TAPR PSR

President's Corner

TAPR at Hamvention 2026.

As you know, we are a group of active radio experimenters and we enjoy talking to others about how to have fun and learn something about the radio communication science.

In May, TAPR will have a booth in the usual location in Building 5 (Hertz) next to the HamSCI booth. We will have a variety of products for sale and booth demonstrations with people to greet and talk with you. Please come by the booth and reacquaint yourself with new and old friends.

We will also have the TAPR Forum in Room 4 which will be in the agricultural building near the grandstand on the fairground.

We will have Paul Elliot (WB6CXC), and George Byrkit (K9TRV) as they speak on development of a SDR receiver to be used with KA9Q radio software and choosing an antenna for WSPR daemon reception use (N6GN SaS variants vs DXE RSEAV1). Paul, the TAPR Vice-President, will also speak on the design of an SDR receiver to replace the RX-888.

We will also have top wsprdaemon George, K9TRV, and wsprdaemon top receive station to discuss to his favorite wsprdaemon antennas. George has a number very interesting insights on how to improve the function of your wsprdeamon setup.

If you enjoy talking about theses types of radios, you can find others in our booth with similar interests. We have a weekly Monday night teleconference where we talk about system development and propagation issues.

If you find this interesting please come and join us.

Dave Larsen, KV0S, TAPR President

###

TAPR is a community that provides leadership and resources to radio amateurs for the pur-

AMSAT/TAPR Banquet

Ray Roberge, WA1CYB, will be the featured speaker at the 17th annual AMSAT/TAPR Banquet. A member of AMSAT's Engineering Team, Roberge will present an update on AMSAT's SDR Gen2 project—covering its capabilities, current progress, and potential applications.

AMSAT's SDR Gen2 is a versatile, programmable GNU Radio–based transceiver/transponder designed for a 1U CubeSat form factor. It provides continuous coverage from 144 MHz to 6 GHz, with future expansion expected to 10 GHz. The system supports direct operation across VHF, UHF, L, S, C, and X bands in multiple modes, including CW, SSB, FT8, NBFM, SSTV, and FSTV, with downlink data rates up to 1 MBps. The transceiver is being developed for AMSAT's GOLF and FoxPlus missions and will be released as open-source hardware and software.

The 17th annual AMSAT/TAPR Banquet will be held on Friday, May 15, at 18:30 EDT at the Kohler Presidential Banquet Center. The banquet is a long-standing highlight of activities during the Dayton Hamvention for both TAPR and AMSAT.

The Kohler Presidential Banquet Center is located approximately 20 minutes from the Greene County Fairgrounds.

Tickets are $75 each and must be purchased in advance through the AMSAT Store. The deadline for ticket purchases is Monday, May 11, at 17:00 EDT (21:00 UTC). Tickets will not be sold at the AMSAT booth, and there will be no on-site pickup. All purchases will be recorded on a list for check-in at the banquet. Seating is limited to the number of meals reserved with the caterer, based on tickets sold by the deadline.

###

TAPR booth at Hamvention

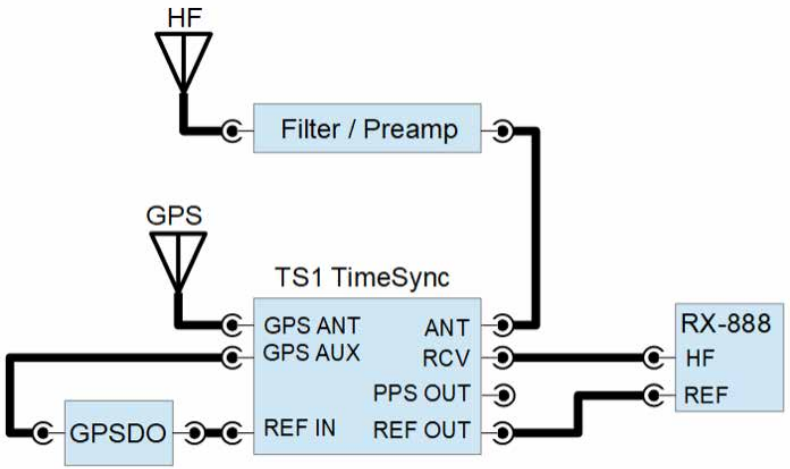
Timestamped Transmissions for Time of Flight Measurements & Simple Techniques for BPSK Modulation

