# PACKET STATUS REGISTER ™

**The President's Corner**

# Changes, SMT, Dayton, and the DCC

**By John Ackermann, N8UR, n8ur@tapr.org**

### Changing Faces

I have another one of those announcements that results in very mixed feelings. Doug McKinney, KC3RL, has decided to resign from the TAPR Board. Doug has been a Board member since 1998 and really helped us advance our GPS-based projects. He also developed a *TAPR Project Guide* that's helped us understand the kind of projects that work best for the organization. Thanks much for your hard work over the last six years, Doug!

As hard as it is to see Doug step aside, I'm very happy with the person we've found to help fill his

shoes. Bill Vodall, WA7NWP, is well known to folks in several different facets of the digital radio world. He's a long-time packet experimenter who's helped develop high(er) speed full duplex repeater networks (he's one of the folks behind the Seattle area WETNET system), he's an APRSer, and he's one of those *Linux*-hams who has helped make *Linux* a cool place to play with ham radio. He brings both experience and enthusiasm to the TAPR Board. Welcome aboard, Bill!

### Surface Mount Devices and Ham Radio

Elsewhere in this issue you'll see a note about the Vector Network Analyzer that we are currently beta testing. I spent this past weekend (when I should have been writing this column – sorry, Stan!) building one of the VNA betas. It is

definitely a cool device, and one that should be very popular with hams, who do RF experimentation, particularly those interested in HF.

The VNA is built entirely using surface mount technology (SMT) parts. When I signed up for the beta program, this scared me. I was one of the many hams, who have been scared to death of the idea of soldering these tiny parts that don't even have leads. Even though the fine-pitch ICs were already soldered on the board when I got it, I thought I wouldn't be able to either see or handle even the larger parts — I've had some eye problems that left me with less-than-perfect vision, and I was voted "most likely to break something" in my high school class :-).

Well, guess what? After about six hours of bench

time, I had installed 100 or so components and had a working VNA. I probably used too much solder and made various other mistakes in technique, but hey, with practice I'll get better.

This surface mount stuff isn't so bad after all. Anyone who knows me will agree – if I can do it, anyone can!

The key to surface mount work is simply to have the right tools. A lighted magnifier on a gooseneck solved the problem of my bad eyes; I could actually see the parts very well. A pair of tweezers replaced fat fingers for placing parts on the board. A good iron with a tiny tip made soldering those little pads quite easy. A flux pen made the solder flow where it was supposed to.

So, if like me, you thought that the days of homebrewing were disappearing along with through-hole parts, take a deep breath, get the right tools, and move into the future. You'll be surprised at how easy it is.

## Hamvention

As I write this, it's two weeks until Hamvention (one advantage of an electronic journal is short lead times!). The TAPR gang is getting ready for the show, and we hope to see you there. We'll have a beta Vector Network Analyzer at the booth, along with other goodies. The TAPR Forum on Friday will give you the latest info on our projects, and the

Digital

BASH on Friday evening will be, as always, a good time for all. See you there!

## Digital Communications Conference

I know, I know – Hamvention isn't even over yet! But the DCC, scheduled for

September 10-12 in Des Moines, is coming up fast, and we're actively looking for papers to include in the Proceedings – the deadline is August 10, so get writing!

## A Final Thought

Despite all the threats that we perceive to ham radio, from tiny SMT parts to Broadband over Power Lines, I am happy to see that TAPR's members continue to be a force for innovation within our hobby. There are a lot of neat projects underway in ham workshops, and there are plenty of signs that hams can still contribute to the advancement of the radio art. We have a lot to be proud of.

73,

John

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## Call for Nominations

Nominations are now open for TAPR Board of Director seats expiring this year, i.e., the seats held by John Ackermann, N8UR, Byon Garrabrant, N6BG, and Bill Vodall, WA7NWP. (Bill, WA7NWP, replaced Doug McKinney, KC3RL, who resigned in March 2004.)

Board members serve three-year terms and their responsibilities include:

1) Attendance at both board meetings each year. (One is held at the Dayton Hamvention in May, the other at the Digital Communications Conference in September.)

2) Regular participation in the continuous board session, which is conducted over the Internet.

3) Active engagement in TAPR's management.

To place a person in nomination, please remember that he or she must be a member of TAPR. Also, confirm that the individual is willing to have his or her name placed in nomination. Send that person's name (or your own if you wish to nominate yourself), call sign, mailing address, e-mail address, phone number(s), and a biographical sketch (100 words maximum) via e-mail to tapr@tapr.org or to the TAPR office (P. O. Box 852754, Richardson, TX 75085-2754) no later than **August 10, 2004**. If you submit a nomination via e-mail, we strongly encourage you to follow up by regular mail.

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# TAPR's Comments on the Cognitive Radio/SDR NPRM (03-108)

**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC 20554**

In the Matter of:

| | |
|---|---|
| Facilitating Opportunities for Flexible | ) |
| Efficient, and Reliable Spectrum Use | ) ET Docket No. 03-108 |
| Employing Cognitive Radio Technologies | ) |
| | ) |
| Authorization and Use of Software Defined | ) |
| Radios | ) |

To: The Commission

**COMMENTS OF TUCSON AMATEUR PACKET RADIO CORP.**

Tucson Amateur Packet Radio Corporation (TAPR) hereby respectfully submits its comments in response to the *Notice of Proposed Rulemaking and Order* (the "Notice"), ET Docket 03-108, adopted December 17, 2003 and released December 30, 2003. In response to some of the questions contained in the Notice, TAPR states as follows:

1. TAPR is a scientific and educational corporation established in Arizona nearly 25 years ago as a non-profit educational and scientific organization. Most of our members are licensed amateur radio operators. TAPR was an early developer of packet radio systems for use in the amateur radio service, and has since focused its research and development activities in various aspects of digital communications technologies, including software defined radios (SDRs). We offer a software defined radio project as a kit (the "DSP-10" 2 meter transceiver) and offer education about SDR technologies through our programs including the annual Digital Communications Conference co-sponsored by TAPR and the American Radio Relay League.

