



PACKET

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President's Corner

The big news to report this quarter is the formation of the APRS Working Group (APRS-WG). As reported in the last *PSR*, there was discussion (sometimes heated) concerning issues related to the future of APRS during April of this year. TAPR brought together the main players and facilitated a constructive dialog on the issues. The result of this meeting and follow up communications was the formation of the APRS Working Group (APRS-WG). TAPR is proud that it was able to help bring closure on this issue and set up a method in which the APRS community as a whole will be able to openly participate. More details on the APRS-WG appear later in the *PSR*.

Another Dayton HamVention has come and gone for TAPR. Dayton, as expected, was a lot of fun again this year. The TAPR digital forum was well attended and the PacketBASH on Friday was jammed packed! If you didn't make it this year, you really should plan on coming next year! No new kits or publications presented, but Steve Bible did show off his prototype for the upcoming Satellite PIC-Tracker box. You can read more about Dayton later in the newsletter.

My apologies for the *PSR* coming out just after Dayton. We had hoped to get the *PSR* caught back up with this last issue, but the local

Look for TAPR at these Upcoming Events

Sept. 24-26, 1999 ARRL & TAPR Digital Communication Conference
Phoenix, Arizona

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President's Corner, continued...

printer we use closed their doors for several days due to a flu outbreak. This caused the *PSR* to get to the office just as Dorothy was leaving for Dayton, which resulted in it being mailed after we returned from Dayton. The June issue has us back on schedule again. Just as a reminder, the *PSR* deadlines are: Jun 15th - Summer Issue, Sep 15th - Fall Issue, Dec 15th - Winter Issue, and Mar 15th - Spring Issue. If you have an article or information to submit for the *PSR*, simply send e-mail to psr@tapr.org.

I received several messages from members regarding my statement about the low voting turnout. For the last three years we have tried to save money and include the ballot as part of the *PSR* mailing. In so doing, we sometimes found that the *PSR* could slip depending on a large number of variables quarter to quarter. The *PSR* with the ballot in it this year had such a problem. The board discussed this at the last board meeting and we plan next year to send out letters to all members and see if they result in a higher election turnout. Thanks to those members that sent in comments.

If you haven't already read about it, the ARRL and TAPR Digital Communications Conference (DCC) is being held in Phoenix, AZ in Sept. Added this quarter to the final agenda is the topic for the technical seminar on Friday. Allen Finne, KB5SQK, will be doing a seminar on HDTV. Allen is involved in HDTV currently with the installation of the broadcast system in Little Rock, AR.

Finally, the FHSS radio project is gathering steam after a brief slowdown during the Spring. Two RF engineers have been recruited for the project. The good news is that the RF design works, but the board layout will need to be redone in order to fix some board level RF issues. We are expecting to turn both the digital and RF boards in July and the result should be one step closer to having a functional radio. Very good news indeed.

Until next quarter!

Cheers - Greg, WD5IVD

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The Tucson Amateur Packet Radio Corporation is a non-profit scientific research and development corporation [Section 501(c)(3) of the U.S. tax code]. Contributions are deductible to the extent allowed by U.S. tax laws. TAPR is chartered in the State of Arizona for the purpose of designing and developing new systems for digital radio communication in the Amateur Radio Service, and for disseminating information required during, and obtained from, such research.

Article submission deadlines for upcoming issues:

Fall 1999

September 15, 1999

Winter 2000

December 15, 1999

Spring 2000

March 15, 2000

Summer 2000

June 15, 2000

Submission Guidelines:

TAPR is always interested in receiving information and articles for publication. If you have an idea for an article you would like to see, or you, or someone you know, is doing something that would interest digital communicators, please contact the editor so that your work can be shared with the Amateur community.

The preferred format for articles is plain ASCII text; the preferred graphic formats are HPGL or PCX. However, we can accept many popular word processor and graphic formats. All submissions on diskette should be formatted for MS-DOS.



DXTelnet Version 4.51

Fab Sartoni, IK4VYX
dxtelnet@usa.net

With this bulletin I'm proud to announce that a new version of DXTelnet (4.51), is available.

If you still don't know about it, DXTelnet is a ham communication software package allowing several kinds of simultaneous connections to many listed DX resources.

Among them:

- RF packet connections to DXClusters
- Telnet connections to DXClusters or ham chat servers
- IRC connections to N6RT's CQDX DX Chat Room (see below)
- Web connections to OH2BUA's DXSUMMIT and JAC web clusters
- Connections to online internet resources such as QRZ (TM) and Buckmaster (TM) on line CD ROMs, 425 DX News, QSL Info, NOAA's Solar Flux Hourly Report,
- PC Time Adjustment from the NASA Internet time server

Note: It is possible to feed any log with the incoming Internet spots.

What's new:

- Added full support to the new DX-Cafe node
- The function retrieving the latest 425 bulletin online has been updated.
- Improved support of the ham converse chat server
- Improved support of the CQDX-IRC site (Check www.qsl.net/n6rt/cqdx.html to learn more about CQDX)
- Improved support of sound Alerts
- Improved web refresh on DX-Plorer
- Upgrade of the site list entries to include new telnet sites
- Added a special spot filter rejecting old spots (this fights huge dx spot loops during main contests)

To get more details about the news in this version, please check:

<http://members.xoom.com/wd4ngb/new.htm>

DXTelnet 4.51 can be downloaded from one of the following web sites:

<http://members.xoom.com/wd4ngb/telnet.htm>

<http://www.powernetonline.com/~dbald/dxtelnet.html>

Please email any feedback to:

dxtelnet@usa.net

Ham Tracker Free Download

Nevyn Campanella, KC7JGW
nevyncampanella@gilanet.com
ICQ 20577394

Because of my concern over possible severe communication problems due to the effects of Y2K, I have developed a small application for hams called Ham Tracker. It is free and can be downloaded from

www.interbug.com/hamtracker/

This is 4.2 meg and is a complete setup program for Windows 95/98. Using a 56k modem it should take about 17 minutes to download.

The question this application can answer is: "If I needed to send a message to someone in an area that has a repeater, BUT I can't reach it from my location, who could I contact that has repeater access to the repeater I need to get a message to and repeater access to me?"

The system is based on having hams in a general area rate their access to local repeaters on the following scale:

- ?=Unknown
- 0=Cannot Reach
- 1=Weak Access
- 2=Normal Access

Once this data is collected and placed in the data base files, all that is necessary to answer the above question is 1: Select ham who needs to send the message, 2: Select from Target groups of repeaters the group that contains the target repeater 3: Select the location of the target repeater.

Ham Tracker will give you the following information:

1. Hams that have an access rating of 1 and 2 to the target repeater.
2. The access rating between the Origin of the message and the hams who can reach the repeater in question.

Final results are given in four tables starting with those who have access rating of 2 to the target repeater and an access rating of 2 between the ham sending the message and the ham passing it through to the target repeater.

The best method for completing the survey is to place the application on a web site and have local club members rate their access directly through the web site. If you need help in doing a survey I would be glad to lend some time. If you have any questions contact me at: nevyncampanella@gilanet.com

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Formation of the APRS Working Group (APRS-WG)

Bob Bruninga, WB4APR, Steve Dimse, K4HG, Keith Sproul, WU2Z, Greg Jones, WDSIVD, and John Ackermann, N8UR met near Baltimore, Maryland on Saturday May 1st and Sunday May 2nd to hold an in-person meeting concerning the recent issues of importance related to the future of APRS.

The main issues discussed were:

- Determine process to open APRS development.
- Determine the management process for the development of the APRS protocols.
- Determine the publication process for the APRS protocol standard.
- Determine and publish a certification/validation process for APRS items and programs.

The meeting was very productive with substantial and positive progress made on these issues. The group developed a working plan and a task list for continued discussion so that the participants who were not in attendance (Authors Mark Sproul, KB2ICI, Brent Hildebrand, KH2Z, and Mike Musick, N0QBF) could have input on the working plan as developed at the meeting.

All involved were pleased with the outcome of the meeting and the working plan that resolved outstanding issues. The group is now focused on the positive and growing aspects of APRS and creating a process that will open the development of APRS hardware and software.

As a result of the dialog held among the primary authors of APRS, the APRS Working Group (APRS-WG) is being founded to aid with the development and growth of APRS. What follows is information on the APRS-WG and initial plans for the next eight months. As promised in the initial agreement between the authors, this announcement covers the substantive outcomes that have occurred in private on-line discussion and at the in-person meeting held on May 1-2, 1999.

The APRS-WG would like to thank all those involved and the APRS community as a whole for allowing this process to happen in the manner that it did. We feel the results will benefit the APRS community as a whole.

Greg Jones, WDSIVD
for the APRS Working Group

APRS Working Group

Mission Statement

APRS, developed by Bob Bruninga, WB4APR, is an Amateur Radio digital infrastructure for realtime and tactical digital communications. It is designed to provide communications during emergencies, but it is recognized to support routine round-the-clock global communications as well. Its applications include mapping, messaging, telemetry, and tracking. It uses a standard protocol over RF links, supplemented by alternate communication methodologies.

The APRS Working Group

The APRS Working Group ("Group") is an unincorporated association whose members undertake to further the use and enhance the value of the APRS protocols by

- (a) maintaining and publishing a formal APRS Protocol Specification;
- (b) publishing validation tests and other tools to enable compliance with the Specification;
- (c) supporting an APRS Certification program; and
- (d) generally working to improve the capabilities of APRS within the Amateur Radio community.

This document describes the organization and operation of the Group. Although the Group may receive support from TAPR or other organizations, it is an independent body and is not affiliated with any organization. The Group will have no budget, collect no dues, and own no assets.



The signing members of the APRS-WG.
Keith Sproul, John Ackermann, Bob Bruninga, Steve Dimse, Mike Musick, Stan Horzepa, Greg Jones, Mark Sproul. Not pictured: Brent Hildebrand. The APRS-WG was officially formed on May 15th, 1999.