By Paul Elliott, WB6CXC

At the HamSCI 2026 Workshop, I gave a presentation on recent work to add TOA (Time of Arrival) and TOF (Time Of Flight) measurements to the SigMonD system (this is a new name for the wsprdaemon network because we aren't just analyzing WSPR any more!) Initial TOF analysis has used time-standard stations WWV and CHU as transmit sources and the results have been very promising.

For the receive-end of the system a simple PPS (Pulse Per Second) time-stamped signal is injected at a low level into the receiver RF input, using the Turn Island Systems TS1 TimeSync box.

This timestamped signal is detected using ka9q-radio software,with extensions developed by Scott Newell, N5TNL. This software then time-aligns all received channels with microsecond accuracy and these time-aligned signals can be analyzed to extract timestamped features such as the per-second or per-minute time-signals broadcast by WWV.



But one aspect of this project that has been only briefly touched on is the ability to generate timestamped transmissions, allowing many more transmit/receive paths, much like the huge number of worldwide WSPR and FST4W paths currently being collected by the SigMonD system and analyzed for Doppler shift and

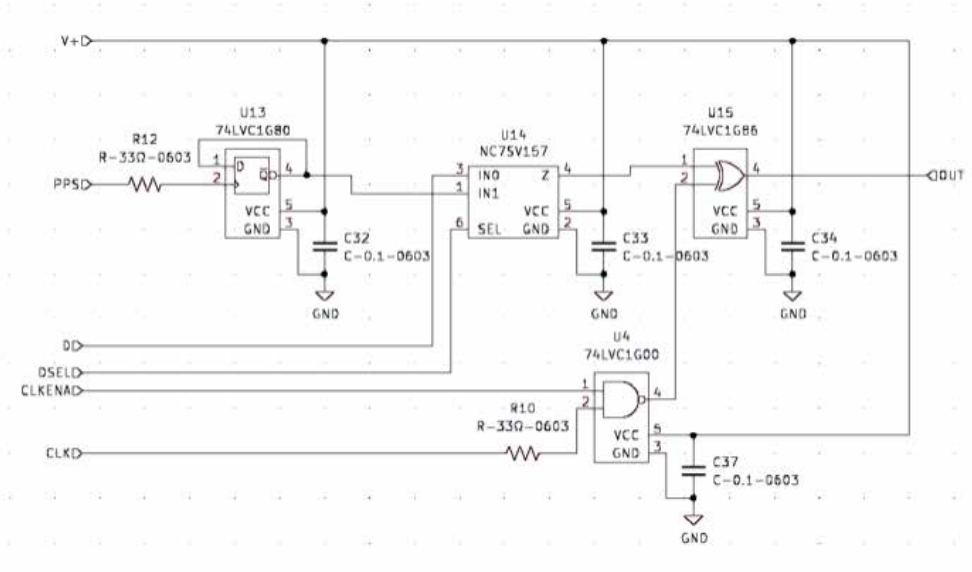
other parameters. While there are many potential types of timestamped signal sources and more than a few currently in service, when designing the TS1 TimeSync I decided to include the capability to generate RF carriers with arbitrary BPSK patterns and rates with timing accuracy of around 100ns.

While simple Pulse Per Second BPSK signals can be generated, more measurement accuracy and flexibility can be obtained by using a faster symbol-rate. Working together, Scott and I decided to first try the 1023-bit PRBS (Pseudo Random Bit Sequence) used for the GPS Coarse Acquisition code. The TS1 can generate this signal with bit-rates as fast as 1.023 kHz, and with varying amplitude-control filter shapes.