2. Paragraphs 81 *et seq* address the potential misuse of high speed Digital to Analog converters (DACs). Such a rule change would have an adverse impact on amateur radio operators. Advances in technology such as the use of DACs as a primary part of radio transmitting systems will prove of value to amateur radio operators in general. The rules proposed by the Commission will severely inhibit development of communication systems incorporating this new and beneficial technology. TAPR believes that rules limiting availability of such technology will not prevent the misuse with which the Commission is concerned, but will severely impact amateur radio experimentation and development. A better approach is to deal with misuse as infractions occur rather than by a blanket ban on availability.

3. Paragraph 90 asks about requiring the inclusion in SDRs of "features in hardware to prevent operation outside of amateur bands." Such features run counter to the fundamental premise of SDR, and requiring their inclusion will increase the cost and complexity of SDRs designed for the amateur community. The effect of such a rule would be to require a significant increase in cost with no apparent benefit to the user. There are practical problems with the implementation of such features as well. First, if they are implemented in the form of filters, it will be virtually impossible to achieve adequate bandpass characteristics to allow full performance within the amateur bands while blocking transmission outside them. Second, there are legitimate reasons for an amateur transmitting device to transmit outside the amateur bands within its coverage range. One primary example is the use of such radios as a "prime

mover" for transverters with outputs on higher frequency bands. For example, a driver for a 2 meter band transverter requires an output spanning 4MHz if it is to cover the entire 2 meter band; there is no HF amateur band that is 4MHz wide. We also note that out-of- band transmission has been possible with non-SDR radio equipment for many years, and this has not proven to be a significant enforcement problem. We see no reason to encumber SDR with protections that are deemed unnecessary for other types of transmitters.

4.      In summary, we do not believe that placing legal or technical burdens on the development of SDRs for amateur use are either necessary or proper. We urge the Commission to adopt rules that foster, rather than inhibit, the development of this new technology in a radio service whose very basis is "advancing the state of the radio art."

RESPECTFULLY SUBMITTED,

Tucson Amateur Packet Radio Corporation

8987-309 E. Tanque Verde Rd., #337

Tucson, AZ 85749-9399

By: John R. Ackermann

President

###

# Announcing the 2004 TAPR Digital Bash!

**By John Ackermann, N8UR, jra@febo.com**

## What?

An event for the digitally-inclined ham, featuring:

* Buffet dinner

* Keynote Address: "Open Source in the Real World" by John Ackermann, N8UR

* Informal "Birds of a Feather" gatherings

* Door Prizes!

## When?

Friday evening, May 14, 2004

Doors open at 7:00 pm; dinner served at 7:30 pm

Speaker, meetings, and door prizes after dinner

## Where?

Kohler's Banquet Center, 4548 Presidential Way, Kettering, Ohio (39 40.75N, 84 08.43W). From downtown Dayton, take Main Street, which becomes Far Hills Ave., south to David Road, then east to Presidential Way. Turn south on Presidential Way. Kohler's is on the left about 1/4 mile south. Maps are available at the TAPR booth and on the TAPR web site (**www.tapr.org/tapr/dayton**, follow the link at the bottom of the page).

## How?

Dinner requires advance registration and payment through TAPR. Tickets will be available at the TAPR booth on Friday, though we strongly encourage registration before the Hamvention. The cost is $28.00 per person, tax, and tip included.

All amateurs are welcome to attend, enjoy the speaker, and participate in the meetings, although only those purchasing a dinner can eat.

To register, contact:

Digital Bash

c/o TAPR

PO Box 852754

Richardson, TX 75085-2754

phone: 972-671-TAPR (8277)

fax: 972-671-8716

Internet: tapr@tapr.org

Visa/Mastercard Accepted

## Who?

Digital BASH is co-sponsored by TAPR, Tucson Amateur Packet Radio, the national leader in digital communication, and the Miami Valley FM Association, Dayton's packet radio club.

For more information (including maps), go to **www.tapr.org/tapr/Dayton** or send e-mail to **tapr@tapr.org**.

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# Silent Key: Billy Ray Jones, N5OIN

Billy Ray Jones, N5OIN, died on March 24, 2004. Billy was the husband of former TAPR office manager, Dorothy Jones, KA5DWR, and the father of former TAPR president, Greg Jones, WD5IVD. Billy was the man behind-the-scenes in the TAPR office during Dorothy's tenure as office manager. TAPR wishes to extend its condolences to the whole Jones family.

Here is N5OIN's obituary as it appeared in *Denton* (TX) *Record-Chronicle*, on Thursday, April 22, 2004:

"Billy Ray Jones, 77, of Denton died March 24, 2004, at Denton Regional Medical Center. He was born Oct. 27, 1926, in Abilene, Texas, to Roy Herbert and Irene (Brown) Jones. He was married to Dorothy Terry on Jan. 13, 1952, in McGregor, Texas. He served in the U.S. Army during World War II. He attended Texas A&M University and received his B.A. degree from NTSU (now UNT). He was a member of Saint David's Episcopal Church and was a systems analyst in the Engineering Department at LTV Aerospace. He was an amateur radio operator; his call sign was N5OIN.

"Mr. Jones is survived by his wife, Dorothy T. Jones; sons and daughter-in law, Greg and Bridget (Bern) Jones, and Gary and Rebecca (Webb) Jones, all of Denton; and four grandsons, William David Jones, Samuel Well Jones, Benjamin Roy Jones, and Gerald Gregory Jones."

<div align="right">###</div>

## Call For Papers
**By Steve Ford, WB8IMY, sford@arrl.org**

The 2004 TAPR/ARRL Digital Communications Conference will be held September 10-12 at the Airport Holiday Inn in Des Moines, Iowa. You'll find more conference information on the Web at **www.tapr.org/dcc**.