Statement of Principles

At a meeting near Baltimore, Maryland on May 1-2, 1999, and in email communications in the days following, the Group members agreed to the following principles that will govern their behavior and that of the Group:

1. Bob Bruninga has been the primary developer of the APRS concept. He owns the APRSdos computer program, the APRSdos documentation, and the APRS trademark, and retains the right to license these items to others.
2. All Group members agree that in the spirit of Amateur Radio, the on-air protocols themselves should be open to general Amateur Radio development and not be restricted by copyright.
3. Existing agreements between or among APRS developers are unaffected by this Charter.
4. The Group will formalize the APRS on-air Protocol Specification and publish a definitive APRS protocol document. Present plans are to make the specification in book and diskette form, and possibly to provide it via electronic distribution.
5. A process will be put in place to define how changes to the protocol specification are made, and that process will permit input, review, and comment by the Amateur Radio public.
6. The Group will put a voluntary APRS certification process in place, to be managed by Bob Bruninga with Group oversight. The process will include a publicly available validation suite.

Protocol Committee

The APRS Protocol Specification is the formal definition of the data elements and message formats used to communicate between APRS devices via wireless or wired (e.g., Internet) connections. It does not include user interface or other elements that do not affect the content or format of these interface components.

The Protocol Committee, which presently consists of all APRS-WG Members, is responsible for the APRS Protocol Specification. It manages the process for publishing and updating the Specification, and for receiving public comment on proposed changes.

The Protocol Committee intends to publish Version 1.0 of the APRS Protocol Specification by the end of October 1999. The first draft of the Specification will be made available to the Amateur Radio community by the end of June 1999, and comments will be accepted as defined below.

Committee Operations and Community Input

Input from the APRS user community, other APRS developers, and the amateur community at large is a key component of the protocol development process. Once the process has been formally defined it will be announced and published.

Certification Committee

The Group wants to encourage the development of products that properly implement the APRS protocols. To that end, the Certification Committee, which is initially composed of all Group members, will establish a Certification Program. Certification is wholly voluntary on the part of an APRS product developer, and the Certification Program is available on an equal basis to any developer. The full certification process and schedule will be announced and published shortly after Dayton. Some of the points of certification include:

1. The Committee will develop and approve a Validation Suite, which will be the primary basis for Certification. The Suite will consist of test inputs and a description of how a product complying with the Protocol Specification should react to each of these inputs. The suite will be based on the TAPR TNC-2 packet display format. The Validation Suite will be made available to the public without charge.
2. Bob Bruninga will manage the Certification Program on behalf of the Committee, subject to oversight by the Committee.
3. Subject to compliance with a Certification Agreement that must be signed before Certification is granted, Certified Products will be permitted to display or be advertised in conjunction with an "APRS Certified" trademark and logo. The trademark and logo are owned by Bob Bruninga and are licensed subject to the Certification Agreement.
4. Certified Products must successfully complete the Validation Suite, but applicants must acknowledge that additional testing may be necessary to ensure that a given Product properly implements the Protocol Specification, and agree to reasonably cooperate with such testing.
5. The Certification process is largely self-managed. The applicant must run the validation suite and submit results with the application. The Committee will conduct such testing as it deems necessary to verify the Product's conformance to the Protocol Specification.

[Full details regarding membership to APRS-WG, meeting and voting process, protocol committee, and the certification process will be made available once the rules have been fully developed.]

1999 Dayton

Greg Jones, WD5IVD

Dayton Ham Vention 1999 was so much fun!!! We had a ton of people attend and work the booth. Thanks to all those who took time out to work the booth, answer all those multitude of different questions asked every year, and generally participated in being at the Ham Vention doing digital stuff. Dayton is fun, but it is a lot more fun because of the activities involving others that happen during the weekend.



Dorothy Jones, KA5DWR, mans her spot in the booth during Ham Vention. TAPR keeps Dorothy busy during the show, taking order information.

TAPR Digital Forum

The room had around 200+ people the entire time of the forum. The following talks were given during the forum:

Welcome to the TAPR Digital Forum

John Ackermann, AG9V, Forum Moderator

TAPR Kit/Project/Organizational Update

Greg Jones, WD5IVD

Linux AX.25

John Ackermann, N8UR

PIC-E Developments

Steve Bible, N7HPR and John Hanson, W2FS

GPS Projects

Steve Bible, N7HPR

Compact Flash Adapter

John Koster, W9DDD

APRS Update

Steve Dimse, K4HG and Stan Horzepa, WA1LOU

TAPR 900Mhz FHSS Radio Project

Tom McDermott, N5EG

We did capture all the audio from the presentations and they are now available on the TAPR virtual meetings page www.tapr.org/tapr/html/Fdayton99.html.

TAPR Banquet and PacketBASH

The fifth annual TAPR Banquet and PacketBASH at the NCR "Sugarcamp" Conference Center had over 100 people attend. If you didn't make it this year, be sure to make it this next year. Again, many thanks to John Ackermann, AG9V, and Fred Peerenboom, KE8TQ, of the Miami Valley FM Association for their support of this event.



John Koster, W9DDD showing the TAPR CompactFlash Card Adapter during the TAPR Digital Forum at Dayton Hamvention.

The dinner talk entitled "A Little Technology Goes a Long Way" was given by Dave Pedersen, N7BHC. Everyone really enjoyed the talk and slide show. The audio from the banquet talk is available on the TAPR Virtual meeting page (see web page above). You'll have to listen to the audio to judge for yourself. Thanks, Dave, for an excellent banquet talk.



Steve Bible, N7HPR, shows off his PIC-Tracker Project to an interested member. Doug McKinney, KC3RL, and Bob Hansen, N2GDE talk to another ham at the far end of the booth.

After the banquet groups of individuals broke into small discussions groups. Hiro, of PRUG, brought the 2.4G Spread Spectrum radio which was discussed in the last *PSR*. The unit uses the Stanford Telecom SS chipset, and as shown in the photo, is mounted inside a cable-tv line box. The enclosure makes for a neat looking and very weather proof radio design.



Hiro, of PRUG, shows off the 2.4G module at the TAPR PacketBASH on Friday. The unit was discussed in the last issue of the PSR in the PRUG update.



Steve Bible, N7HPR, and Steve Dimse, K4HG, assemble the PIC-E kits before the exhibit area opens Friday at HamVention. They seem to be having fun.

Mic-E / MIM Transmit

Bob Bruninga, WB4APR
bruninga@nadm.navy.mil

A person just asked if he could use the MIM/Mic-E as a general purpose AX.25 TNC transmitter and the answer is yes (sort-of).

If you program the MIM/Mic-E GPS string to be a wildcard such as "SX" then if you connect a dumb terminal, then you can send anything you type by preceding it with SX.

So SXHello everyone, how copy my MIM?
should transmit the packet "Hello everyone, how copy my MIM?"

Microchip Seminar

Steve Dimso, K4HG

On June 15, Steve Bible (N7HPR) and I attended the Advanced Microchip Seminar in Orlando. John Hansen also attended one the week before up in his neck of the woods. For anyone interested in using the PIC processors from Microship, these seminars are well worth it. First of all, the food is great! Don't make the mistake of pigging out the night before, and then eating the lousy hotel freebie breakfast as Steve and I did, instead go hungry!

The topics covered include the new features in the latest chips (they make you drool over chips you can't get yet), operation of the high end emulators (they make you drool over \$2,000 tools you can't afford yet), and the new low end In-Circuit Debugger (ICD) (they make you drool over the tools you ordered but they haven't shipped yet). Good thing there is a lot of food to soak up all that saliva...oops, I guess I already mentioned the food. They were also giving away a nice little prototype board for the 16F8xx series, but unfortunately it was without the chips we've all been dying for (but at least the 16F877 is finally available from DigiKey).

The ICD deserves special mention. This is something which is going to be very useful to us in future projects. It uses some special circuitry built into the new flash-programmable PIC's, the 16F873, 16F874, 16F876, and 16F877. The ICD connects to your project's board via a modular phone cable, which provides power for the ICD, as well as serial communications with the debugging and in-circuit programming pins on the PIC. The ICD is in bidirectional communication with the PIC chip, and uses a single hardware breakpoint register on these new chips. While this is not as flexible as the \$2000 ICE products, it is a vast improvement over what we have now. You lose a couple of pins and 256 bytes of program memory, which is a small price to pay. Expect to see the ICD socket in most future TAPR projects.

If you get the chance to go to a Microchip seminar in your area, we highly recommend it. These guys are really looking to sell some chips, and they don't even care if you are small time like us. The seminar is more than reasonably priced at \$50. If you buy one of their development tools, the PicStart programmer for \$150, or the In-Circuit Debugger for \$130, the seminar is free. The schedule and registration are available on the web site. The summer round will be over by the time you get this, but pay close attention to the Microchip web site (www.microchip.com) for the next round.



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APRS® Microphone Encoder Firmware for the PIC-E

John Hansen, W2FS
john@hansen.net

TAPR's PIC-E is out of beta testing and is now available for general consumption. The PIC-E is a general purpose serial data to packet radio interface that is specifically designed to allow reprogramming by the end user. As of this writing there are five firmware packages posted in the PIC-E software download area (see the link from www.tapr.org/tapr/html/Fpice.html):

- **PICE090.zip** An APRS Microphone Encoder
- **GPS-E-2c.zip** An APRS Microphone Encoder
- **u2k.zip** A Packet Radio Interface for the Peet Brothers Ultimeter 2000.
- **picediag.zip** Diagnostics Program for the PIC-E (described in the PIC-E manual).
- **pktin01.zip** Beta Version of Code to Receive Short Packets

This paper will describe the operational aspects of the first two of these packages. In both cases, these firmware packages were designed to displace the TNC that is often used in mobile APRS installations. In addition, they provide most of the functionality of a MIC-E microphone encoder. If the PIC-E is operating as a stand-alone tracker, it is connected to a GPS unit (any that provides standard NMEA data will do) and to a radio (most likely tuned to 144.39 MHz). It then simply transmits a position report (and optionally a beacon text) at regular intervals. In this way, the PIC-E could be combined with a rudimentary GPS unit and radio (perhaps even crystal-controlled) to provide a very inexpensive (and potentially very small) tracking unit.

Alternatively, a microphone can also be plugged into the PIC-E and it can then be used in pretty much the same way a MIC-E microphone encoder would be used. A position report is transmitted at regular intervals or at the end of a transmission when the user lets up on the microphone PTT button. Presumably this position report is then forwarded from the MIC-E enabled repeater to the standard APRS frequency. In both cases (stand alone tracker or microphone encoder) the firmware transmits compressed position reports to minimize air time.