Actual use of these signals for TOA / TOF study is just beginning, as yet there's really nothing to report. But during the hardware and firmware design process some interesting techniques were used in the modulation path.

BPSK Modulation

Rather than use the traditional analog mixer for modulation, the TS1 uses an all-digital method with a simple digital XOR gate driven by a microcontroller-generated signal used to invert (or not) the digital carrier-frequency clock. While this is simple and easy, any traditional analog envelope-shaping must be done after this stage.



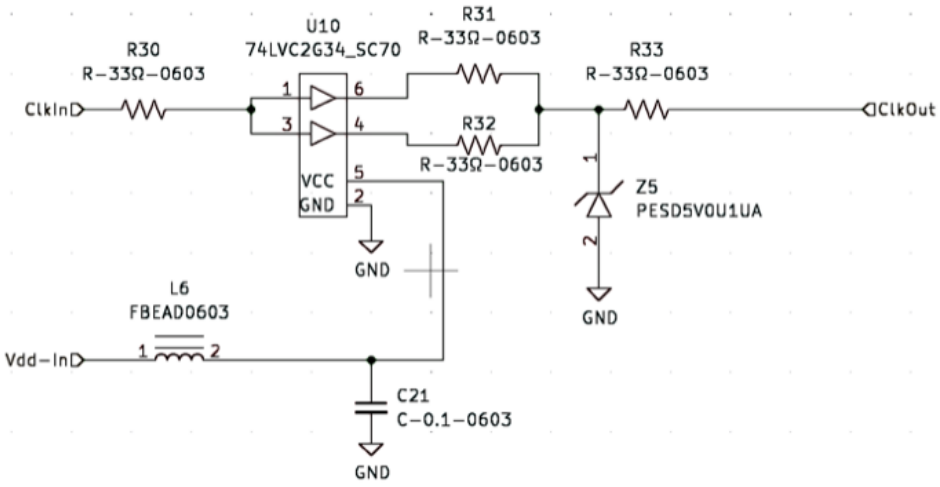
Envelope Shaping

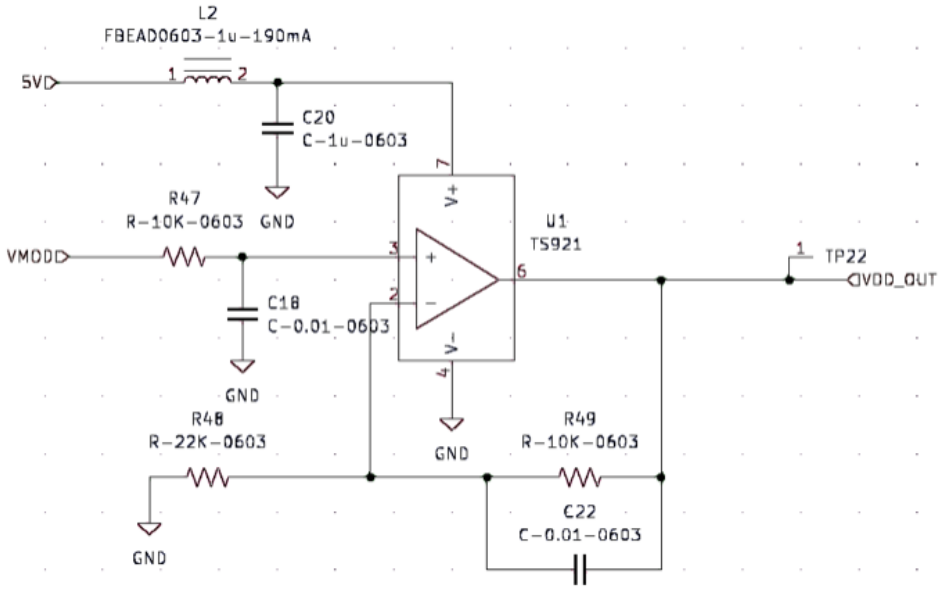
Envelope shaping is done by varying the supply voltage to the output driver, which is a simple 74LVC digital buffer. This device is being operated somewhat "off-label," but as it is specified to provide full-output swing with a supply voltage range from 1.65V to 5.5V it performs well as an amplitude modulator. The buffer accepts a 0-3.3V logic level input regardless of supply voltage.