We are now accepting papers for the conference proceedings. You do *not* have to be present at the conference to have your paper included in the proceedings.

Please send your submission by August 10 to:

Maty Weinberg

ARRL

225 Main St

Newington, CT 06111

or via the Internet to:

**maty@arrl.org**

<div align="right">###</div>

# TAPR Vector Network Analyzer Beta Test

**By Tom McDermott, N5EG, tom.mcdermott4@verizon.net**

TAPR has started beta test of a Vector Network Analyzer kit. The VNA measures transmission and reflection (S21 and S11) parameters of a network. The VNA operates over the range 200 kHz to 100 MHz and uses a USB 1.1 interface to attach to the host computer. Ten units have been kitted and are in the process of assembly. *QEX* has accepted an article on the analyzer for publication in the July-August 2004 issue of that publication.

Steve Bible, N7HPR, and John Ackerman, N8UR, will have a unit at the Dayton Hamvention for show and tell. I have been working on the software. The C++ source code has been released under the GNU GPL and is available on the web site, as well.

Once the beta testing is completed, production kits will be made up for sale. No date or price has been set yet.

Here is a picture of the unit Steve Bible assembled (without the cabinet). The front panel is being machined now by Karl Ireland and should be to the beta testers within a week or two.



And here is a screen shot of the analyzer in rectangular mode (displaying S21 amplitude and phase of a 3 dB attenuator and some interconnecting cables).
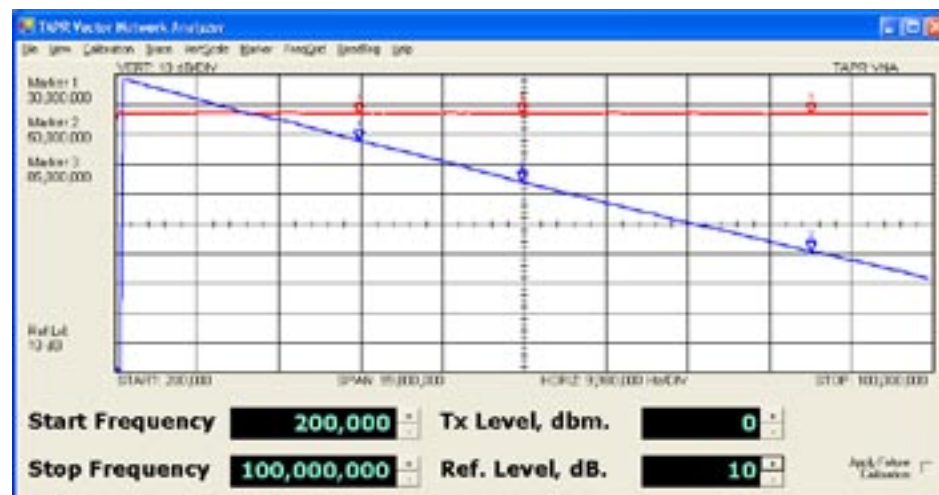


On the neext page is a screen shot of the analyzer displaying a load (S11) in polar mode.

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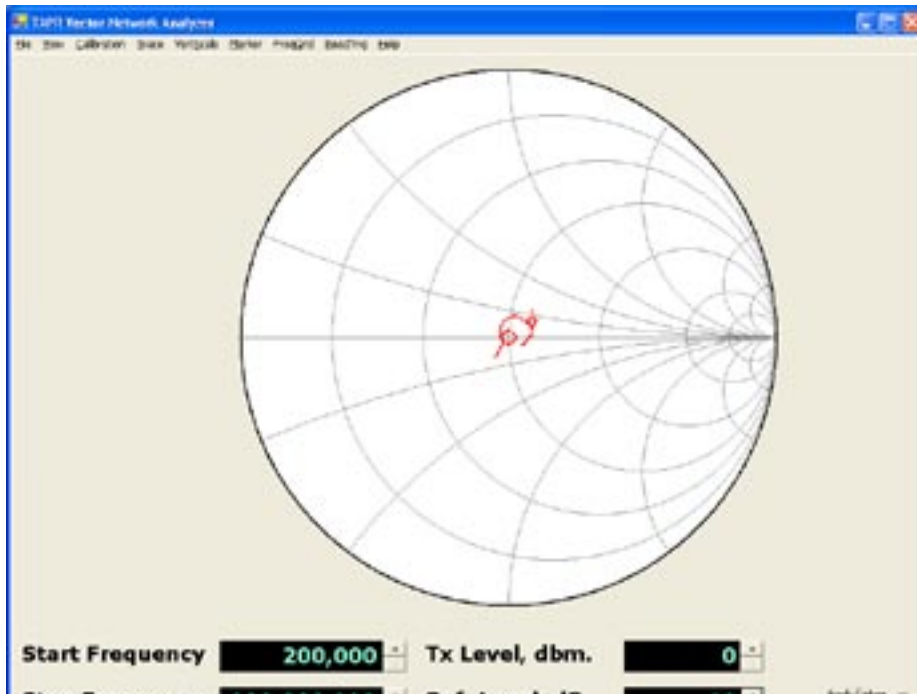
# X1W Kit Update

**By John Bennett, N4XI, jabennett@insightbb.com**

The new X1W kits will be on display at the TAPR booth during the Dayton Hamvention. Additionally, there will be a short presentation given at the APRS and TAPR forums on Friday to highlight the new kits.

The X1W-1 is the second in the X1W series that features the long awaited barometric pressure sensor in addition to supporting a rain gauge and an EMP sensor. Additionally, an RS-232 interface, indoor temperature sensor, and two control outputs are on the board. The X1W-2 has been revised to support a rain gauge and EMP sensor if the user wishes to connect those sensors from that board rather than inside the X1W-1.

