



# President's Corner

By Steve Bible, N7HPR



Greetings!

Another successful ARRL/TAPR Digital Communications Conference (DCC) is under our belts and plans are already underway for the next DCC, which will be in the “Motor City,” also known as Detroit, Michigan, on the weekend of September 20-22.

A call for papers has already gone out for the DCC, so it is not too early to begin working on your presentation(s) for the “big enchilada” of ham radio digital conferences.

Speaking of “big enchilada,” the grandest ham radio convention of them all, Hamvention ([www.hamvention.org](http://www.hamvention.org)), is only three months away (May 17-19) and as in the past, TAPR will be present in a big way. Scotty Cowling WA2DFI will have a full card for the annual TAPR Forum on Friday morning followed by the annual TAPR/AMSAT Banquet, Friday evening. Meanwhile, the TAPR suite of booths will be open throughout Hamvention weekend in Building 5, booths 5009-5011.

I hope to see you wherever TAPR hangs its hat in 2019!

73, Steve, N7HPR

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# WSPR Without Tears 30m Transmitter

By Bruce Raymond ND8I

TAPR has created a low-power WSPR transmitter (WSPR Without Tears) for the 30m ham band that avoids most of the problems associated with building a fairly complicated digital mode kit.

WSPR stands for Weak Signal Propagation Reporter Network. It's a digital mode used by hams. The process is similar to a beacon. WSPR is a wonderful communication mode created by Joe Taylor (K1JT).

WSPR Without Tears is our attempt at simplifying the process of getting an actual transmitter up and running so you can enjoy working with WSPR and avoid dealing with the headaches associated with building a working system. What makes it really interesting is that WSPR is optimized for operating at very low power. Our kit puts out a whopping 200 mW which is capable of reaching impressive distances even with a bad antenna. See Figure 1 for typical response using an end-fed dipole in an attic.

Our approach uses a Raspberry Pi computer (\$40) to generate WSPR transmissions. Our board plugs into a Raspberry Pi and amplifies and filters the output (the Raspberry Pi output is a very low power square wave that would be illegal to transmit due to its harmonic content). The Raspberry Pi generates the WSPR signal in software and utilizes timing data from the Internet to calibrate its internal clock and transmit frequency, so you don't have to calibrate it.

Our WSPR transmitter is fully-assembled (see Figures 2 and 3). Instructions for downloading the software and copying it to an SD card are on our website.

You set WSPR parameters (your callsign and grid square) from a web page in your favorite web browser and WSPR Without Tears is up and running without doing any programming or soldering.

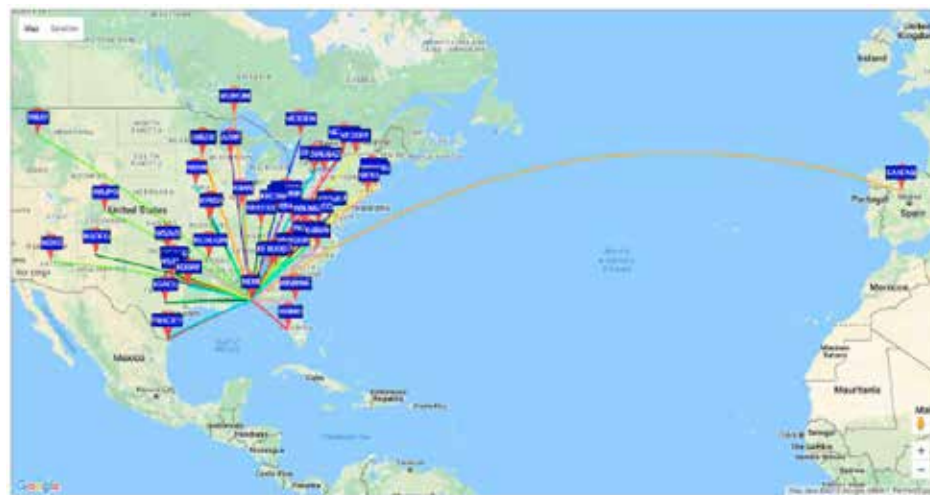


Figure 1. WSPR Coverage



Figure 2. WSPR Without Tears board.



Figure 3. WSPR Without Tears mated with Raspberry Pi computer.

For more information on TAPR's WSPR Without Tears, visit [https://www.tapr.org/kits\\_30M-wspr-pi.html](https://www.tapr.org/kits_30M-wspr-pi.html)

Enjoy!