Design Philosophy

In creating the PIC-E, we wanted to minimize the complexity of the circuit. We managed to reduce the number of chips to just two in an effort to make the project easy to build and inexpensive. Inevitably, this resulted in some compromises. Any APRS packet requires a lot of information to be held in memory. Such items as the station's callsign, path, APRS Icon, beacon text, and various timing parameters all require memory space. The

needed amount of memory space then had to be doubled since we wanted to include at least two independent configurations for the PIC. However, in keeping with our goal of minimizing the parts count, we did not want to have to include an EEPROM chip to store this data. Furthermore, we wanted a unit that would be easy for end users to experiment with and develop new firmware. As a result, we wanted to avoid using any microcontroller that would require special equipment (like an expensive programmer or ultraviolet eraser) to use. These were the reasons that we ended up using the Microchip PIC 16F84 microcontroller. It has 1K of program space, is relatively easy to program and reprogram, has 13 input/output pins, and has 64 bytes of on-board EEPROM storage.

It did not take long for us to realize that the 64 bytes of data storage would be inadequate, even for one configuration, let alone two. Between the station callsign, path, and timing parameters, most of this space would be used up even before we came to the point of considering adding the beacon text. However, we reasoned that it would be possible to use some of the 1K of programming space to store data, but only if it really was very easy to reprogram the unit. This led to a decision to include a PIC programmer on the circuit board itself, so that all a user would have to do to program it would be to use a serial cable to hook it up to his or her computer. Thus when you change the parameters on the PIC-E using either of our firmware packages, you are really reprogramming the program area of the chip, not merely changing the data area. Microchip says that these devices can be successfully reprogrammed at least 1000 times before failure, which we deemed to be adequate for this purpose.

PICE090 and GPS-E-2

From an operational standpoint, the biggest difference between these two programs is that PICE090 provides the user with the absolute maximum in flexibility while the GPS-E-2 targets ease of use as its main goal. To use PICE090, you first change those parameters (callsign, path, etc) that you wish to alter and then use an assembler (MPASM) to recompile the program. You then load the code into the chip using a program like PICPROG or PIX. GPS-E-2, on the other hand, presents you with a standard Windows graphical user interface (GUI) dialog box that allows you to fill in the values you want for the various parameters, and then programs the chip for you. This GUI is both its strength and its weakness. On the one hand, the program is never recompiled, so you don't need MPASM. Nor will most users require a separate program to load the code into the chip. However, because the program is not recompiled, the amount of space devoted to each parameter has a fixed maximum and cannot be changed by the user. For example, GPS-E-2 permits a maximum of only three digipeters in the path

specification and only 50 characters in the beacon text. For most users this will not be an inconvenience. However, if you were to decide that you wanted to include a longer path but use shorter beacons, this would be impossible in GPS-E-2. These types of trade-offs are possible, however, in PICE090. One other advantage of PICE090 is that it can be run under plain DOS, while GPS-E-2 requires either Windows95 or Windows98.

Using PICE090

You will need the PICE090.zip file, the asm22000.zip file, and the picprg06.zip file to use PICE090. Unzip all three of the files (using one directory for all of them is fine). Find the file called OPTIONS.ASM and edit it with an editor such as NotePad. Look for the lines called Option1_Start and Option2_Start. These are used to separate the parameters you will enter for the two different configuration options. The default values for these lines are as follows:

```

Option1_Start
dt D'40' ; number of flags to send auto
dt D'5' ; number of flags to send manual
dt D'0' ; mic-e message
dt '>' ; aprs symbol
dt H'2F' ; aprs symbol table
dt H'0' ; mic-e path
dt D'2' ; auto time in 10 sec (2 = 20 sec)
dt D'1' ; manual time in 10 sec (1 = 10 sec)
dt D'4' ; quiet time in seconds
dt D'3' ; beacon rate (beacon every third)
dt Beacon1_Start - Option1_Start ; beacon offset

dt "N6BG " , D'0' + H'30' ; callsign and digis
dt "WIDE " , D'0' + H'30' ; callsign and digis
dt "WIDE " , D'0' + H'30' ; callsign and digis
dt "WIDE " , D'0' + H'30' ; callsign and digis
dt "WIDE " , D'0' + H'30' ; callsign and digis
dt "WIDE " , D'0' + H'30' ; callsign and digis
dt 0
Beacon1_Start
dt " PIC-E testing byon@iname.com" ; beacon
dt 0
;

ORG Option1_Start + D'120'

Option2_Start
dt D'40' ; number of flags to send auto
dt D'5' ; number of flags to send manual
dt D'0' ; mic-e message
dt '>' ; aprs symbol
dt H'2F' ; aprs symbol table
dt H'0' ; mic-e path
dt D'6' ; auto time in 10 sec (2 = 20 sec)
dt D'4' ; manual time in 10 sec (1 = 10 sec)
dt D'4' ; quiet time in seconds
dt D'3' ; beacon rate (beacon every third)
dt Beacon2_Start - Option2_Start ; beacon offset

dt "N6BG " , D'0' + H'30' ; callsign and digis
dt "WIDE " , D'0' + H'30' ; callsign and digis
dt 0
Beacon2_Start
dt " PIC-E testing" ; beacon
dt 0

```

The first two lines allow you to specify the number of flags that will be sent before the data. This essentially allows you to set the TXDelay. Each flag takes approximately 6.7 ms to transmit so the default value of 40 would result in a TXDelay of approximately 270 ms.

In most TNCs this would correspond to the command TXDelay 27. The default value for the auto setting is significantly higher than the manual setting, because in manual mode it is assumed that there is no transmit/receive turnaround time because you are already transmitting and have just let up on the microphone button.

The next line specifies the Mic-E message. These are taken from the Mic-E manual and are as follows:

MSG	Icon Color	Default Definition
0	normal	Off Duty
1	normal	Enroute
2	normal	In Service
3	normal	Returning
4	dim yellow	Committed
5	Brn yellow	Special
6	dim red	Priority
7	Brn red	Emergency

The next two lines ask you to fill in the symbol for the Icon that you wish to use and whether it comes from the primary or alternate table. The primary table is the default (a hex value of 2F). If you are using an Icon from the alternate table, specify this value as 5C. Here is a listing of the Icons that are currently available. In PICE090, you should fill in the value from the Sym column.

Sym	Hex	Primary Table	Alternate Table
	21	Police, Sheriff	EMERGENCY (!)
*	22	reserved (had been rain)	reserved
#	23	DIGI (white center)	Numbered Star (green)
\$	24	PHONE	Bank or ATM (green box)
%	25	DX CLUSTER	
&	26	HF GATEway	numbered Diamond
'	27	Small Aircraft (SSID = 7)	Crash site
(28	CLOUDY	CLOUDY
)	29	avail (Mic moved to m)	
*	2A	SnowMobile	SNOW
+	2B	Red Cross	Church
,	2C	Boy Scouts	Girl Scouts
-	2D	House QTH (VHF)	House (HF)
.	2E	X	Vicinity Ambiguous Plot(new)
/	2F	Dot	
0	30	Numeral circle	A0# Numbered Circle
1	31	Numeral circle	A1
2	32	Numeral circle	A2
3	33	Numeral circle	A3
4	34	Numeral circle	A4
5	35	Numeral circle	A5
6	36	Numeral circle	A6
7	37	Numeral circle	A7
8	38	Numeral circle	A8
9	39	Numeral circle	A9 Gas Station (blue pump)
:	3A	FIRE	Hall
;	3B	Campground	Park/Picnic area
<	3C	Motorcycle(SSID = 10)	ADVISORY
=	3D	RAILROAD ENGINE	
>	3E	CAR (SSID = 9)	NUMBERED CAR
?	3F	SERVER for Files	INFO Kiosk (Blue box with ?)
@	40	HC Future predict (dot)	Hurricane/Trop-Storm
A	41	Aid Station	# NUMBERED BOX
B	42	BBS	Blowing Snow
C	43	Canoe	Coast Guard

D	44	Drizzle	
E	45	EYEBALL (Eye catcher)	Smoke
F	46		Freezing rain
G	47	Grid Square (6 digit)	Snow Shower
H	48	HOTEL (blue bed symbol)	Haze
I	49	Tcp-IP	Rain Shower
J	4A		Lightening
K	4B	School	Kenwood
L	4C	avall	Lighthouse
M	4D	MacAPRS	
N	4E	NTS Station	Navigation Buoy
O	4F	BALLOON(SSID = 11)	
P	50	Police	Parking
Q	51	TBD	QUAKE
R	52	Rec. Vehicle (SSID=13)	Restaurant
S	53	SHUTTLE	Satellite/Pacsat
T	54	SSTV	Thunderstorm
U	55	BUS (SSID = 2)	SUNNY
V	56	ATV	VORTAC Nav Aid
W	57	National WX Service	Numbered NWS site (NWS options)
X	58	HELO (SSID = 6)	Pharmacy Rx
Y	59	YACHT (sail) (SSID = 5)	
Z	5A	WinAPRS	
[5B	Jogger	Wall Cloud
\	5C	TRIANGLE (DF)	
]	5D	PBBS	
^	5E	LARGE AIRCRAFT	# Numbered Aircraft
-	5F	WEATHER Station (blue)	Numbered WX site (green digi)
.	60	Antenna	Rain
a	61	AMBULANCE (SSID = 1)	ARRL ARES etc
b	62	BIKE (SSID = 4)	Blowing Dust/Sand
c	63	ibid	Numbered Civil Defense (RACES)
d	64	Dual Garage (Fire dept)	DX spot by callsign
e	65	HORSE (equestrian)	Sleet
f	66	FIRE TRUCK (SSID = 3)	Funnel Cloud
g	67	Glider	Gale Flags
h	68	HOSPITAL	HAM store
i	69	IOTA (islands on the air)	Indoor BOXn digipeater (w/overlay)
j	6A	JEEP (SSID=12)	WorkZone (Steam Shovel)
k	6B	TRUCK (SSID = 14)	
l	6C	avall	Area Locations (box,circles,etc)
m	6D	Mic-Repeater	Value Signpost (3 digit display)
n	6E	Node	# Numbered Triangle
o	6F	EOC	small circle
p	70	ROVER (puppy)	Partly Cloudy
q	71	GRID SQ shown above 128 m	
r	72	ANTENNA	Restrooms
s	73	SHIP (pwr boat)(SSID=8)	# Numbered Ship/boat (top view)
t	74	TRUCK STOP	Tornado
u	75	TRUCK (18 wheeler)	# Numbered Truck
v	76	VAN (SSID = 15)	# Numbered Van
w	77	WATER station	Flooding
x	78	xAPRS (Unix)	
y	79	YAGI @ QTH	
z	7A		
{	7B		Fog
	7C	reserved (Stream Switch)	
}	7D		
-	7E	reserved (Stream Switch)	

In the next line you specify the Mic-E path. This is not the same as the digipeater path (e.g. Relay, Wide, Wide) that you would normally expect to see. The APRS path is documented in the Mic-E protocol document. It is our understanding that this is little used and can be safely left at 0.