The display at the TAPR booth will be an active working display. Visitors will be able to view the data collected by the T238 and the X1W sensors and interfaces. The manuals for the X1W kits will be available to view on-line as well.

If you are at Dayton, stop by and see us.

###

# APRS at NWS-ILX

**By Larry Keeran, K9ORP, NWS-ILX APRS Coordinator, k9orp@tapr.org, www.qsl.net/k9orp/ILX.htm**

APRS has been in use at the National Weather Service Office in Lincoln

Illinois (ILX) since September 27 1996, and been welcomed by the personnel there. I have been Acting NWS-ILX APRS Coordinator since then.

The valuable points to a successful NWS APRS system are as follows:

* By acting as digital pin maps, APRS provides visual assistance as to where the spotters are during a weather event. The same display helps the net control to picture where everyone is.

* Weather objects used for spotting in our area have the name as mmdtownname where mm=miles, d=direction, townname=closest town spelled out (Example: 5SPeoria). The icon should be the appropriate weather object. The remarks in those objects should say "Confirmed by K9XYZ," "Reported by State Police 6-24," "Reported by countyname ESDA," or whatever station reported what you entered, and your call. The name and comment fields help keep the one tornado from becoming many because of duplication of reports. We can use the time stamp on the packet and ask that agency further information later.

* NWS-ILX uses the 445.925 MHz at 9600 baud for all its traffic.

* The 445 MHz backbone uses WX# aliases for the digipeaters on the backbone. The "#" represents tens of miles from NWS-ILX. For example, WX3 would be near 30 miles radius from ILX. This algorithm allows the star distribution of NWS-ILX reports to all the weather coverage area stations. It also designates desired weather related traffic. By inserting your local digipeater MYGATE alias in your path followed by the WX#, you can jump over the local QRM on 144.39 and get to NWS-ILX without waiting for "clear air."

* Damage reports after the weather event are sent in primarily by county contact standard procedures. Amateur Radio can pass along damage reports also as long as they meet the agreed local weather forecast office (WFO) format. The report can also be done digitally on APRS as long as it is an acknowledged type of exchange in keeping with the local WFO format.

*The logging feature of APRS objects is used as a time line of events. All objects are scrutinized after the weather event to replay the storm.

The operation of APRS in the NWS environment is important because of its non-verbal information, which is so valuable in a busy office. A glance from the NWS personnel can tell them that an APRS object exists of a spotted weather condition. Amateurs are guests in the NWS offices and being polite by keeping the noise down is important while providing a service.

It is important to remember that NWS does not direct us, instead they ask for reports. We have to use our own safe procedures both on APRS and on the voice net control. This area recommends that one person per net has a version of APRS that they are fluent with and have intimate knowledge of the area so they can enter the position of stations they hear on their weather net as objects. This allows the spotters to be seen at NWS over APRS.

Trackers are used in weather spotting vehicles, but it is highly discouraged to have a computer screen on when you are spotting. Your night vision is ruined and you can't give yourself enough advanced warning to evade a popup tornado.

It is important to remember that APRS is a secondary system for reporting. You should always have a voice net in addition to APRS during a weather event.

Since APRS was put in our office, the number of stations has grown, which makes the backbone more valuable then ever before for timeliness of APRS data. Software has improved, so training

is necessary to keep the personnel up on the latest features.

We are constantly asking NWS if we are in keeping what they would like to see. The answer is familiar: maps that aren't too cluttered with names and contrasting APRS objects. Another constant is logging with time stamps, which is highly important. The comment field mentioning if the object seen was "reported" or "confirmed" and by the actual ID, name, or call of who saw it, is hard to fit in the comment field, but is necessary.

## Conclusion

We, as Amateurs are innovative and flexible with our improvements, therefore we will be welcome additions to any weather service office as professionals rather than Amateurs.

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# APRS Forums at Tampa Bay Hamfest

By Geoffrey Dick, WA4IKQ, wa4ikq@NEVETS.OAU.ORG

The folks who put together the forums at the Tampa Bay Hamfest did a great job this year, especially for APRS. Many kudos go out to Chris Schwab, N4BSA, for bringing Bob Bruninga, WB4APR, to our doorstep to speak on his favorite topic. Bud Thompson, NO1A, gave a very interesting talk and demonstration about passing e-mail through ham radio on packet to and from the "last mile" and how tools such as *PACLINK*, *WINLINK2K*, *TELPAC*, and *PACTOR 1*, *2*, and *3* play important roles. AMSAT had a great forum and demonstration from which my son gathered several pages of handwritten notes.

For benefit of those who missed the opportunity to hear WB4APR speak, I will try to summarize some of the interesting things he had to say in two of the three sessions I attended. One had to listen closely because he speaks quickly to cover so much territory:

### Satellite Communication

Bob believes his *APRS DATA* is a great program tool for tracking. The Kenwood TH-D7A(G) can hold up to 16 messages, 2 screen pages long each. Since it is two radios in one with an internal TNC capable of doing 9600 baud, it is a convenient package for doing satellite communication. Few have taken the time to learn it. Not too long ago, six satellites passed over North America five times a day giving 30 opportunities to make a contact. We have lost a few Amateur Radio satellites, but a new one, *ECHO* is scheduled to be launched in March of 2004.

### Dead Reckoning

While many feel that *APRSdos* is lacking the fancy, pretty maps, many APRS versions have a long way to go to catch up to the many functions *APRSdos* has had for years, such as dead reckoning. This is a tracking function that increases the accuracy of moving objects using properties of velocity and heading. If you have noticed cars and trucks leapfrogging up a highway, instead of smooth progression, then you are witnessing what Bob feels other APRS programs should have.

