7DCH	ENUMCLAW	WA	14.1090	870701
WB7DCH	ENUMCLAW	WA	145.0100	870701
KA7VEE	EVERETT	WA	145.0100	870701
KA7VEE	EVERETT	WA	145.0900	870701
KE7OM	NORTH BEND	WA	7.0930	870605
KE7OM	NORTH BEND	WA	14.1110	870605
KE7OM	NORTH BEND	WA	145.0100	870701
WA7NTF-1	SPANAWAY	WA	144.9900	870810
WA7NTF-1	SPANAWAY	WA	146.9800	870810
N7HFZ	SPOKANE	WA	145.0100	870701
N7HFZ	SPOKANE	WA	145.0300	870701
N7FYA	TACOMA	WA	144.9900	870810
N7FYA	TACOMA	WA	146.9800	870710
KA7VKB	TACOMA	WA	145.0100	870701
KA7VKB	TACOMA	WA	145.0300	870701
WD9DHI	CEDARBURG	WI	14.1090	870712
WD9DHI	CEDARBURG	WI	145.0900	870712
N9EQP	EAU CLAIRE	WI	145.0100	870424
WB9OWN	FRANKLIN	WI	14.1070	870712
WB9OWN	FRANKLIN	WI	145.0100	870712
AG9V	GREEN BAY	WI	145.0100	870605
WB9LST	KENOSHA	WI	145.0900	870712
W9LZQ-1	LA CROSSE	WI	145.0100	870716
W9LZQ-1	LA CROSSE	WI	145.0900	870716
W9WI-1	MADISON	WI	145.0100	870605

W9WI-1	MADISON	WI	145.0700	870605
WB9TYT	MILWAUKEE	WI	14.1070	870712
WB9TYT	MILWAUKEE	WI	145.0100	870701
WD9AHY	NEW BERLIN	WI	145.0900	870712
WA9KEC	NORTH PRAIRIE	WI	145.0100	870605
WA9KEC	NORTH PRAIRIE	WI	145.0900	870605
W9ZBD	RHINELANDER	WI	7.0930	870701
W9ZBD	RHINELANDER	WI	14.1110	870712
W9ZBD	RHINELANDER	WI	145.0100	870712
N8FJB	BAKERTON	WV	145.0100	870701
WD8MIK	KINGWOOD	WV	145.0100	870701
KA1SY	TERRA ALTO	WV	145.0100	870605
W7ZAC	CASPER	WY	145.0100	870825
KA3IDN	CHEYENNE	WY	145.0100	870701
WA7TJU	CHEYENNE	WY	145.0100	870825

Please let me know of any corrections, deletions, additions or verifications to this file. Send them to me - K1MGC @ K1MGC via one of the Packet Radio PBBS mailboxes. If you publish or maintain a Digipeater/PBBS listing, please forward a copy of them to me so that they may be added to this list. Insure that the station you are correcting is marked Digipeater or PBBS. Any call signs listed on this list will be purged if the Update date exceeds 2 years, therefor verification is necessary. The Master list contains over 1000 calls signs, of which 55% are digipeaters and 45% are PBBS's. Please do not forward maps or listings which do not indicate if the station is a user, digipeater or PBBS.

73's Don Bennett - K1MGC
15016 Carlsbad Road
Woodbridge, Va 22193
(Home) 703-670-1773
(Office) 703-274-9355/56
(AMRAD BBS) 703-734-1387
(ARPANET) dbennett@amc-hq
(CompuServe)-72310,263

TONIO

01 September 1987

To: All TAPR Members
Fr: Lyle Johnson, President
Re: PSR

Last September, *Packet Status Register (PSR)*, the TAPR newsletter, merged with *Packet Radio Magazine (PRM)*. This resulted in your receiving up-to-date packet radio information on a monthly basis.

By February of this year, *PRM* was in serious trouble. Gwyn Reedy, W1BEL, Editor of *PRM*, lost the valuable assistance of Brad Voss, and was unable to secure additional volunteer help to continue the publication. Feeling the responsibility of continuing the magazine while he searched for help, Gwyn attempted to continue the effort virtually single handedly.

Unfortunately, the combined workload of editing *PRM*, continuing an active role in TAPR and FADCA, and the growing pains of his company (which he also "inherited" when he and his partner parted ways), proved to be too much. After getting the March and April issues of *PRM* out, Gwyn realized he was unable to do everything and still do a good job. Thus, reluctantly, he has stepped down from his directorship of TAPR, the Presidency of FADCA and ceased editing *PRM*. This decision occurred in late July.

Of course, this meant that TAPR had to locate an editor for, and attempt to revive, *PSR*.

I am happy to report that we have been successful in this effort. Effective immediately, Scott Loftesness, W3VS, TAPR Director and CompuServe's HAMNET Chief Sysop, has agreed to edit *PSR* for us. Scott is well qualified for this volunteer post, and we are grateful for his willingness to serve the TAPR membership in this way.

Scott desires that *PSR* be a meaningful publication for packet radio, and this means that he needs technical and operational articles. Please assist us in bringing a quality publication to you by submitting material to him. Material may be sent to the TAPR office at the address indicated on this letterhead, or submitted directly to Scott via CompuServe (upload on the DL7 database), or you may mail information to him at:

Scott Loftesness, W3VS
Editor, *PSR*
16440 Rustling Oak Court,
Morgan Hill, CA 95037.

The "July" cover-date issue is being assembled now, so any submissions you make will be for the next issue.

A final note. TAPR dues were raised last year from $12 to $15, partly to cover the additional expense of providing *PRM*. Since the dues were set in 1981, this has been the only increase. Providing the office, supporting packet development, and general costs to maintain the organization have resulted in costs greatly in excess of those anticipated 6 years ago. Therefore, the dues structure will remain as it currently is.

Thank you for your patience with us during this time of turmoil, and please join me in welcoming Scott as your new *PSR* Editor.

Happy Packeting!

Lyle Johnson, WA7GXD
President

MEMBERSHIP APPLICATION

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

Name: _____

Call Sign: _____ License Class: _____

Address: _____

City & State: _____ ZIP Code: _____

Home Phone: _____ Work 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

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Packet Status Register - July 1987

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Check your address label for membership expiration date. Your renewal is important!