The following three lines specify timing parameters. Auto time is the time between transmissions in automatic mode. When the switch SW2 is set to "auto," the unit will automatically transmit a position report every so often. This interval is the amount of time specified in the auto time line. A value of 2 in this line corresponds to 20 seconds. The next line does the same thing, but it corresponds to an SW2 setting of manual. In manual mode, the PIC-E does not send a position report at the end of every transmission. If that were the case several quick transmissions would each have their own position report appended to them. Instead, it waits until the first time the mic button is released after the amount of time specified in manual time line has passed. Again, a value of 2 would correspond to 20 seconds.

The PIC-E is capable of detecting when the frequency is in use and avoids transmitting when it would step on someone else's transmission. So, for example, in automatic mode, even when the appropriate length of time between transmissions has elapsed, it will not transmit if the frequency is in use. However, you might not want it to send immediately after the frequency has been cleared, because this may simply be a pause in between transmissions by two stations on frequency. So, if you like, you may specify an additional amount of time (in seconds) that the PIC-E should wait before transmitting if it initially detected a busy frequency. This is known as the "quiet time." The beacon rate in the next line simply specifies how frequently the beacon text should be transmitted. A three, for example, specifies that the beacon text should only be transmitted every third transmission.

The lines labeled "callsign and digi" allow you to specify your callsign and the path to be used. Your callsign goes first. Notice in the sample there are two blank spaces in the quotation marks following the callsign N6BG. This is essential. The callsign must be exactly 6 characters long, so if your callsign is shorter than 6, pad it with spaces to make sure that there are enough. The entry after the D' is where the SSID is placed. A digipeater path (up to 8) can be added on lines following the line that contains the station callsign. Digipeaters are entered using the same syntax as the station callsign. Make sure the line "DT 0" is left at the end of your list of digipeaters. One line is then added at the bottom for the beacon text. Put it in quotations and follow the general pattern that is used in the sample value. Follow this line with another DT 0 line (as shown).

KISS Is Ultra Simple

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If anyone is interested in sending frames to a KISS device here is a super easy snippet of code I whipped up:

```
/* KISS Escape (and trap =) Characters */
#define FEND      0xc0
#define FESC      0xdb
#define TFEND     0xdc
#define TFESC     0xdd

void SendByte(byte data)
{
/* Check to see if the character needs to be escaped -
per KISS spec*/

switch(data)
{
case FEND:
printf("%tc",FESC,TFEND);
case FESC:
printf("%tc",FESC,TFESC);
default:
putchar(data);
/* doesn't need to be escaped */
}
}

void SendPacket(void)
{
byte i,j;

putchar(FEND); /* Start KISS frame */
putchar(0); /* Data frame on port 0 */

for (i = 0 ; i < SPACKET_LENGTH ; i++)
/* do ... while != 0x00 would probably be okay */
{
/* grab the packet out of EEPROM */
SendByte(read_eeprom(i));
}

putchar(FEND); /* End KISS frame */
}
```

You can just plug a KPC-9612 or whatever onto the PIC-E and fire away. The CRC is handled on the the TNC, so that doesn't even need to be worried about. I'm working on code for receiving AX.25 frames right now - the KISS TNC makes a nice interface because I don't need to figure out the MX614 receive hardware in order to get some useful debugging done.

First Impressions on Rand McNally GPS Receiver

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I tried out the Rand McNally GPS receiver yesterday with my Palm V and two software packages - pocketAPRS and GPSpilot's Atlas. This is my first GPS receiver, so I don't have much of a baseline for comparisons.

The RandMcNally unit comes with their road atlas software for \$99 or \$79 for just the receiver, so we're talking simple, cheap, but works here. There is no on/off switch, you are supposed to plug the DB9 connector into your laptop and the PS/2 cable into the mouse port for +5 VDC power. I have not checked if power can be applied on the DB9 connector.

The case is the size of a large mouse and appears to be weather or spill-resistant (the only hole is on the bottom for the data/power cable). The bottom has four small feet that have enough friction for the unit to sit on the dash against the windshield or the rear shelf. The data cable is 6 feet long, the power cable comes off the back of the DB9 and is about 2 ft long.

I made up a battery pack using 4 AA cells and a PS/2 female jack so I can use it as a tracker or with my Palm Pilot. Current draw is 105 mA @ 6V; A slightly used set of Duracell's was down to 4.5 V open-circuit and could not power the GPS after 12 - 16 hours (I don't know precisely when it quit). There is no user-accessible "sleep" mode. A simple 12v-5Vdc regulator circuit would allow powering from the car battery or from a TNC.

The unit seems to take about 2-5 minutes to get a good position (maybe less, I'm new to this; it did recover pretty quickly when I had to sit under a metal roof at the gas station for a fill-up) based on the output of Atlas or pocketAPRS. This causes a problem with pocketAPRS — it sends alarms when GPS lock is lost and the alarms overflowed a buffer and crashed the software several times. Four to six satellites were usually being received, occasionally 3 (once only 2) and as many as 8. I've no idea what this says about the number of real channels in the receiver.

Output is NMEA at 4800 bps, 8,1,N. PocketAPRS is quite happy with it and I was able to drive around Herndon VA and from Herndon to Germantown MD and watch my car crawl around the map. Now I just have to find or figure out how to create and load better maps! Next step is connecting it to my KPC3 for APRS tracking.

I can already tell finding a way to safely mount the Palm in the car is going to be IMPORTANT! The serial connector is not THAT rugged, and I don't want to get into an accident!

My impression is that this receiver shows real potential as a cheap tracker or entry-level Tripmate/Eathmate alternative. I'm also going to try it with other software for my Pilot; based on product reviews, Macrosoft's QuoVadis looks promising.

GPS-E-2 and Kantronics TNCs

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Some weeks (or was it months?) ago it was reported to me that GPS-E-2 was not working reliably with Kantronics TNCs. The Kantronics TNCs simply weren't reliably decoding PIC-E packets sent with my firmware. I spent some time trying to debug this problem but it was difficult because I didn't own a Kantronics TNC myself. At a Hamfest I attended the end of last month I found a KPC-3 for \$50 and bought it. I was then able to confirm that there in fact was a problem and that Kantronics equipment did not decode my packets very well, if at all. This was puzzling to me since my MFJ TNC decoded them fine.

In the intervening weeks I've spent an awful lot of time trying to find a solution to this problem. I assumed that it stemmed from the timing tolerances of the Kantronics being tighter than the MFJ. As a result I've spent massive amounts of time trying to "tune" the timing algorithms in the gpse.hex file. As it turns out, I was barking up the wrong tree. Tonight, for some odd reason (I can't even remember why) I increased the number of flags at the end of the packet from 1 to 2. The AX.25 docs say 1 is fine and, in fact, you can even end one packet and start the next with the same flag. This may be true, but all I know is that when I upped the flag count from 1 to 2, I started getting rock solid copy on the KPC-3. Rather than pursue the reason for this further, I've decided to simply declare victory and leave the 2nd flag in there.

I mention this since many of you are developing your own firmware for the PIC-E, you might want to seriously consider ending each packet with 2 flags rather than 1.

If you have been using the GPS-E-2 firmware, please download the GPS-E-2b.zip file. It contains the updated software. The only other change that I've made is to alter the default icon from a bicycle (62h) to a car (3Eh). Drop me a note and let me know how this round of software works for you.

Thanks and sorry this fix took so long.

APRS ICQserve

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I have put together a webpage with instructions and an up-to-date listing of the registered users of the APRS ICQserve by Tom NY4I. It's located at www.qsl.net/wb8tif/icqserv.htm and it can also be accessed via my APRS webpage at www.qsl.net/wb8tif/. This list will be kept updated.

METCON Update

Paul Benjamin Newland, AD7I
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The METCON team has been making good progress. We are just about ready to release Beta kits to those patient souls who have been waiting for quite some time.

At this point, we have ROMed code that implements the functions of the old METCON-1 system, as well as a few new functions. A draft set of documentation (all except the construction manual) have been posted to the beta testers web site (email me if you just gotta have the URL). This documentation includes schematics, circuit descriptions, hex code, data sheets for components used in the device, etc.

The code has been through a "system test" where the device is operationally checked against the documentation. Because of this effort we hope that the beta testers will find few, if any, problems with the code.

I'd like to thank everyone on the METCON team for their help and assistance with this project. And I'd also like to thank the beta testers and others who have been waiting patiently for this device to be made available.

***Connect Request

Request For Home Brew PIC Programmer

Our Port Elizabeth Amateur Radio Society (PEARS) intend to start a PIC user group. We are total novices and are looking for circuit diagrams to construct a PIC programmer.

-Neil Thomas, ZR2NT

I have been playing around in designing home brew PIC programmers for some time. In the process, I have gathered lots of images of schematics for various serial and parallel PIC programmer hardware designs (typically for 16F84). I found these useful in learning how to build a PIC programmer, and others may too. I have uploaded them to www.byonics.com/pic/picprogimg.zip (464K).

The zip file mostly only contains schematic images. I still have the documentation for most of these on my computer, so if any of the schematics interest you, and you are not able to find them in greater detail on the net, let me know and I'll send you what I have.

My first PIC programmer was a David Tait style one, which I modified (both hardware and software) to allow me to also use it to power and run my projects. This allows me to erase, program, run and stop the device, in circuit, all from the keyboard! Very handy, and leads to rapid turnaround time!