### Mile Markers

Before APRS, many motorists conveyed their location on the highway by passing what mile marker they were at. This can still be used to show location without a GPS. *APRSdos* has this feature and it can be used with some position ambiguity. One can turn Objects ON to allow others to see the position inputted. Bob would like some help in making his highway database mile markers more accurate.

### PHG Circles Can Be Used To DF

By simply questioning hams on what they hear

and do not hear from their position on an input frequency, a fox can be approximately located using PHG circles, using receiver antenna height as part of the calculation. *APRSdos* has been doing this since 1994.

## Bulletins

Today, you will often see bulletins with scrambled messages. Many APRS authors have not followed the example of *APRSdos* that labels all bulletins on one (1) page with line numbers.

## 144.390 MHz Needs To Be Fixed

Big city APRS communities are being jammed from outside activity. APRS can comfortably handle 40 stations on the air at a time with a typical cross sample of 30 fixed stations beaconing every 30 minutes, 5 weather stations beaconing once every 8 minutes, and 5 mobile stations sending packets each minute. This will load the channel in an ALOHA curve with a peak capacity at 18%. Beyond that, packets begin to collide and the channel efficiency drops quickly to zero.

The proposed fix would require breaking the WIDEN-N paths at the entrance to big metropolitan areas, forcing the packets to travel around high density areas, reducing the number of RELAYS to a practical level for mobiles, and using a simple WIDE for inside the high usage areas. Digipeater paths could be renamed for a (NS) North-South path or an (EW) East-West path instead of sending packets in all directions with WIDEN-N. Setting all digipeaters with NO-ID and changing UI-FLOOD to link can reduce packet loading.

## How Many Hops To Reach A Typical IGate?

Typically, WIDE2-2 is adequate and WIDE3-3 or more is rarely needed.

## APRS on a Floppy

WB4APR is releasing a compact version of *APRSdos* that fits on one floppy disk. It will run in a PC as low as a 286 machine.

## What Is CUSTOM1, CUSTOM2... In A TH-D7A(G)?

Our Kenwood representative could not answer this question. Bob knew the answer.  In the APRS MENU, POS COMMENT choices are: ENROUTE, Off Duty, EMERGENCY!, CUSTOM 6, CUSTOM 5, CUSTOM 4, CUSTOM 3, CUSTOM 2, CUSTOM 1, and CUSTOM 0. I never see anybody use the CUSTOM settings. Bob says you cannot program them in unique text, as they are represented by only 2-bits in a packet. Tactically, they can serve a meaning if everyone has agreed ahead of time what they indicate.

## Map Object Circles Should Have Standard Color-Coding

In *APRSdos*, green objects are digipeaters. Stations with message capability are in white.  APRS authors should try to go with the original plan.

## NWS Messages Cannot Be Ignored On Kenwood TNC Radios

If you are seeing weather messages filling your Kenwood radio, it is because they are not filterable as a message group in the radio. The problem needs to be fixed at the source of origin, and at digipeaters that forward the weather messages with longer paths. One solution may to be to rename the message "typei" as a selectable, filterable bulletin.

## If You Want To Read All The Messages With Your Kenwood

If you want to read all the messages with your Kenwood, put an asterisk (*) in MSG GROUP and you can read all the mail.

## *ECHO-LINK* And *IRLP* Channel Notification

Each community could do a service to travelers by having one or more stations periodically sending out a status packet of the frequency of local *ECHO-LINK* and *IRLP* repeaters.

<div align="right">###</div>

# Kenwood THD7 A/G and Perl
**Porting the THD7.pm to Windows and more…**

By Kevin Wittmer, KB8VME, kevinwittmer@hotmail.com

For more than five years, the Kenwood TH-D7A/G has demonstrated its longevity in the ham community for operators who seek a HT that can operate on the VHF and UHF bands. Part of the appeal of this HT is the depth of functionality that has been integrated into a small handheld profile that is easily held or mounted. The array of functionality in this HT includes Slow Scan TV (SSTV), repeater, auto-patch via DTMF, Kenwood's Sky Commander remote control feature, and a built-in TNC with APRS software.

To configure, control, and program the various features of TH-D7 A/G, Kenwood provides a comprehensive menu system that can be navigated using the built-in keypad. Although functional, the number of settings that an operator might want to modify for a particular application (i.e., APRS setup) can at times make this interface cumbersome. To alleviate this situation, various software packages and tools have been released in the public domain to augment the built-in programmability of the TH-D7 A/G with the ability to control nearly every aspects of this radio from a *Windows* or *Linux*-based computer.

The *THD7.pm* is one software tool or module. This module was first developed by David Nesting, WL7RO, in the early part of 1999 to control many aspects of the TH-D7A. This software module was written in *Perl* and was developed to support many features of the TH-D7A including repeater operation, APRS, SSTV and Sky Commander. *Perl* is a powerful interpreter-based programming language, which has been ported to nearly every operating system invented. WL7RO first developed the *THD7 Perl* module in *Linux* for *Linux* since the module expects to be able to address the serial port using the *UNIX*-based file system device I/O model (/dev/tty).

The *Linux* aspects of this module are a result of differences between how a conventional *UNIX* operating system (such as *Linux*) and Microsoft *Windows* provide access to device I/O. In *UNIX*, I/O peripherals, such as a serial port, are overlaid with regular file system objects (directories and files). This allows applications, scripts, and other software programs to access a device in the same fashion as it would read or write to a file. Unfortunately, this I/O model does not exist in *Windows*, although *DOS* does have some provisions for reading and writing to printer and serial ports as a character stream similar to that of a file. In order for the *THD7 Perl* module to function on *Windows*, I was going to have to tackle those subroutines that interacted directly with the serial port.