Amplitude Control of Power Supply

The driver supply voltage is provided by a simple rail-to-rail input/output op-amp. The amplifier used has a relatively high

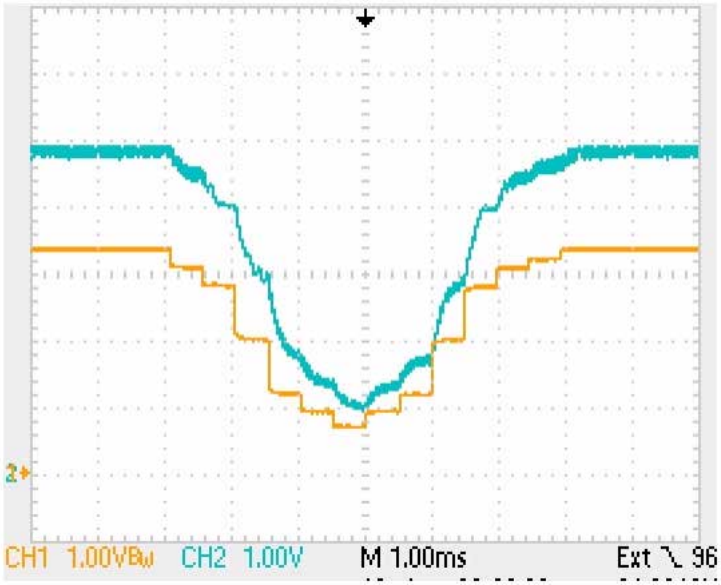
current capability output, and is able to source the buffer Vdd practically up to the +5V supply rail. The amplifier is driven by the microcontroller internal DAC (with a 0-3.3V output range) and provides low-pass filtering and voltage gain so the +3.3V input drives the output to about 4.8V.