-Byon Garrabrant, N6BG, byon@mail.com

Linux APRS Digipeater 2.0

Alan Crosswell, N2YGK
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Announcing N2YGK's Linux aprsdigi-2.0.

Several hams have been using my original Linux APRS(tm) digipeater, aprsdigi, for a couple of years now. It was found in the arpsmon.zip package (don't ask) on ftp.tapr.org. Release 2.0 of this advanced APRS digipeater is now available for free under the terms of the GNU Public License (GPL) at:
www.users.cloud9.net/~alan/ham/aprs/.

Major features of this release of aprsdigi:

- MYCALL substitution.
- WIDE, WIDEn-n, TRACE, and TRACEn-n.
- As many radio interfaces as you can plug into your Linux machine with flexible gatewaying between them.
- Special handling for Mic-Encoder, Kenwood TH-D7, and TheNet X1J4, including SSID-based digipeating.
- Suppression of duplicate and looping packets.
- Works with Linux 2.2 kernel AX.25 network stack. This means any AX.25 interface supported by the kernel will work, not just a TNC2 clone. Examples include all the BAYCOM interfaces (BAYPAC, PICPAR, PICSER, etc.), soundcards, 8530 SCC cards, etc.

This distribution also includes an updated version of arpsmon, but, unless you require support for other than a TNC-2, I recommend using WA4DSY's aprsd instead.

New Version of aprsd Linux APRS Internet Server Available

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www.wa4dsy.ampr.org

I have made a number of changes and bug fixes to aprsd for Linux and have posted the file on ftp.tapr.org in the aprsig/linux section.

The file is aprsd210.tar.gz

It's also available at:
www.wa4dsy.radio.org/Files/aprsd210.tar.gz

This is a very worthwhile upgrade which fixes several irritating bugs and adds several new features.

Below is a segment of the README file which lists the changes.

REVISIONS: aprsd 2.1.0 6-22-1999

- 1) Fixed the code so it runs properly as a daemon.
See added function "daemonInit()" in aprsd.cpp.
Also modified aprsd.init.
To run as a daemon enter: ./aprsd -d
To run as a program enter: ./aprsd
- 2) Added logic to handle MD5 password encryption in the validate module. Now it works with RedHat 6.0 shadowed MD5 passwords.
- 3) Added "#include.h" statements in history.cpp and aprsd.cpp. Now it now compiles under RedHat 6.0.
- 4) Changed logic so messages sent on RF also are sent to other Internet users. I needed to do this so messages to wild card groups such as "SCOUTS" go both to RF and the remainder of the users and igates.
- 5) New Feature: The server now responds to the "?IGATE?" query.
- 6) New Feature: You can put system abusers in the "user.deny" file and deny access to RF or prevent them from logging on.
- 7) New Feature: You can configure the server to ignore packets which were transmitted from your own TNC. The previous versions always igated your own TNCs packets. Use the command line "igateMyCall no" in aprsd.conf to turn off igateing of your own TNCs packets.
- 8) Fixed bug that caused the history list dump to abort and disconnect user after about 700 items had been sent.
- 9) Fixed two bugs in aprsString and raw-user send code. Now mic_e packets come out in raw format on port 14580.
- 10) Changed the servers status messages to the new format. eg: "aprsdATLAPRS,TCPIP*::USERLIST :Verified user W4HAM has logged on." Note the extra colon after TCPIP* and the lack of a message number on the end to indicate we don't expect an ack.
- 11) Fixed speed related problem in SendToAllClients() function that caused overflows of the Internet send queue. The server can now handle many more users at higher data rates.
- 12) Added command "TncPktSpacing" to the aprsd.conf file. This command takes one parameter which is the number of milliseconds between packets sent to the TNC. Queued packets to be transmitted will be spaced out at least by this number of milliseconds. The default is 1500 (1.5 seconds).

PocketAPRS v1.00 Released

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After a year of development, Version 1.00 of pocketAPRS - APRS for the 3Com Palm Connected Organizer - is now available on the TAPR FTP server. This application incorporates most of the popular features of the APRS programs which run on conventional desktop computer systems, yet it runs on a device that truly fits in a shirt pocket.

Features added since the previous mention in the *Packet Status Register* include:

- Extensive RDF (radio direction finding) functions
- Numerous changes to settings dialogs for improved organization
- "No digipeat" notification alarm
- Full support of GPSxyz tracker format
- On-screen retry counter for messages
- Completion of object data entry dialog
- Station list function popup
- Object/station information display screen
- Object editing
- Proximity and movement alarms
- Smoother interface response in several areas
- Fixes for several bugs and operational inconsistencies

A specific feature set planned for but not released with this new version is map text labels. It was discovered late in the process that the label functions were flawed, so in lieu of risking frequent operation problems the label features were temporarily disabled. This feature will hopefully be fixed and enabled by the time you read this.

Like its "big brothers," pocketAPRS is shareware, and registration enables retention of user settings between program activations. Registration is \$40, and registration information is contained in the README.TXT file included with the downloadable binary.

The latest version of pocketAPRS is located at:

<ftp://ftp.tapr.org/aprssi/palmstuff/palmaps/PCKTAPRS.ZIP>

Also, general information, screen shots, FAQ's and a map index for pocketAPRS can be found at:

www.anet-stl.com/~mcmusick

Maps for pocketAPRS

At this writing, maps were still being generated to meet specific user requests. The limitation to local area coverage (80-mile squares) remains, but this should be remedied shortly with conversion software for at least APRSdos maps, plus possible conversion of large-scale government geodata sources.

Check the WWW page mentioned above for a map index, or download:

<ftp://ftp.tapr.org/aprssi/palmstuff/palmaps/MAPINDEX.TXT>

X-APRS Alpha Version Released

Mark Sproul
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An Alpha (preliminary) version of APRS for X-Windows is now available. I have placed a TAR file for X-APRS up on

<ftp://aprs.rutgers.edu/pub/hamradio/APRS/Xaprs/>

It is a 9 meg file, it has several maps but not a lot. You can add standard WinAPRS maps to the MAPS directory. Currently the libraries are statically linked, this makes it larger than it needs to be.

It requires LesTif

X-APRS version 0.0.1 ALPHA June 30, 1999

The following items are working:

- WinAPRS format maps
- TCP/IP connection to APRServe
- List Windows HOWEVER, these open up as small windows and must be enlarged manually
- Airport display
- Zipcode display
- CAP grids
- Click and drag with the RIGHT mouse button to zoom
- +/- key for zoom in/out

Not Working:

- No Icons
- No serial I/O
- No double clicking
- No Dos maps
- No Image support

Please do not report things that are not working, there are LOTS of things not finished yet

What I need to know:

- Does it work under RedHat Linux 6.0
- Does it work under Other PC-unix flavors such as FREE-BSD
- If it crashes

ACE: A Version of APRS for Windows CE

Rob Wilner, KZSRW
rmw@rwa-inc.com

Several weeks before the 1999 Dayton Hamvention, I dusted off the idea of writing a version of APRS for a relatively new computer platform. Previously, I had started to write a version of APRS for the Apple Newton handheld, but the untimely demise of that platform led me to realize that a Newton software product had a very limited future.

Windows CE (WinCE), on the other hand, has been upgraded and enhanced several times since its initial release, and has since become a relatively stable and feature-rich platform for portable computing devices. There is a wide variety of WinCE-based hardware on the market today, and I've been very impressed with the latest round of subnotebook-style handheld PC (H/PC) Pro's, color palm-size PC's (P/PC), and the auto PC.

I had started thinking about writing a version of APRS to run on WinCE about the time that the APRS authors gathered together to work out the details of the APRS Working Group and the APRS Certification Program.

Around the first of May 1999, I jumped into development with both feet, setting my sights on being able to display maps and display received position reports by the time I had arrived at Dayton. This proved to be a bit too aggressive for my current schedule, but I did have the opportunity at Dayton to talk about what I was doing with the other APRS authors, and some of the TAPR board members. I am grateful for all of their support, and am looking forward to working with all of them as development progresses.

The final name for the software hasn't been decided yet, but for now its code name is ACE. (ACE stands for anything you'd like it to stand for, e.g. A CE Endeavor.) The weekend following Dayton '99, it was able to read and display all WinAPRS/MacAPRS format maps (Tiger, DCW, WUZZ), in full color on color-capable devices. It could also read and display maps in pocketAPRS format. (If only I had started a week earlier!) DOS APRS format support will be completed shortly. As of this writing, it can now read and display APRS position, weather, and status reports from a connected TNC and display them on the currently loaded map. If development keeps progressing at this rate, I should have a publicly-available beta in early July 1999.

The following is a high-level list of features and goals that I have for an initial release of ACE. My e-mail address is rmw@rwa-inc.com and I welcome all comments, suggestions, and wish lists.

Overall

- APRS Certification (when available)
- TCP/IP connection support, to connect to APRServe

Maps

- Support for WinAPRS/MacAPRS format maps
- Support for pocketAPRS maps
- Support for DOS APRS maps
- Color support for maps, or appropriate monochrome mapping on monochrome devices
- Support for variable magnification from viewing the entire globe at once to 1 pixel = 1/1000th of an arcsecond (1 pixel = 1 inch at the equator)
- Display of all received stations with appropriate icons on maps
- Overlay support (Digipeater lists, grid squares, etc.)

Messages

- Support for APRS-style messages with acknowledgement
- Support for auto-reply messages
- Support for APRS bulletins
- Possible support for reverse-path messaging

TNC's, GPS's, and Position Reporting

- Ability to decode all valid APRS packets on the air
- Support for any TNC-2 or AEA compatible TNC
- Support for multiple serial ports (TNC and GPS simultaneously)
- Support for TNCs with second serial ports, for GPS data passthrough
- Support for direct GPS input, to allow program to be used without a TNC
- Dead-reckoning for use with non-GPS-equipped mobile units
- Track history plotting for mobile stations

Weather

- Support for display of weather data from stations, both on the map and on a station detail screen
- Support for display and notification of weather advisories, watches, and warnings

DF and PHG

- Support for DF coverage circles and vectors on the map
- Support for PHG coverage circles on the map

The screenshots from the current alpha version of ACE are from Davie County, NC, Eastern Canada, and the Keys, Florida. *[The original images before publication were in full color.]*

I hope I've piqued your interest in trying out this new version of APRS as soon as it's available, as well as trying out the other excellent versions of APRS for DOS, Windows, Macintosh, and PalmOS, if you haven't already.