## Making Changes

The complete set of changes that I made to port the *THD7 Perl* module to *Windows* is concentrated in the new subroutine of the module. When WL7RO first developed this module, he did so using an early *Perl* object-oriented development style. This style was the result of efforts by the *Perl* community to introduce object-oriented support into *Perl* and has since been greatly improved. Nevertheless, the new subroutine (which exists in both the old and new styles of object-oriented *Perl*) represents the class constructor for a THD7 object, and is where the serial I/O initialization code is located. It is important to note here that I chose not to revise the *THD7 Perl* module to support the new object-oriented style since that would have involved reorganizing many core aspects of the *Perl* module.

Listing one contains the code changes that I made to the THD7.pm to support both *Windows*, as well as *Linux*. Summarizing these changes, the flow of the code is to check the operating system type. If the operating system type is *UNIX*, then initialization serial port is to function as before (using /dev/ttyn, etc.). If this is not true, then the else case is taken

where *Windows* is assumed and a tie (or bind) of the file handle to a newly created instance of Win32::SerialPort occurs.

**Listing 1: New subroutine - The revised New subroutine that supports both *Windows* and *Linux*.**

```
sub new {
 my $caller = shift;
 my $serial = shift;

 my $self = {};

 my $UNIX = 0;
 my $WINDOWS = 1;

 my $os = ($^O eq "MSWin32" ? $WINDOWS : $UNIX);

 if ($os == $UNIX) {
  # Initialize the serial port in Linux as before . . .
 } elsif ($os == $WINDOWS) {
  my $configuration = $serial;
  tie(*FH, 'Win32::SerialPort', $configuration) ||
croak("Can't tie: $^E");
  $self->{_fd} = *FH;
  $self->{_serial} = $configuration;
 }

 $self->{_CALLBACK} = {};
 $self->{_TEXT} = $TEXT;

 if ((!$serial) || $self->{_serial}) {
  bless $self, $caller;
  return $self;
 } else {
  return undef;
 }
}
```

## Installation Steps

As I mentioned before, *Perl* is available for nearly every operating system invented, and several operating systems including *Windows* have more than one implementation of *Perl* to choose from. Various vendors, as well as different organizations in the open-source community have taken the standard distribution of *Perl* and customized it for a particular operating system, or to fit inside the framework of a particular toolset or development environment.

*ActivePerl* is a very popular *Perl* implementation that is available for *Windows*, as well as *Linux* and *Solaris*. This software is made freely available by ActiveState, a company that specializes in integrated development environments for interpreted languages such as Perl, Python, Tcl and XSLT.

To get started with installation, you will first need to download the *ActivePerl* MSI distribution from **www.activestate.com**. Please note, the *ActivePerl* distribution is available for download under a different web page and is not the same *ASPN Perl* or *Visual Perl*, both of which are commercially available software products that offer a visual development environment for editing, debugging, and testing Perl scripts and modules.

To locate the *ActivePerl* binary distribution, browse to the *ActivePerl* page and select Features from the left-hand tree view. You show find a "Download Now!" link near the bottom of the web page; click this link and follow the instructions to initiate the downloading process. At this stage, you will be able to download either *ActivePerl* 5.6, or *ActivePerl* 5.8. Although the THD7.pm module does not require specifically version 5.8, I would suggest that you download the latest version of *ActivePerl* that is available, and that you download the software distribution as a *Windows MSI* package (as opposed to *AS* package).

Next, you will need to proceed with installing *ActivePerl*. Once this process is complete, you will need to install two additional software dependencies before you can copy over and install the *Perl* THD7.pm module. These additional dependences are the *Win32-API* and *Win32::SerialPort*. *Win32-API* is a software

module that allows other scripts and modules to call into various Dynamic Link Libraries (or DLLs) that constitute the Win32 Application Programming Interface (or API) available in *Windows*.

To install the *Win32-API* module, you will make use of the *Perl Package Manager*, or *PPM*. For the 5.8 distribution, *ActiveState* makes *PPM3* available. To run this installation tool, type "ppm3" at the *Windows* command prompt (this step assumes that you allowed the *ActivePerl* installer to add the *Perl* bin directory to the *Windows* PATH statement). Once you arrive at the *PPM* command prompt, type "install Win32-API" to initiate the process of installing the *Win32-API* distribution.

ppm> install Win32-API

Next, you will need to download and install the *Win32::SerialPort* module. This module can be obtained from the URL **http://members.aol.com/Bbirthisel/ alpha.html**. Download and unzip the ZIP archive file. Change directory to the SerialPort-0.19 subdirectory, type "perl Makefile.pl" and hit enter to generate the *Perl* installation file. Now you are ready to install the *Win32::Serial* module, this can be accomplished by typing "perl install.pl" and hitting enter.

After you have installed *ActivePerl* and the two additional module dependencies, you are now ready to download and install the THD7.pm. This software module can be downloaded from **ftp://ftp.tapr.org/aprssig/**. The installation of this module is completely manual as it does not install through the *Perl Package Manager*, nor does it have any *Perl* installation script that copies the module into place. Installing this module simply involves downloading the THD7.pm file and copying it into C:\*Perl*\*site*\*lib* subdirectory (C:\*Perl* is the default subdirectory for *ActivePerl*; if you changed this default directory location you will have to identify the correct path based on the particular root directory location).

**The Command Set**

The following four tables shown below detail the commands that are available from the THD7.pm Perl module for radio, APRS, repeater, and auxiliary

purposes. There are other commands available for general, DTMF, and Sky Commander programming. My attempt here is to capture some of the most interesting commands. The tables provide you with the command syntax, the subroutine (or alias) (radio commands does not include this column), the parameters, and a description. Commands in the *THD7 Perl* module can be invoked using the command syntax, and in most cases, also with the alias and module parameters. Not all commands have aliases and not all parameters have symbolic constants (i.e., ON, OFF).