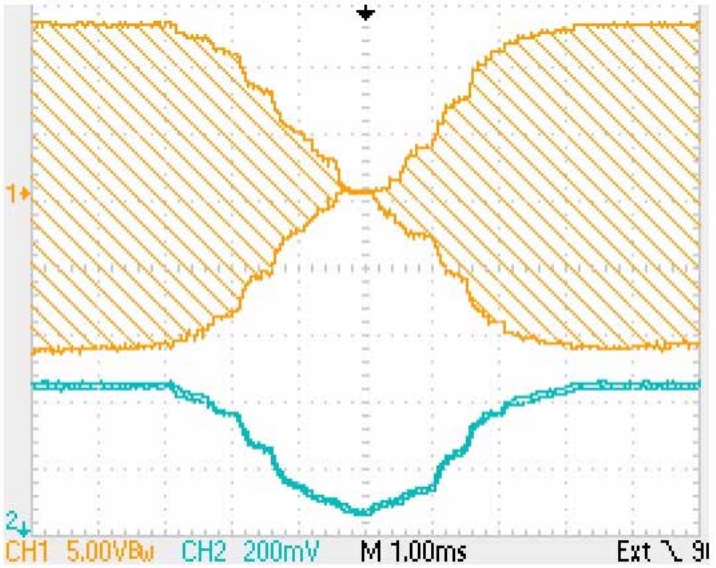


Control Voltage Generation

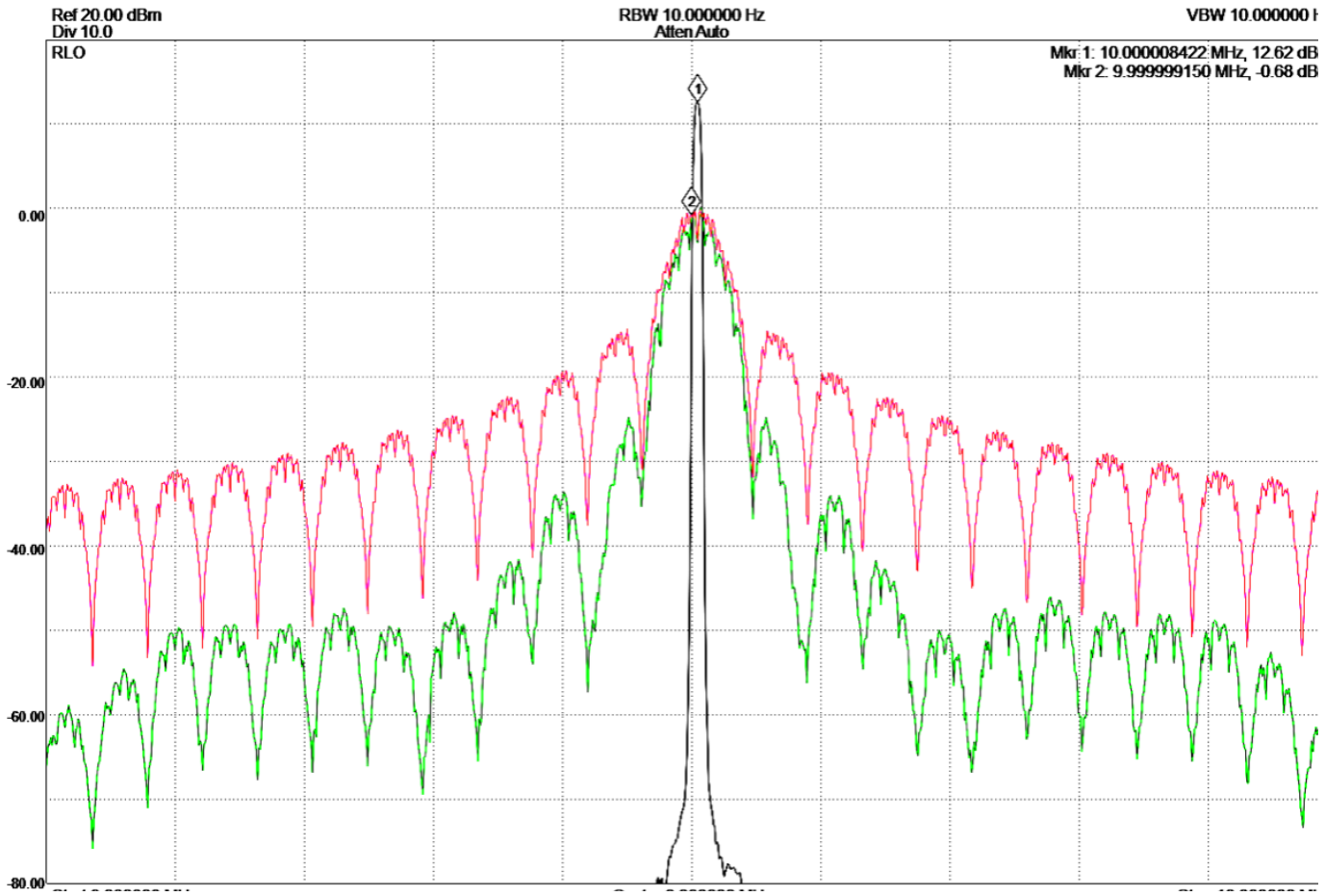
The DAC control values are generated using an interrupt-driven FIR (Finite Impulse Response) filter, clocked at a 2.043 kHz rate (this interrupt also generates the BPSK data). There are multiple FIR patterns available, ranging from 1 to 16 samples in width. The image below shows the stair-stepped DAC output and the filtered driver supply voltage:



And here is a modulated BPSK carrier:



The BPSK carrier with and without filtered phase transitions displays the classic modulation spectra. Here is the spectrum of the un-modulated carrier (level +12.62 dBm), an 85 bits/second modulated but unfiltered BPSK signal (0.68 dBm peak) and the same BPSK but with transition filtering as shown above. With filtering the main-lobe amplitude is essentially unchanged, but the occupied bandwidth is greatly reduced.