Don't let the idea of buying a CE device scare you off, I've recently seen some very compact, 8MB, backlit, grayscale P/PC's selling for as little as \$99!

Hope to see you on the map!

APRS is a trademark of Bob Bruninga. Windows CE is a trademark of Microsoft. Newton is a trademark of Apple Computer, Inc. All other trademarks are property of their respective owners.



Garmin GPS20/25 mods

Steve Bragg, KA9MVA
steveb@skymaster.c2-tech.com

Harry Mueller KC5TRB and I have been working on preamp modifications for the Garmin GPS20/GPS25s. Harry took extensive pictures and notes of the modifications, and documented them:

www.webzone.net/harrym/gps/gpsmod.html

Harry doesn't subscribe to the SIG, but asked me to pass the URL along. I applaud his efforts and tried to give him every assistance, because if there's one thing I hate it's the GPS unlocking on my tracker!

APRS Coming Attraction: XMLserve

Steve Dinac, K4HG
s4hg@TAPR.ORG

My internet APRS server, APRServe, has been successful beyond my wildest dreams. In the last two years, there have been more than a quarter million page-views of the java and MapBlast pages displaying the data on the web, and over 100,000 connections from client programs like Mac/WinAPRS and APRS+SA. On a typical day, more than 2000 APRS stations can be viewed on the APRServe network.

Despite this success, APRServe is limited in two significant ways. First, the data is served in the raw form as it comes out of TNCs. This means any program that wishes to process the data must deal with the full complexity of the APRS protocol. This is a significant stumbling block to new applications. Second, the HTML of the MapBlast interface is coded into the program. Therefore there can only be a single page for all users, and to change it means recompiling and rebooting the servers.

My latest project, XMLserve, addresses these problems. As the XML in the name suggests, the data is returned as an XML document. If you have not heard of XML, you will, it is expected to be the NextBigThing on the Web. Currently web pages are written in Hypertext Markup Language, or HTML. This is a subset of the Standardized General Markup Language, or SGML. HTML was designed to be a very limited subset of SGML, optimized for display in a browser. A big drawback of HTML is that it is not extensible. There is no way for a web author to identify what part of a document is significant data. This limits the automatic processing that can be done on web data.

XML stands for eXtensible Markup Language, which is a more powerful subset of SGML than HTML. With XML, an author can identify specific data within a web document. In turn, this makes processing the document easier, and promises much greater interoperability of web-based systems in the future. A full discussion of XML is far beyond this short article, a good place to start for more information is www.xml.com

XMLserve will listen to the APRServe data stream, and maintain a database of every packet on the network. By itself this archive will be a valuable contribution to the APRS community, as many significant events are lost because no permanent database is maintained. A user will be able to query the database to obtain data of interest. The data will be returned in XML, which will be useable in a web template for direct display, can be imported directly into many programs (Office 2000 supports XML, for example), or imported into a user's program. By developing different web page templates, a user could, for

example, be able to produce web pages that display their location with customized text and links, graphically display weather information, or show current message traffic. Source code for an XML parser will be released as open source to facilitate the development of user applications.

It is important to remember that XMLserve is an enabling technology. It will do almost nothing on its own. It is up to YOU to think of things that it can be used for.

DSP FTP Area is Reorganized

Tim Biggett, AASDP
TBeggood@AustinTX.net

If you have web pages with links to files in the TAPR DSP FTP area, you will probably have to adjust them as the new organized TAPR DSP FTP area is now in place. It took quite a bit of work, as I wasn't familiar with half the code in there. In fact, I'm not sure I'm even familiar with much more than that now!

The good news is recent uploads is gone, and never to return. I'll accept 100 lashing for being negligent and inane in creating it in the first place. It was never meant to be a permanent home to downloads.

In addition to the reorganization, I tried to include a README file for each directory that will contain a list of files found within that directory complete with a rough description. To continue along these same lines, please be sure to include a short .txt document containing a description of any files you upload. Also, when uploading files to the dsp/upload directory, send an email to aasdp@tapr.org to alert me to the fact I need to move a file to it's appropriate home.

The reorganized FTP area hierarchy is based on the DSP hardware. In this way, if you are looking for files for a particular DSP, you can easily find them by just knowing what DSP you are interested in. The first level directories are the major DSP manufacturers: Texas Instruments, Motorola, Analog Devices, etc. There is also a general first level directory for general DSP stuff, such as tutorials, simulation tools, etc.

Once you are inside the appropriate manufacturer's directory, it breaks down according to the particular DSP, and DSP boxes.

These are the first level directories:

Analog-Devices:

Contains DSP tools, source code, etc., for Analog Devices DSP-based boards, including PSA Sound Cards, and Share EZ Kits.

DSP Tools:

software and documents for DSP in general. Files are not for any specific DSP platform.

Motorola:

Contains DSP tools, source code, etc., for Motorola DSP-based boards including Alef Null's DSP-CARDS, and the Motorola DSP56002EVM.

Texas Instruments:

Contains DSP tools, source code, etc., for TI DSP-based boards, including the TAPR/AMSAT DSP-93, and TI DSP Starter Kits (DSK).

mail_archive:

Contains mail archives from the TAPR DSP SIG Mailing list.

upload:

For incoming file uploads. Email aa5df@tapr.org after uploading.

Here is a detailed list of the directory structure:

dsp
 dsp/upload
 dsp/Analog_Devices
 dsp/Analog_Devices/psa_sound_card
 dsp/Analog_Devices/Sharc
 dsp/DSP_Tools
 dsp/mail_archive
 dsp/Motorola
 dsp/Motorola/dsp56000
 dsp/Motorola/dsp56001
 dsp/Motorola/dsp56001/dsp-12
 dsp/Motorola/dsp56001/dsp_card_3
 dsp/Motorola/dsp56001/dsp_card_4
 dsp/Motorola/dsp56001/dsp2232
 dsp/Motorola/dsp56002
 dsp/Motorola/dsp56002/evm56k
 dsp/Motorola/dsp56002/evm56k/ca2aru
 dsp/Motorola/dsp56002/evm56k/kc7ww
 dsp/Motorola/dsp56002/evm56k/motorola
 dsp/Motorola/dsp56002/evm56k/motorola/schematics
 dsp/Motorola/dsp56002/evm56k/TAPR_evmri
 dsp/Motorola/dsp56002/evm56k/coherent_bpsk
 dsp/Texas_Instruments
 dsp/Texas_Instruments/tms320c10
 dsp/Texas_Instruments/tms320c10/dalanco-spry
 dsp/Texas_Instruments/tms320c10/dsp1
 dsp/Texas_Instruments/tms320c10/dsp1/disk5
 dsp/Texas_Instruments/tms320c10/dsp1/disk10
 dsp/Texas_Instruments/tms320c10/dsp1/disk11
 dsp/Texas_Instruments/tms320c10/dsp1/disk12
 dsp/Texas_Instruments/tms320c10/dsp1/disk2
 dsp/Texas_Instruments/tms320c10/dsp1/disk3
 dsp/Texas_Instruments/tms320c10/dsp1/disk4

dsp/Texas_Instruments/tms320c10/dsp1/disk1
 dsp/Texas_Instruments/tms320c10/dsp1/disk6
 dsp/Texas_Instruments/tms320c10/dsp1/disk7
 dsp/Texas_Instruments/tms320c10/dsp1/disk8
 dsp/Texas_Instruments/tms320c10/dsp1/disk9
 dsp/Texas_Instruments/tms320c10/dsp1/diskidx
 dsp/Texas_Instruments/tms320c10/w9gr
 dsp/Texas_Instruments/tms320c26
 dsp/Texas_Instruments/tms320c26/c26_dsk
 dsp/Texas_Instruments/tms320c50
 dsp/Texas_Instruments/tms320c50/c5x_dsk
 dsp/Texas_Instruments/dsp93
 dsp/Texas_Instruments/dsp93/Paccomm_eproms
 dsp/Texas_Instruments/dsp93/manuals
 dsp/Texas_Instruments/dsp93/simulators
 dsp/Texas_Instruments/dsp93/dsp93_eproms
 dsp/Texas_Instruments/dsp93/util
 dsp/Texas_Instruments/dsp93/util/JPEGview_files
 dsp/Texas_Instruments/dsp93/software
 dsp/Texas_Instruments/dsp93/software/linux
 dsp/Texas_Instruments/dsp93/diskettes
 dsp/Texas_Instruments/dsp93/schems
 dsp/Texas_Instruments/dsp93/updates
 dsp/Texas_Instruments/dsp93/upload
 dsp/Texas_Instruments/dsp93/stlouis.wrksph.95
 dsp/Texas_Instruments/dsp93/source

SK: Ray Petit, W7GHM, CLOVER Inventor

[From ARRL Headquarters]

CLOVER inventor Ray Petit, W7GHM, died June 13, 1999, at his home in Oak Harbor, Washington. He was 55. According to his close friend Ed Bixby, AK0X, Petit suffered a stroke in early March caused by a brain tumor that left him mostly paralyzed. Continuing growth of the tumor resulted in additional strokes that finally took his life.

CLOVER is a digital communications protocol designed for use on the HF bands that's found wide application in commercial and amateur communication.

Petit was well-known and respected within the Amateur Radio digital community. "Ray was a real gentleman and he will be missed," said *QST* Digital Dimensions Editor Stan Horzempa, WA1LOU. An ARRL member for more than 27 years, Petit had authored several articles for *QST* and *QEX* on CLOVER and coherent CW, among other topics.

Petit is survived by his wife, Joyce, two brothers and a sister.

Petition to Prohibit Data Transmissions on VHF

Steve Dimac, N4IIG
Greg Jenks, WD5IVD

[Edited for publication from messages posted on the Special Interest Group mailing lists.]

The FCC has assigned RM-9673 to a petition by the Central States VHF Society (CSVHFS) seeking generally more restrictive regulation of the modes used by amateurs in the 6 m, 2 m, 1.25 m, and 70 cm bands. The proposal is to eliminate all data from 50.1-54.0 and 144.1-148 MHz! What the text discussion implies and the actual proposed changes in Appendix A say are different.