**Table 1: Radio Commands – The radio command group set to properties and control operations of the Kenwood TH-D7A/G radio.**

| Command Syntax | Module Parameters | Description |
| --- | --- | --- |
| AIP [0\|1] | ON or OFF | Advanced Intercept Point |
| BY [0\|1],[0\|1] | Band A and B | Squelch on band |
| DS [0\|1] | DATA or BOTH | DCD sense |
| DTB [0\|1] | Band A and B | Data band |
| DW | | Adjust the frequency downward |
| FL | | Returns an even numbered list of band extents |
| FQ | Frequency, band | Sets/returns the current frequency and step on the currently |
| PV [1\|2\|3\|6],f1,f2 | [AIR\|VHF_A\|VHF_B\|UHF], f1 and f2 are frequencies in MHz | Programmable VF, low=f1 high=f2 |
| REV [OFF\|ON] | ON or OFF | Reverse mode |
| SC [0\|1] | ON or OFF | Start and stop scanning on selected band |
| SCR [0..2] | Time, Carrier or Seek | Scan resume |
| SM [0\|1] | Band A or B | Signal meters, returns 00..05 |
| SQ [0\|1],[00..05] | Squelch for band, A or B | Squelch for band, open |
| ST n | Step size | Set step size |
| MODE | AM or FM | When operating in the 118 MHz region, AM or FM modulation can be used. |
| TX [0\|1] | Band A or B | Begin transmitting on band A or B |
| UP | Adjust up one | Adjust the frequency upward one |
| VCS [0\|1] | ON or OFF | VCS shutter - on or off |
| VMC [0\|1],[0\|2\|3] | Band A or B, Memory | Band mode for A or B; VFO, Memory or Call |
| VR vfo | | Reads the currently set frequency for VFO band vfo |

**Table 2: APRS Commands –** *Perl* **module commands associated with APRS properties and operation.**

| Command | Alias/Subroutine | Command Parameters | Description |
| --- | --- | --- | --- |
| AMGG | N/I | | Groups to receive messages: QST, CQ or "*" to all. |
| AMSG | APRS_Send() | | Send an APRS message |
| AMR [0\|1] | N/I | ON or OFF | Automatic message reply |
| ARL N | APRS_PosLimit() | n Units integer | Limit APRS notifications to distance miles/ kilometers. This value must be divisible by ten (10). From 10 to 2500 miles. |
| BCN [0\|1] | APRS_Beacon() | ON or OFF | Enabled beacon |
| BEPT [0-3] | N/I | 0 => Off \| 1 => Mine, 2 => All new \| 3 => All | Produces a distinct tone for APRS events |
| DTX [0..2] | APRS_TransmitMode() | MANUAL, PTT or AUTO | Control data TX mode |
| GU [0\|1] | | | GPS device used |
| ICO [0\|1],i | APRS_Icon() | 0 ==> Built-in icon, 0 to E hex; 1 ==> User-defined; integer | Sets or retrieves the current icon setting.The TH-D7A/G has 16 built-in icons. |
| MYCALL Callsign | APRS_MyCall() | Callsign string | Sets/retrieves the call sign for APRS packets. |
| LIST [1-40] | N/I | Will list up to 40 stations | Displays information on received stations |
| POSC [0..7] | APRS_Comment() | 0 => Off duty \| 1 => Enroute \| 2 => In-service \| 3 => Returning \| 4 => Committed \| 5 => Special \| 6 => Priority \| 7 => Emergency | Sets/retrieves the positional comment. |
| PP [0-6] | N/I | T, TRACE => Trace \| W, WIDE, WIDEn-n => Wide | Packet path |
| STAT text | APRS_Status() | Status text string | Set status text |
| TEMP [0-1] | N/I | | Farenheit or celcius temperate scale |
| TNC [0\|1] | TNC() | ON or OFF | Activate/deactivate the TNC (APRS mode only). |

| Command | Alias/Subroutine | Command Parameters | Description |
|---|---|---|---|
| TXI [0-8] | N/I | 0 => 0.2 minutes \| 1 = 0.5 minutes \| 2 = 1 minutes \| 3 = 2 minutes \| 4 = 3 minutes \| 5 = 5 minutes \| 6 minutes \| 7 = 20 minutes \| 8 = 30 minutes | Tx Interval |
| UNIT [0\|1] | Unit() | ENGLISH or METRIC | Set/retrieve the current English/metric setting. |
| URP | APRS_Path() | Unprotocol path string | Set the unprotocol string |
| WAY [0-6] | N/I | 0 => Off \| 1 => 6 digits out NMEA \| 2 => 7 \| 3 => 8 \| 4 => 9 \| 5 => 6 \| 6 => DGPS | |

**Table 3. Repeater Commands - Perl module commands used to configure the THD7 for voice repeater operation.**

| Command | Alias/Subroutine | Command Parameters | Description |
|---|---|---|---|
| ARO [0\|1] | AutoOffset() | ON or OFF | Auto Repeater Offset |
| CT [0\|1] | CTCSS() | ON or OFF | Enable/disable CTCSS |
| CTD [0\|1] | - | ON or OFF | Turns CTSS on or off; displays status |
| CTN n | CTCSSFreq() | n => 1..39 | Set/retrieve the CTCSS tone frequency. |
| OS nnnn | Offset() | n Hz | Set/retrieve repeater offset in Hz |
| SFT [0-3] | Shift() | OFF, NEGATIVE or POSITIVE | Simplex, plus, minus or -7.6 MHz offset |
| TN [0-39] | ToneFreq() | n => 0..39 | Set PLL subaudible tone |