## TAPR Wear Available



Personalized Land's End clothing with the TAPR logo and your name and call sign are now available from the TAPR Store at <http://business.landsend.com/store/tapr/>

Select from the Men's or Women's catalog. (To make shopping easier, there are "TAPR Recommended Shirts" in the Men's catalog including two styles of polo shirts, each available with or without pockets.)

The logo is available in three colors -- red, blue, and white. The name/call sign monogram thread will match the logo color. (We recommend that you use the white logo with dark colored shirts.)

Prices are very reasonable, for example, after adding the logo and monogram, a mesh pocket shirt is \$36.95. Processing time is 5-7 days, plus shipping.

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## HPSDR Sale

TAPR announces sale pricing on many HPSSDR products. The discount for eligible items is approximately 37%. As an example, the Metis board that normally sells for \$395 is available for \$249.

The discounted prices are displayed as the TAPR member price on the order page (<https://www.tapr.org/products.php>) for as long as the sale is in effect. You do not have to be a member to take the discount; simply indicate that you are a TAPR member when checking out. Membership status will not be checked for the purposes of this sale. Of course, if you choose to join or renew in appreciation, that is okay.

Use this as an opportunity to expand your HPSSDR system or stock up on spares.

The discounted items are as follows:

Item	Reg. Price	Sale Price
Alex TX	\$279	\$176
Atlas	\$39	\$25
Excalibur	\$88	\$55
Janus	\$91	\$57
Magister	\$199	\$125
Metis	\$395	\$249
PennyLane	\$399	\$251
PennyWhistle	\$88	\$55

###

## DCC Call for Papers

Technical papers are solicited for presentation at the ARRL/TAPR Digital Communications Conference (DCC) to be held September 20-22 at the Marriott Detroit Metro Airport Hotel. Papers will also be published in the Conference Proceedings. Authors do not need to attend the conference to have their papers included in the Proceedings.

The submission deadline is August 5, 2019. Submit papers to via e-mail to [maty@arrl.org](mailto:maty@arrl.org), or via post to Maty Weinberg, KB1EIB, ARRL, 225 Main St, Newington, CT 06111. Papers will be published exactly as submitted and authors will retain all rights.

###



## TAPR Election Results

TAPR concluded its Board of Director election and the following directors were elected to three-year terms: George Byrkit K9TRV, Scotty Cowling WA2DFI and John Koster W9DDD.

Earlier, preceding the ARRL-TAPR Digital Communications Conference (DCC) in Albuquerque, the following officers were elected to one-year terms: president Steve Bible N7HPR, vice president Scotty Cowling WA2DFI, treasurer Tom Holmes N8ZM and secretary Stana Horzepa WA1LOU.

###

## TAPR Takes a Hamcation

TAPR was at HamCation in Orlando, Florida, February 8-10 with a booth and technical presentations. Scotty Cowling WA2DFI, Dan Babcock N4XWE and Mel Whitten K0PFX took turns holding down the fort at TAPR's booth, while the following presentations were made:

- > Introduction to HamSCI and the Space Weather Station Project by Scotty Cowling WA2DFI
- > ITAR and EAR, the US Technology Export Laws and How to Work With Them by Bruce Perens K6BP
- > Phase 4 Ground – Ambitious Open Source Space Communications Initiative by Michelle Thompson W5NYV
- > Digital Hi-Def Television for the Radio Amateur by Mel Whitten K0PFX
- > Amazing Advances in Amateur Digital Voice by Bruce Perens K6BP

###

**2019 ARRL / TAPR**  
**Digital Communications Conference**

**September 20-22**  
**Detroit, Michigan**

Make your reservations now for three days of learning and enjoyment at the Marriott Detroit Metro Airport Hotel. The Digital Communications Conference schedule includes technical and introductory forums, demonstrations, a Saturday evening banquet and an in-depth Sunday seminar. This conference is for everyone with an interest in digital communications—beginner to expert.

Call Tucson Amateur Packet Radio at: **972-671-8277**, or go online to [www.tapr.org/dcc](http://www.tapr.org/dcc)

Marriott Detroit Metro Airport Hotel

# TAPR Board Meeting Minutes

13 September 2018, Albuquerque, NM

This session was called to order by President Steve Bible at approximately 9 AM.