According to Bill Tynan, W3XO, Chairman Government Liaison Committee for the Central States VHF Society, this restriction on data transmissions was not what was intended. The intent was to prohibit wide-band emissions on the lower end of the VHF and UHF bands.

Regardless of their intentions and any possible error, there IS a proposal now before the FCC that would eliminate data from all but a tiny segment of the 2 meter and 6 meter bands.

If all they were asking for is protection in the 50.1 to 50.3 and 144.1 to 144.3 segments, I could support it. However, they also explicitly wish to eliminate all test activity below 222 MHz, which is something I cannot support. The ability to experiment is central to amateur radio, and that ability must be maintained.

Steve is correct. This is a very important PRM to read, consider, and comment on.

I have placed the pdf file in question, in my web area for easier access
www.tapr.org/~wd5ivd/RM-9673.pdf
I urge all of you to read it.

This has been in the works for some time now and is actually an offshoot of the Spread Spectrum rule making that TAPR has been pushing. I was aware that Bill Tynan was working on this over a year ago. There are two major sides to this. The NPRM reflects the side that basically wants band segment plans defined in the rules and the other side feels that we can't limit the nature of operations on the amateur bands so as to allow the most utilization of the spectrum as possible now and in the future, since technology and people who use it change with time. Once something gets into the rules, the spectrum is stuck. Once the spectrum is locked in place, we lose one of the greatest advantages of amateur radio, that

of large segments of contiguous spectrum. If we continue to further segment our own spectrum, we only further reduce the usage on these segments and make it easier for someone to say that our bands are underutilized and therefore they should be placed into the commercial sector. A very difficult position which we would be hard pressed to defend.

This is a VERY DANGEROUS slope we face if the FCC goes ahead with this NPRM. Bandwidth in the amateur radio bands must remain open to its usage and not be further segmented within the community. There are already rules in the regulations that keep people from interfering with each other, and trying to set up band plans in Part 97 is a big mistake and will impact amateur radio very negatively for a long time (maybe even permanently).

This seems all very harmless and might look like something many of you can support, but the down side that isn't explained is that once rules get enacted in Part 97 it literally takes many years to get something changed again. Take the Spread Spectrum rule making TAPR started to work on in 1994 (yes 94). Here it is 5+ years later and the FCC has the basic wording defined, but it still sits someplace waiting to finally get put before the commissioners to get signed. Until these rules do get signed we are still burdened with SS rules written in the early 80's (approaching 20 years old). This could easily happen with this PRM. It might pass and in ten years we might need to be operating different modes, which would not be acceptable with the rules changes suggested in this PRM.

The basic premise is that the amateur radio bands should be non-restrictive so that the spectrum benefits the most people. Hams should be trained well enough to know where they should operate to be in good amateur radio operating practice. While there are some that ignore good practice and operate where they want, creating additional rules in the Part 97 will not stop these poor operators, but it will impact those of us that do follow the rules and amateur radio as a whole in order to benefit a specific sub-group within our hobby.

[By the time this is published, the initial comment period will have closed (July 28th). Watch the SIGs and bulletin boards for additional opportunities to act on this issue.]

New TAPR Kits

EasyTrak

TAPR has embarked upon a new project called EasyTrak that is presently in the prototyping stage. EasyTrak is an antenna rotor controller interface between a computer running a satellite tracking program, such as WiSP or Nova, and the Yeasu G5400B or G5500 azimuth and elevation rotors. It functions as the interface circuitry between a computer serial port and the Yeasu rotor controller and will use the EasyComm protocol. It is not a stand-alone tracking device like the AMSAT/TAPR TrakBox. The prototype was displayed at the Dayton Hamvention this year and hopes to move into beta production late this year. As always, stay tuned to the TAPR home page for news and announcements.

APRS 1-Wire Weather Station

Another new project is an APRS compatible weather station. Dallas Semiconductor (<http://www.dalsemi.com>) created a weather station to demonstrate their line of 1-wire semiconductor devices. It consists of an anemometer, wind vane, and temperature sensor. Out of the box, the demonstration kit connects to a computer via a serial port adapter. A stand-alone controller is being designed to replace the serial port adapter to receive weather data and format it as APRS formatted packets. The project is still in the prototyping stages and hopes to enter beta stage late this year. Stay tuned to the TAPR home page for news and announcements.

PIC-E Update

The TAPR PIC-Encoder completed a successful evaluation stage. Fifty evaluation units were sold and changes and lessons learned were incorporated into the production PIC-E. Only slight changes were made. The most significant change was the desire to have a larger voltage regulator on the PIC-E to power GPS receivers. The production PIC-E now sports a 7805 voltage regulator that can support up to 1 amp of current, more than enough for many GPS receivers on the market today. Production PIC-Es sales were brisk at the Dayton Hamvention. You can order yours from the TAPR home page.

TAPR Project Proposal Format

One of the primary purposes of TAPR is to provide input and support for research, development, and standards for new applications and technology. In order to effectively provide an avenue for new project support we have developed an outline for proposal submissions. The main purpose of the document is to provide enough information on the project in question, so that the TAPR board can make an informed decision. Hopefully the form is pretty much self-explanatory. The whole submission shouldn't be more than about 5 pages total. Proposal submissions should be sent to the TAPR office or e-mailed to Greg Jones (wd5ivd@tapr.org). Notification of receipt will be sent as soon as distributed to the board. The board will then discuss the proposal in a timely fashion and provide feedback. Again, we hope this will facilitate project concepts and ideas within TAPR. If you have any suggestions, or

comments on this format or process, please let us know.

1. Cover Page
 - a. Name, Address, Phone, Fax, Email of project participants. (please indicate project leader)
 - b. Title of Project or Proposal
 - c. Time Period of Project
 - d. Total Amount Requested
2. Technical Abstract of Project (short overview - less than a page)
3. Research/Project Objectives
4. Research/Project Impact (who this is intended for and what is the potential application/service/function)
5. Research/Project Personnel (briefly describe the participants and what they will be doing)
6. Technology Transfer (what is the potential for something TAPR would develop, kit, propose, or publish in the future)
7. Budget Justification (spreadsheet)
8. Attach anything else you think necessary for the proposal.

ARRL and TAPR 18th Annual Digital Communications Conference

September 24-26, 1999 • Phoenix, Arizona



<http://www.tapr.org/dcc>

Information

Mark your calendar and start making plans to attend the year's premier event in digital communications. The 18th Annual ARRL and TAPR Digital Communications Conference will be held **September 24-26, 1999, in Phoenix, Arizona**—just minutes from Phoenix Sky Harbor International Airport.

The ARRL and TAPR Digital Communications Conference is an international forum for radio amateurs in digital communications, networking, and related technologies to meet, publish their work, and present new ideas and techniques for discussion. Presenters and attendees will have the opportunity to exchange ideas and learn about recent hardware and software advances, theories, experimental results, and practical applications. The Digital Communications Conference is not just for the digital expert, but for digitally-oriented amateurs of all levels of experience.

A Conference for the Beginner as well

The conference is not just for the digital expert. As in years past an entire session strand with beginning, intermediate, and advanced presentations on selected topics in digital communications will be offered. Some of the topics will include: APRS, Satellite Communications, TCP/IP, Digital Radio, Spread Spectrum and other introductory topics. Come to the conference and hear these topics presented by the experts!

Symposia, Seminars, and Banquet

Three symposia/seminars will be held which allow those with additional time and interest to make the most of the Conference. For those who may have interest in just one symposium or seminar, registration for the conference is not required to attend these activities. This allows maximum flexibility for those who may want to participate during the Digital Communications Conference, but do not have an entire weekend to devote to the event.

The Third APRS National Symposium will be held on Friday and will be moderated by Steve Dimse, K4HG (the developer of javAPRS). It will likely include many APRS software authors, such as Bob Bruninga, WB4APR (the father of APRS), Keith Sproul, WU2Z, Mark Sproul, KB2ICI (the developers of MacAPRS and WinAPRS), Brent Hildebrand, KH2Z (the developer of APRSPLUS), Mike Musick, N0QBF (developer of PocketAPRS), and other nationally-known APRS leaders. Join this group for the afternoon and evening for in-depth discussions and presentations on the current and future status of APRS. This is a unique opportunity to gain insight into this fast-growing digital aspect of amateur operations that combines computers, packet radio, and GPS (Global Positioning System).

Starting late Friday afternoon, a technical seminar will be conducted by Allen Finne, KB5SQK, on High-Definition Television (HDTV). Allen is currently the chief engineer for Little Rock's FOX 16 KLRT as well as for UP 38 KASN. Allen will be discussing DTV (Digital Television) Implementation by Broadcasters during this two hour talk.

Co-Hosts

The 1999 ARRL and TAPR Digital Communications Conference will be co-hosted by the Motorola Amateur Radio Club of Arizona (MARCA). MARCA is one of eight Motorola radio clubs located around the world. MARCA has been the primary driver of APRS in Arizona, maintaining two WIDE digipeaters that cover the Phoenix metropolitan area and working with other clubs to expand the network into Tucson and other parts of the state. MARCA recently took over the sites of the Arizona Network Intertie Group to continue support for the packet network in Arizona. For more information on MARCA, please contact David McCarthy, KC7AYX, at rxyh90@email.sps.mot.com

PRUG (Packet Radio User Group of Japan) will be the International co-host for a second year running. PRUG will be hosting an informal social Friday evening before their seminar and symposium is held. Visit <http://www.prug.or.jp> for more information about the organization.

Call for Papers

Anyone interested in digital communications is invited to submit a paper for publication in the Conference Proceedings. Presentation at the Conference is not required for publication. **Papers are due by August 9th, 1999**, and should be submitted to Maty Weinberg, ARRL, 225 Main Street, Newington, CT 06111 or via the Internet to lweinberg@arrl.org. Information on paper submission guidelines are available on-line (<http://www.tapr.org/dcc>).

On Saturday night the DCC Banquet will be held. This year the conference is proud to have Geoff Baehr, N6LXA, Sun Microsystems Chief Network Officer at the banquet to speak. Sun Microsystems has been doing some very exciting things in networking over the years and the talk should be a very interesting one. After the banquet, there will be time for special interest group gatherings.