Conclusion

While there are more efficient modulation and filtering methods, here the goal was to add pattern transmit capability to the TS1 TimeStamp unit in a simple and cost-effective manner with a signal that meets the occupied bandwidth requirements of out HF ham bands. The results are quite satisfying. We shall see how this works in practice as we try to extend our transmit / receive paths!

TAPR will be presenting and demonstrating updates on this topic at the 2026 Dayton Hamvention. More information on the TS1 TimeSync is available at www.TurnIslandSystems.com.

###

SynthDO — A Low Cost Synthesized GPS Disciplined Oscillator

By John Ackermann, N8UR

As part of the TangerineSDR project, we developed a clock module that provided GPS-disciplined frequency outputs at programmable frequencies. When that project was discontinued, I hoped to turn the clock module into a standalone product, but for a number of reasons that proved impractical.

Earlier this year I got the urge to revisit the project and started working with Paul, WB6CXC, on a new version. While prowling around the web, Paul discovered a recently published project on GitHub that looked very similar to what we were contemplating. We reached out to the developer and he was willing to work with us on modifications to meet the needs of HamSCI as well as the time-nuts communities. Our goal is to turn this into a TAPR product.

Just a couple of days ago, I received two boards manufactured by JLCPCB to the original design and just today, I started testing them. The initial tests show very good performance.

While the final design is still taking shape, here are some of the features we plan:

-- Self-contained unit powered from 5 volts via USB-C connector

-- At least four RF outputs independently programmable from a few kHz to at least 350 MHz

-- At least one RF output with the potential to reach over 1 GHz

-- GPS synchronized pulse-per-second (PPS) output for timing

-- Ability to use a local reference rather than GPS (for those who already have a GPSDO but need a programmable frequency source)

The performance (frequency stability and phase noise) will be similar to the Leo Bodnar units and we hope the price will also be similar.

As mentioned, design work is still ongoing, with the main changes from the original being to provide PPS outputs, which requires using a different GNSS receiver module and optimizing the RF output stages. By the way, “SynthDO” is a placeholder from the earlier work we did and may or may not be the final name.

###

Priority Areas for Funding ARDC

By Rebecca Key, KO4KVG
Communications Manager, ARDC

If you or your organization are developing projects that advance amateur radio or digital communications, now's a great time to apply for ARDC grant funding, with our next application deadline on February 1, 2026.

ARDC's priority areas for funding reflect our broader vision and strategy for supporting experimentation, education, and open technology within the amateur radio and digital communications communities. We're especially interested in projects that align with these three areas:

-- **Research & Development (R&D)**: open hardware and software systems that enable learning and experimentation (e.g. SDRs, open codec technologies, new modulation techniques).

-- **Space-Based Communications**: projects that create or expand access to satellite communications for amateur radio (AR) and digital communications (DC), engaging communities in wireless experimentation (e.g. GEO or HEO programs, repurposed commercial satellites, space-based tools for learning).

-- **Open Source Education**: scalable, open educational materials and hands-on projects that make AR and DC more accessible, especially for new learners and clubs (e.g. curricula, videos).

While we welcome proposals across the full range of AR and DC, projects that align with these areas remain a priority in our grantmaking decisions.

Learn more about these priority areas at https://www.ardc.net/apply/priority-areas-for-funding/, and find information on eligibility and how to apply at https://www.ardc.net/apply/. For additional questions, contact giving@ardc.net.

###

That T in TAPR

By Stana Horzepa, WA1LOU

TAPR is the initialism for Tucson Amateur Packet Radio, a ham radio organization that has been on the cutting edge of digital radio technology for 45 years.

I've been a member of TAPR for nearly as long as it has existed. These days, I serve on its board of directors, act as secretary, and edit its quarterly newsletter, *PSR*.