Present in person: Steve Bible, Scotty Cowling, John Ackermann, John Koster, George Byrkit, Bruce Raymond, Mark Thompson, Tom Holmes.

Guests: Roland Kraatz W9HPX (likely host for 2020 Charlotte DCC), Tom McDermott, Paul Cecil, Phil Erickson, Mel Whitten

At 10 AM we will take a break to deal with the hotel staff.

Tom Holmes presented the current financial report through July 2018. The August report is in preparation.

Discussions occurred about how to raise money for TAPR: 1) sell more/new kits/projects, 2) sell more memberships, 3) get donations and bequests in wills.

Moved by John Ackermann, seconded by Bruce Raymond, to accept the treasurer's report.

We took a break at 10 AM so that Steve Bible and John Koster could deal with the hotel at the final planning meeting.

We resumed at 10:30 AM with John Koster and the sales/store/office report. Have still high levels of PennyLane and Magister, the trade-in Penelope units and 15-20 pandora boxes. Still occasionally selling some of these. Still Alexarias TX boards. Consider getting the inventory to Dayton to sell at Hamvention. This discussion will be continued online. George will run the booth at Dayton.

Scotty moved and Bruce seconded accepting the office report. It was accepted.

It was moved and seconded to reelect the current officer corps for the next year. Steve Bible president, Scotty Cowling vice-president, Tom Holmes treasurer, Stana Horzepa secretary. Moved by George, seconded by Bruce. The

vote was unanimous.

A discussion ensued about IP and rights for the videos of the DCC. Steve will pursue this with Jason Johnston.

We discussed the request by the QRPKits folks that Scotty handled. We are happy with their making a through-hole version. This segued into Bruce Raymond reporting on his 30m wspr-pi board. He is ready to go with 200 boards. It should sell for \$29.95. Should we offer an optional SD card with the needed RPi software distribution and WSPR software? No, not for now. One can download an image already with this and put it on your own SD card.

Recess at 11:50 for lunch. At about 1:30 PM, we resumed our meeting.

Talking about projects...

Past and present projects. Bruce continued with his wspr-30m board, but wants to wait before choosing another band. John A: TICC is enjoying good acceptance. Someone already did an add-on board for the Red Pitaya, so John A won't pursue that. Also a half-TADD-1 and half-TADD-3. Name to be determined, but in progress. Has been working on a 10-MHz to 1-GHz low-noise synthesizer. Joint use for TimeNuts, and VHF use. A discussion ensued about good CAD programs (KiCad seems to be the current choice).

We talked about getting a lot of the old, discrete parts from John K's house to Hamvention. Paul Cecil volunteered to drive it up to Dayton when he comes up next year. We will also mark down the HPSDR stuff to 66% for an early 'pre-Hamvention' sale, and mark down further to 50% all to be picked up at Hamvention.

New projects:

Bruce brought back extensions of his wspr-pi board. He would like to produce filter components for other bands. He would coordinate with John K



to determine reorder point/time. There was much discussion about how to get multi-band wspr transmitters (either simultaneous or in rotation.). We think that multiple single-band units (different bands) rather than a single unit 5-band rig is the first choice. Bruce will produce 160m, 80m, 40, 20m, 15m, 10m boards. Board voted to pursue this project. And have these ready for Hamvention.

Scotty: Minerva – a new HPSDR board that Phil Harmon VK6PH is working on. A/D, D/A, small FGPA that has PCIExpress output board. You could plug this into e.g. a Nvidia TK1 board or similar. More likely an intel I7 processor, Nvidia video card, and this Minerva board. 30 MHz bw realtime FFT is the goal and seems possible.

Bruce: Balloon transmitter. Has carried on since what he showed us at Dayton. He was trying at the time to use off-the-shelf components/modules. Was unable to get good performance and frequency stability with temperature. Using now a different Silicon Labs VCO chip and a TXCO. Getting better results, but needs more time. Some competition with Bill Brown WB8ELK. More progress to come.

John A reports that he, Scotty and Tom McDermott are working with Phil Harmon to fix a long-standing fpga code bug affecting Hermes and all similar boards.

Nathanial will be talking on HamSci personal space weather station on Sunday. There will likely be some possible hardware projects that fall out of this initiative. This could be TAPR's next watershed moment.

At about 4 PM we adjourned back to online session.