**Table 4: Auxiliary Commands – Commands used to control different auxiliary functions on the Kenwood TH-D7 A/G.**

| Command Syntax | Alias/Subroutine | Command Parameters | Description |
|---|---|---|---|
| AI [0\|1] | AI() | ON or OFF | Enable/disable serial port status and reporting notifications |
| APO [0..2] | APO() | OFF, APO_30, APO_60 | Automatic Power Off |
| BAL [0\|1],[0..4] | Balance() | 0 : A - 100%, B - 0%, 1 : A - 75%, B - 25%, 2 : A - %50, B - %50, 3 : A - %25, B - %75, 4 : A - %0, B - %100 | Adjusts the speaker balance between the two bands. |
| BC [0\|1] | Band() | Band A and B | Switches the currently selected band between A and B. |
| BEP [0..3] | Beep() | 0=Off, 1=Key, 2=Key Data and 3=All | Enable/disable the key/data notification beep. |
| CH [0\|1] | ChannelMode() | ON or OFF | Enable/disable channel display mode |
| CNT [1-16] | Contrast() | 8 = Default | Adjusts the LCD contrast |
| DUP [0\|1] | Duplex() | Half or Full | Activates/deactivates full duplex mode. |
| ID | ID() | | The ID command returns string "TH-D7" |
| ELK [0\|1] | TuneEnable() | ON or OFF | Activate/deactivate the tune enable feature. |
| LK [0\|1] | Lock() | ON or OFF | Lock/unlock the radio keypad. |
| LMP [0\|1] | Lamp() | ON or OFF | Set/check the status of the LCD display lamp. Please note that momentary lighting of the lamp via the [LAMP] button will not be registered with this command. |
| MES message | Message() | Power-on message string | Sets/retrieves the power-on message |
| PC [0\|1], r | N/I | 0 => High \| 2 => Low \| 3 => EL | Sets/retrieves the transmit power control level |
| VMD mode | Mode() | CALL, MEMORY, or VFO | Sets the specific mode to call. memory or VFO. |
| SV [0..9] | BatterySave() | 0 => Off \| 1 => 0.2 sec \| 3 => 0.4 sec \| 5 => 0.6 sec \| 6 => 0.8 sec \| 7 => 1.0 sec \| 8 => 2 sec \| 9 => 3 sec \| 10 => 4 sec \| 11 => 5 sec | Set battery saver time |

## Scripting the THD7 A/G

Once the dependences along with the THD7 module has been installed, writing scripts to set and control the THD7 A/G is straightforward for the most part. To create a new script, launch your favorite text or programming editor and enter the following scripts into a new file. The key elements of a script that utilizes the *THD7 Perl* module include declaring use for this module, and then creating a new instance of the THD7 object. Once this is done, you are ready to issue commands to set and control the THD7 A/G HT. The example script shown in Listing 2 creates a THD7 object and sets the automatic power off, duplex, and band control parameters.

**Listing 2: Basic Settings – A short example *Perl* script that uses the *THD7 Perl* module to configure three radio/auxiliary properties.**

```
use strict;
use THD7 qw(:constants :functions);

my $configuration = "C:\\Sandbox\\Perl\\Serial Port\\COM7port.cfg";
my $radio = new THD7($configuration);

$radio->APO(APO_30);
$radio->DUP(FULL);
$radio->BC(BAND_A);
```

The next script is a little more complicated. In this example, I set several APRS parameters to configure the TH-D7 A/G HT for APRS beaconing mode.

**Listing 3: APRS Operation – The example *Perl* script below demonstrates how to use the *THD7 Perl* module to configure the Kenwood for APRS operation.**

```
use strict;

# Kenwood TH-D7A/G Module
use THD7 qw(:constants :functions);

my $configuration = "C:\\Sandbox\\Perl\\Serial Port\\COM7port.cfg";

my $radio = new THD7 ($configuration);

$radio->Band(BAND_A);
$radio->DataBand(BAND_A);
$radio->TNC(ON);
```

```
$radio->APRS_MyCall("KB8VME-2");
$radio->APRS_TransmitInterval(1);
$radio->APRS_Beacon(ON);
$radio->APRS_Path("WIDE2-2");
```

## Summary

This article is my attempt at providing an overview of the modifications that I have made to the THD7. pm *Perl* module for supporting *Windows*. In addition, I have also provided an overview of many of the commands available in this module. In a future article, I will demonstrate how to add new commands and take a look at other *Perl*-based tools for APRS.

## Article Resource Links

AES Specifications for the TH-D7 A(G): **http://www.aesham.com/display_pages/thd7a.shtml**

Wonderful web launching point for the TH-D7 A/G: **http://www.radiohound.org**

David Nesting's THD7.pm Module for *Linux*: **http://fastolfe.net/ham/THD7.pm.html**

*Win32::Serial Port*: **http://members.aol.com/Bbirthisel/SerialPort.html**

*Win32::API*: **http://www.gknw.com/nwperl/win32api/Win32-API.html**

D7 and D700 Commands **http://www.radio-active.net.au/web/ham/d7.html**

<div align="right">###</div>

# Letter to the Editor

Stan, WA1LOU:

I'm sure you know the FCC allocations to the "Insular Islands," but unattended packet is ruining our sub-band due to operating ignorance, stupidity, or many "newsters," or perhaps **all of these** operating without consideration for those of us.

If you can encourage **all** packesters to refrain from transmitting **packet data** in the 40-Mtr portion of 7050 to 7100, as it is a decade-plus old FCC allocation to "Insular Islands" Hawaii, Pacific Islands, Alaska, Puerto Rico and US Virgin Islands.

Stan, if you lived here, you'd know my complain of the annoyance

QSL?!

Lee Wical, KH6BZF

*Good point, Lee, but is it packet or some other mode? There really isn't much plain vanilla packet on HF these days. – Editor*

<div align="right">###</div>

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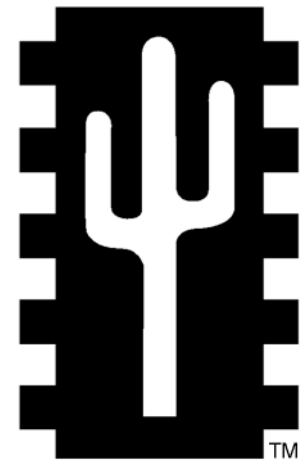
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