Most years, I staff TAPR's booth at Hamvention. And without fail, a handful of attendees will stop by and ask, "How are things in Tucson?"—or something along those lines—revealing their assumption that TAPR is a Tucson-based organization.

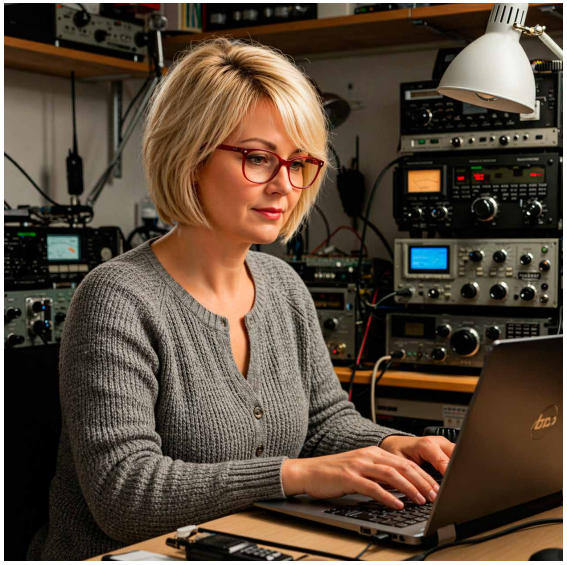
It's an understandable mistake.

TAPR is connected to Tucson in name only. The organization was founded there, but it is not headquartered there. Its mailing address was once a Tucson post office box, but that hasn't been the case for quite some time.

In fact, none of TAPR's officers or directors live in Tucson. While the organization does have members in the area, the majority are scattered across the country—and around the world.

###

Write Here!



Your *PSR* editor is always working on the next issue of *PSR* and hopes to find a few good writers, particularly ham radio operators working on the digital side of our hobby, who would like to write about their activities and have them published here in *PSR*.

You don't have to be Hiram Percy Maxim to contribute to *PSR* and you don't have to use *Microsoft Word* to compose your thoughts.

Your *PSR* editor can handle just about any text and graphic format, so don't be afraid to submit whatever you have to stanzepa@sbcglobal.net – she can handle it!

The deadline for the next issue of *PSR* is July 22, so write early and write often.

###

On the Net

By Mark Thompson, WB9QZB

Facebook

As you may know, TAPR has a Facebook page, www.facebook.com/TAPRDigitalHam.

However, I also created a TAPR Facebook Group, www.facebook.com/groups/TAPRDigital.

If you have a Facebook account, "Like" the TAPR Facebook page and join the TAPR Facebook Group.

If you join the group, click on the Events link and indicate you're Going to the events.

YouTube

TAPR has its own channel on YouTube: the TAPR Digital Videos Channel: www.youtube.com/user/TAPRDigitalVideo.

At this time, there are a slew of videos on our channel including many from the TAPR-ARRL Digital Communications Conference (DCC) that you may view at no cost, so have at it!

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TAPR Office Hours: Monday to Friday, 9 AM to 5 PM Eastern Time

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 TAPR, please contact the editor (stanzepa@sbcglobal.net) so that your work can be shared with the Amateur Radio community. If you feel uncomfortable or otherwise unable to write an article yourself, please contact the editor for assistance. Preferred format for articles is plain ASCII text (OpenOffice or *Microsoft Word* is acceptable). Preferred graphic formats are PS/EPS/TIFF (diagrams, black and white photographs), or TIFF/JPEG/GIF (color photographs). Please submit graphics at a minimum of 300 DPI.

Production / Distribution

PSR is exported as Adobe Acrobat and distributed electronically at www.tapr.org

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PSR Advertising Rates

Full Page Ad for 1 issue: $100, 4 issues: $350
Half Page Ad for 1 issue: $75, 4 issues: $250
Quarter Page Ad for 1 issue: $50, 4 issues: $175

Membership Application

TAPR
1 Glen Ave., Wolcott, CT 06716-1442
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Benefits of a TAPR Membership:

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