(Meeting minutes were recorded by George Byrkit, K9TRV)

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## 2018 DCC Videos Online

Videos of presentatrions given at the 2018 ARRL/TAPR Digital Communications Conference (DCC) are now online at:

<https://tinyurl.com/y373h3wx>

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# Annual Membership Meeting

15 September 2018, Albuquerque, NM

Meeting started at 4:33 PM

Steve Bible introduced the board and officers. The three directors whose terms are expiring are John Koster, George Byrkit and Scotty Cowling. There is a fourth nomination by e-mail. There were no nominations from the floor. Nominations were closed, and there will be an election.

Tom Holmes N8ZM presented the TAPR financial statement.

Steve Bible described the on-going activities of TAPR.

Projects:

Bruce Raymond is working on a 30m WSPR-Pi board, Bruce asked what other bands are interesting to others:

- 1) 40m interest
- 2) Small 80m
- 3) 15m some interest

Steve described other ways that you can support TAPR: Amazon Smile, donations, bequests in your estate.

TAPR is looking for ways to support citizen science through the HamSci organization. Tomorrow's seminar will be about what is needed for citizen space weather instruments from the perspective of scientists looking to have us contribute to the space weather investigation.

Steve Bible gave an extended description of TAPR's history. He mentioned many of the projects and people that have been involved with TAPR over the years.

The meeting ended at 5:30 PM.

(Meeting minutes were recorded by George Byrkit, K9TRV)

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☰
HamSCI

## HamSCI Workshop 2019



Come join HamSCI at its second annual workshop! The workshop will be held March 22-23, 2019 at Case Western Reserve University in Cleveland, OH and seeks to bring together the amateur radio community and professional scientists. Anyone interested in this workshop is invited to join.

### Cost and Registration

- Friday Registration: \$100 (Includes Breakfast, Lunch, and Banquet Ticket)
- Saturday Registration: \$50 (Includes Breakfast, Lunch, and Dinner)
- Friday Banquet Ticket Only: \$50

**For more information, visit: <http://hamsci.org/hamsci2019>**



# 2018 DCC Photo Album

George Byrkit K9TRV and Mike Pappas W9CN, photographers



TAPR is a community that provides leadership and resources to radio amateurs for the purpose of advancing the radio art.



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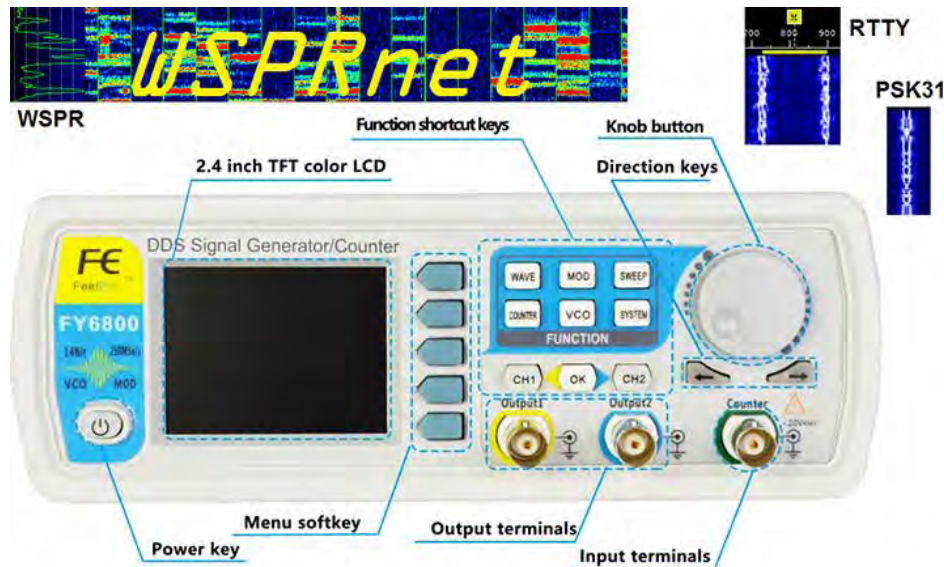