The Sunday morning seminar will be focused on PIC development, design, and programming. This five-and-a-half hour seminar will focus on the things you need to know now in order to understand and begin to participate in PIC development. PIC processors are becoming very important in various project designs and implementations. This seminar will be presented by the TAPR PIC Development team.

Hotel

Conference presentations, meetings, and seminars will be held at the Holiday Inn Select Airport. Special DCC rooms rates are \$69/single and \$79/double per night. When making reservations with the hotel, be sure to indicate you are attending the ARRL and TAPR DCC in order to get the discount. It is highly recommended that you book your room prior to arriving. **A block of 75 rooms is reserved until August 22, 1999.** After the 75 rooms are booked, rooms will only be available in nearby hotels, so be sure to book your rooms early! The hotel provides transportation to and from the Phoenix Sky Harbor International Airport. Please contact the hotel to arrange specific transportation needs.

Holiday Inn Select Airport (conference hotel)
4300 E Washington
Phoenix, AZ 85034
Phone 602-273-7778, fax 602-286-1109

What you can expect in 1999!

- * A full day of papers and breakouts for the beginner to the advanced
- * Three seminars/symposiums
- * The fourth annual Student Paper session.
- * A banquet with Special Guest Speaker Geoff Baehr, N6LXA
- * Informal get-togethers throughout the weekend.
- * TAPR Membership Meeting
- * An event at which the most important new developments in amateur digital communications are announced.
- * Digital 'movers and shakers' from all over the world in attendance.

Conclusion

There are few activities where your participation can be **so much fun and important!** What a great way to share and renew your enthusiasm for digital amateur radio! A get-together with colleagues and bringing each other up to date on your latest work -- all this, and more, for an unforgettable weekend of amateur radio and digital communications. We hope to see you at the ARRL and TAPR Digital Communications Conference on September, 24-26, 1999!

Full information on the conference and hotel information can be obtained by contacting Tucson Amateur Packet Radio. Phone: (940) 383-0000. Fax: (940) 566-2544. tapr@tapr.org Web: www.tapr.org

Registration Form

Contact the TAPR office by Phone 940-383-0000, Fax 940-566-2544, or Internet: <http://www.tapr.org> and tapr@tapr.org to register or for additional information.

- * Pre-Registration (before Sept 1st) \$42.00 _____
- * Registration (after Sept 1) or at door \$47.00 _____

Conference Registration includes:
Conference Proceedings, Sessions, Meetings,
and Lunch on Saturday.

- * Saturday Evening Dinner \$22.00 _____
(Limited Space)
Dinner: Geoff Baehr, N6LXA Speaker,
Prize Drawing

Symposia/Seminars

- * 3rd Annual APRS National Symposium
Friday, 1pm - 7pm. \$25.00 _____
- * Technical Seminar on HDTV
Friday, 5pm - 7pm. \$15.00 _____
Conducted by Allen Finne, KB5SQK.
- * Sunday Seminar
PIC Design, Development, and Programming
Conducted by the TAPR PIC Development Team
Sunday, 8:30am - 2pm. \$20.00 _____

TOTAL _____

Name / Call: _____

Street Address: _____

City / State / Zip: _____

Country: _____ Phone Number: _____

Internet E-mail: _____

Charge my credit card (check one):

VISA MasterCard

Acct. # _____

Expiration Date: _____

Signature on card: _____

Mail completed registration form with
check to:

TAPR
8987-309 E Tanque Verde Rd #337
Tucson, Az 85749-9399

or check <http://www.tapr.org/dcc> for an
on-line registration form.

A registration packet will be mailed in September
upon receipt of registration form and payment.

Kits	Price	Qty	Total
PIC-B (no order)	\$65.00		
CompactFlash Card Adapter	\$59.00		
Motorola EVM56002 Interface	\$150.00		
TAPR APKS™ MIC-Encoder™	\$149.00		
TAC-2 (Totally Accurate Clock)	\$139.00		
Differential GPS (Member Price)	\$179.00		
DAS (DTMF Accessory Squelch)	\$68.00		
AN-93 HF Modem	\$90.00		
TAPR 9600 bps Modem	\$80.00		
Bit Regenerator	\$10.00		
Clock Option	\$5.00		
PK-232 Modem Disconnect	\$20.00		
PK232MBX Installation Kit	\$20.00		
XR2211 DCD Mod	\$20.00		
State Machine DCD Mod	\$20.00		
State Machine DCD w/Int Clock	\$25.00		

Firmware	Price	Qty	Total
32K RAM w/ TNC2 update docs	\$20.00		
TNC-2 1.1.9 w/KISS EPROM	\$15.00		
1.1.9 Commands Booklet (only)	\$8.00		
TNC-2 WADED EPROM	\$12.00		
TNC-1 WADED EPROM	\$12.00		
TNC-2 KISS EPROM	\$12.00		
TNC-1 KISS EPROM	\$12.00		
PK-87 WADED EPROM	\$12.00		

Publications	Price	Qty	Total
TAPR Spread Spectrum Update	\$18.00		
1998 TAPR CD-ROM	\$20.00		
1997 TAPR CD-ROM	\$10.00		
Wireless Digital Communications	\$39.99		
Packet Radio: What? Why? How?	\$12.00		
BB5 Sysop Guide	\$9.00		
NOS Intro, Intro to KA9Q NOS	\$23.00		
TAPR's 94 Annual Proceedings	\$7.00		
TAPR's 95 Annual Proceedings	\$7.00		
PSR Set Vol 1 (#1 - #17 '82 - '85)	\$20.00		
PSR Set Vol 2 (#18 - #36 '86 - '89)	\$20.00		
PSR Set Vol 3 (#37 - #52 '90 - '93)	\$20.00		
PSR Set Vol 4 (#53 - #68 '94 - '97)	\$35.00		
ARRL/TAPR 1998 DCC	\$15.00		
ARRL/TAPR 1997 DCC	\$15.00		
ARRL CNC Proceedings 1st - 16th	call		
Entire Set ARRL DCC 1st - 16th	\$120.00		

Other	Price	Qty	Total
TAPR 11oz Coffee Mug logo	\$11.00		
TAPR Badge	\$10.00		
TAPR Shirt - 4 styles			
3 1/2" Disk from TAPR Library	\$3.00		

GPS	Price	Qty	Total
TAC-32 Software Registration	\$55.00		
Garmin GPS-25 (Member Price)	\$135.00		
Garmin GPS-20/25 Interface/Power Kit	\$40.00		
Garmin GPS-20/GPS-25 Data Cable	\$15.00		
Garmin GA-27 GPS Antenna	\$75.00		
Oncore VP GPS (Member Price)	\$269.00		
Oncore VP Interface/Power Kit	\$40.00		
Oncore GT+ GPS (Member Price)	\$169.00		
Motorola Antenna 97	\$65.00		
MCX Rt-Ang Connector w/coax pigtail	\$15.00		

Kit Code Information

1 A FlashCard is not included in the kit
<http://www.tapr.org/ftp/html/dsp5612devm.html>

10 Requires a GPS to operate
 16 Requires a GPS to operate
 3 As seen in Dec 95 QST
 4 Limited kits available.

1 used for regenerative repeater operation
 1 used for regenerative repeater operation
 2 simplifies connection of external modems
 2 for installation of 9600 modem in PK-232MBX

2 For KPC2 (or other TNC) w/ 16X or 32X int clock

2 Includes 1.1.9 Commands booklet (below)
 2 Full TNC-2 command set for 1.1.9
 2 2 required volume for ARES/Data standard

2 300+ pages on ARS Spread Spectrum Topics
 4 ISO 9660, 650 Mbits of info! w/ html nav pages
 4 ISO 9660, 650 Mbits of info! w/ html nav pages
 8 300+ pages w/disk by: Tom McDermott, N5EQJ
 5 130 pages - TAPR's Packet Radio book.
 4 60 pages - by: Barry Buelow, WA0RJT
 X Kai Wale, G0NRW, TCP/IP over Packet Radio
 4 Papers from the Annual Meeting (Tucson)
 4 Papers from the Annual Meeting (St Louis)

4 1998 DCC Proceedings Chicago, IL
 4 1997 DCC Proceedings Baltimore, MD
 Individual Proceedings, call for prices
 12 Proceedings from 1981 to 1997

4 Logo in black and microwavable gold
 0 include Name and Call for badge
<http://www.tapr.org/tapr/html/shirts.html>
 0 \$3 per disk. See TAPR Software Library List

0 No Discount. (data cable included)

2 No Discount.
 # MCX connector, mag and suncon mounts

2 No Discount.

2 No Discount
 # mcx connector, mag mount

2 No Discount.

Subtotal: Added Total Kit Codes

All prices subject to change without notice and are payable in U.S. funds. Members receive 10% off on Kits and Publications. Please allow six to eight weeks for your order to be shipped. For specific information on kits, see Product Description flyer.



Tucson Amateur Packet Radio
 8987-309 E. Tanque Verde Rd #337
 Tucson, Arizona • 85749-9399
 Office: (940) 383-0000 • Fax: (940) 566-2544
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 Non-Profit Research and Development Corporation

May 1999

www.tapr.org • ftp.tapr.org • tapr@tapr.org
 Office Hours: Tue-Fri 9am-12pm, 3pm-5pm CT

Membership	Price	Number of Years	Total
United States	\$20.00		
Canada/Mexico	\$20.00		
International	\$25.00		

Renewal New Member

SubTotal

Membership 10% Discount
 Member #: _____ (Place new if joining)

Total Sales (Subtotal minus discount)

Texas Residents (7.75% tax)

Membership (New or Renewal)

Shipping and Handling

For Total Kit Codes Between

1 - 3	4 - 7	8 - 15	16 - 27	28 - 55
Add \$3	Add \$5	Add \$6	Add \$7	Add \$8

Kit Codes above 55 or International orders must contact TAPR for amount.

TOTAL Order Amount

Charge my credit card (check one):

VISA MasterCard

Acct. # _____

Expiration Date: _____

Signature on card: _____



Name / Call: _____

Street Address: _____

City / State / Zip: _____

Country: _____ Phone Number: _____

Internet E-mail: _____