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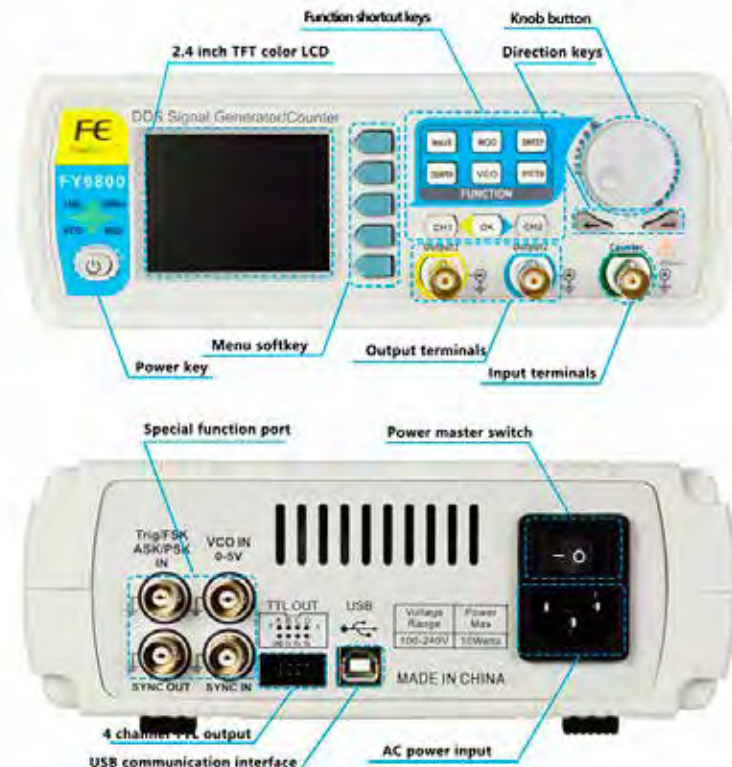


# FY 6800 Generator as Beacon

By Anthony Le Cren F4GOH



- > Trigger input for FSK modulation.
- > VCO input for FM modulation.
- > Arduino UNO
- > LCD 4×20 display.
- > RTC (for WSPR)
- > Breadboard wiring.



## Introduction

The FY6800 generator is a good product. Why?

HF full band, schematics, open source code and lot of inputs/outputs to control it.

Just connect an Arduino on TX/RX and Trig/Vco inputs to create BPSK, RTTY, Hellschreiber, CW or WSPR beacon.

## FY6800 beacon features:

- > LF, HF full band.
- > Power : 19dbm on 40 meters.
- > Modes : BPSK , RTTY, Hellschreiber, CW, WSPR.

**The Concept:**

The challenge is to use FY 6800 function generator to get BPSK, RTTY, Hellschreiber, CW, WSPR on the ch1 output.

As you can see on FY 6800 rear, there is a TTL serial bus on a HE8 connector. Connect it to an Arduino and it is possible to generate different ham radio modulations.

**Special Function Port**

The trigger TTL input is used for FSK, PSK modulation (RTTY, BPSK31, CW and Hellschreiber)

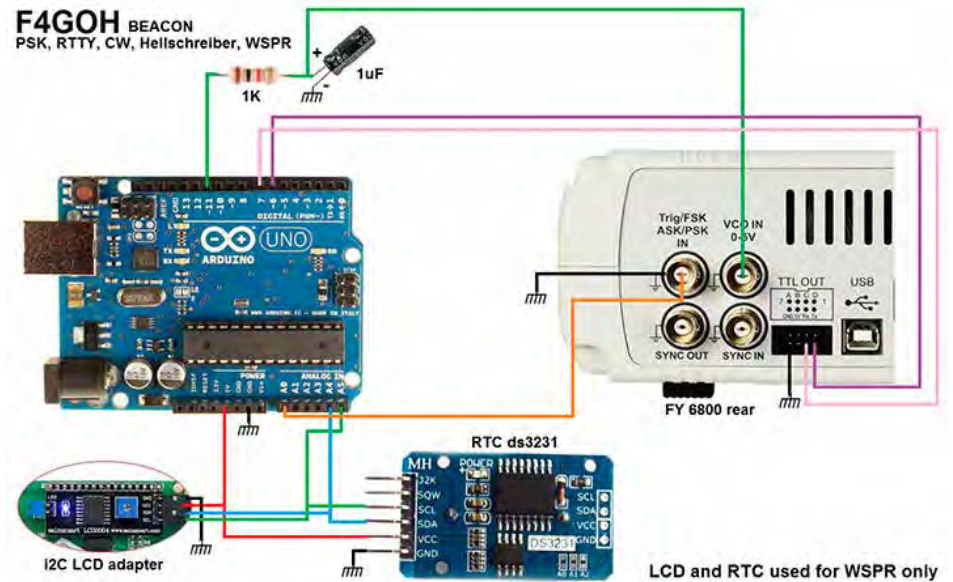
The VCO input is used for FM modulation (RSID and WSPR)



Don't forget a low pass filter between the generator and antenna.

**Schematics**

I use a breadboard to test different ham radio modulations





### Inside FY6800

You will find all schematics and the serial protocol here :

<https://github.com/f4goh/FY6600-15-30-50-60M>

### Programming Software

<https://github.com/f4goh/FY6800Beacon>

Compiling the program from the Arduino environment is easy. Indeed, it is necessary to install the libraries for the RTC and the LCD.

You will find an example here:

[https://github.com/f4goh/FY6800Beacon/blob/master/examples/FY6800\\_Modulation/FY6800\\_Modulation.ino](https://github.com/f4goh/FY6800Beacon/blob/master/examples/FY6800_Modulation/FY6800_Modulation.ino)

Select between this three modes in loop function:

```
//bridge(); // to send command manually with any serial terminal
//test(); // to test each modulation send 1,2,3,4,5 on any serial terminal
syncTime(); // to send wspr each even minutes
```

### Serial Command Brief

**WMF07041500000000** : frequency on main channel CH1 7.041.500 Hz

**WMN1** : CH1 on, used as PTT

**WPF0** : PSK modulation

**WPM3** : external DC trigger

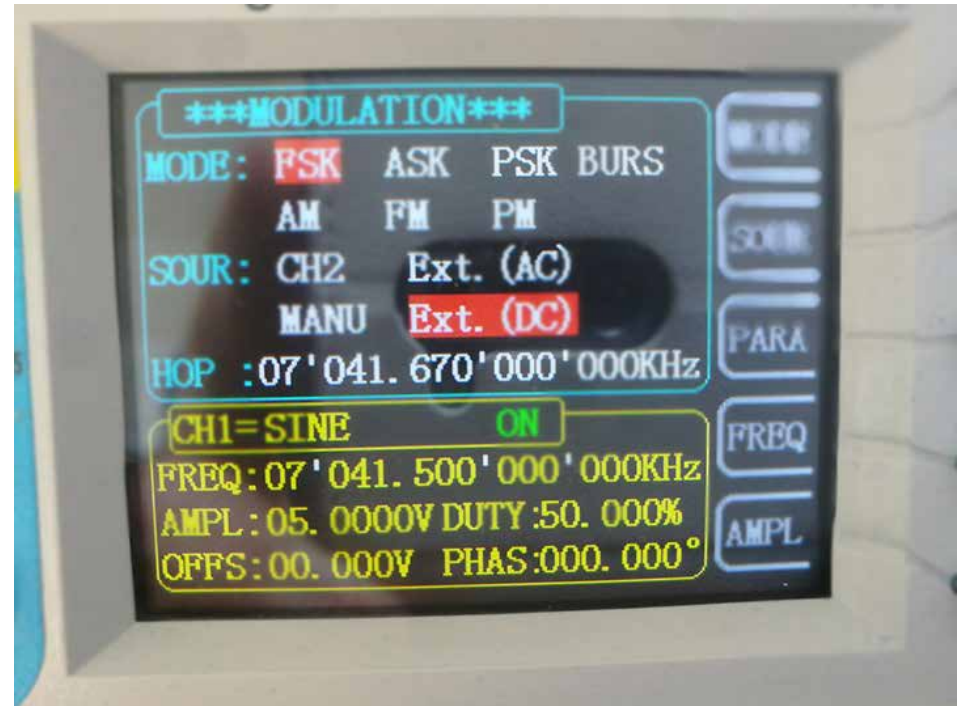
**WFK07041670000000** : main frequency and 170-Hz shift

**WMN0** : CH1 off

Each command must be finished by LF 0xa character. FY 6800 returns an LF to acknowledge.

It is possible to use PC software and spy data on a serial terminal to understand how different commands works.





### Ham Modulations Configuration

Trigger TTL input is used for FSK, PSK modulation (RTTY, BPSK31, CW and Hellschreiber)

#### RTTY (FSK)

WMF07041500000000  
 WMN1  
 WPF0  
 WPM3  
 WFK07041670000000  
 WMN

Figure: RTTY (FSK) set-up

#### Hellschreiber (same as CW)

WMF07041500000000  
 WMN1  
 WPF0  
 WPM3  
 WFK00000000000000  
 WMN0

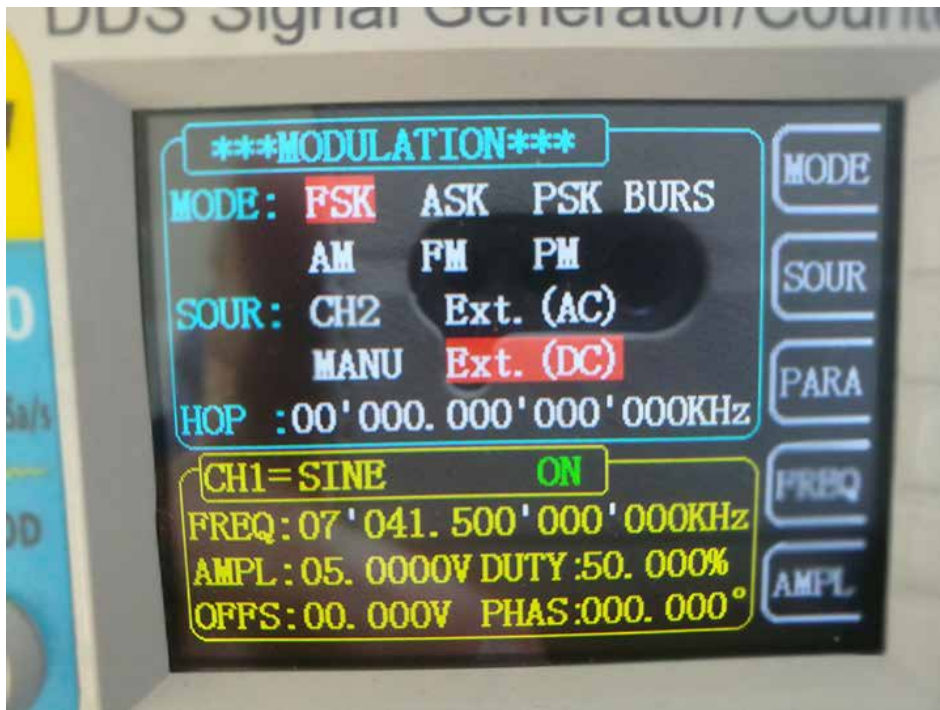


Figure: Hellschreiber (same as CW) set-up

**PSK**

WMF07041500000000  
 WMN1  
 WPF2  
 WPM3  
 WMN0



Figure: PSK set-up

**WSPR (FM)**

WMF07040000000000  
 WMN1  
 WPF5 fm  
 WPM1 vco  
 WFM00000005000000 modulation range 5 Hz



Figure: WSPR (FM) set-up

VCO input is used for FM modulation (RSID and WSPR)  
 Arduino PWM generates analog control for VCO. So a low-pass filter is added to have continuous voltage.

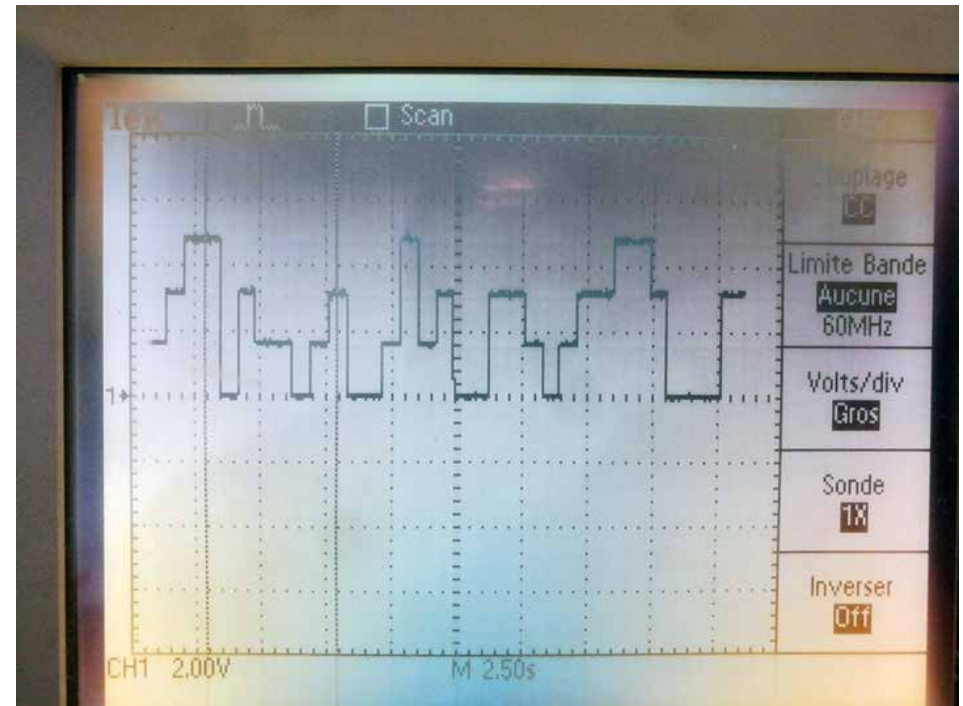


Figure: Four voltages levels for WSPR modulation

Set amplitude voltage as you want. I measure 19 dbm at 7MHz (AMPL : 5V).

To test WSPR, set AMPL to 40 mV to not saturate the receiver next to the generator.



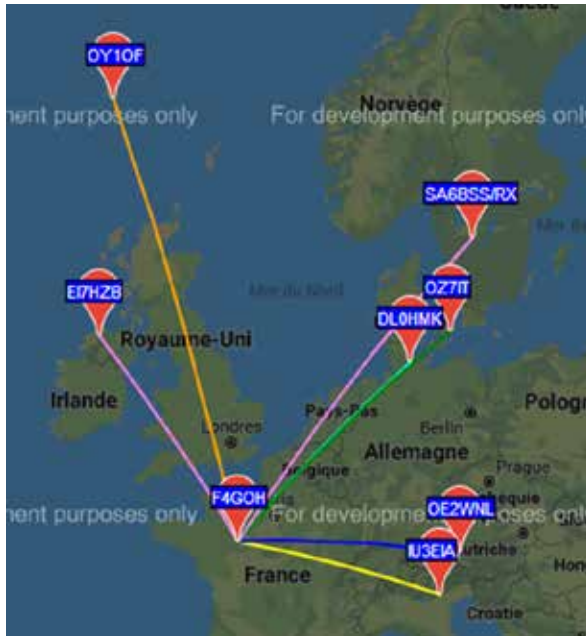


Figure: WSPR test on CH1 output at 19 dbm (AMPL : 5V)

## Conclusion

It is possible to assemble and program it in less than 30 minutes on a breadboard. The cost of the equipment is very low, so you take no risk of trying and the FY 6800 can be used for other things.

This project is usefull for understanding ham radio modulations without using ad9850 DDS.

If you improve the source code, please send me your upgrade by e-mail and I will add it on github.

###

## Donate to TAPR

TAPR is now participating in the AmazonSmile program!

When you shop using the AmazonSmile program, Amazon makes a donation to TAPR equal to 0.5% of the price of your eligible AmazonSmile purchases.

AmazonSmile is the same Amazon you know. Same products, same prices, same service.

Bookmark the TAPR AmazonSmile Program link:

<https://smile.amazon.com/ch/86-0455870>

That link takes you to a special login portal where you enter your normal Amazon credentials and get redirected at the same Amazon home page except there will now be a notice that you are supporting TAPR.

Other ways to donate to TAPR:

[http://www.tapr.org/tapr\\_donate.html](http://www.tapr.org/tapr_donate.html)

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## Write Here!

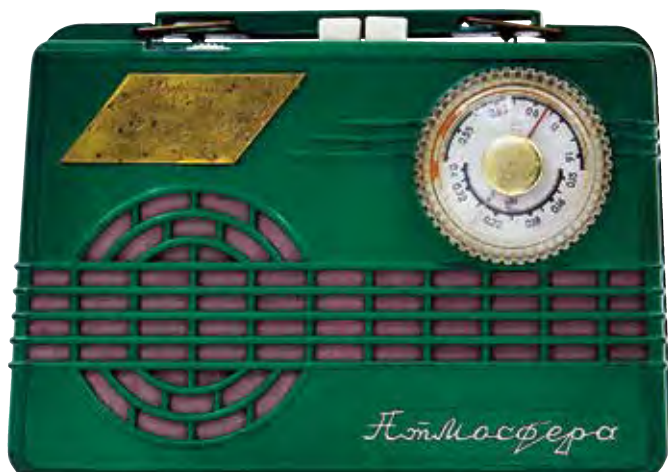
Your *PSR* editor is focusing on the next issue of *PSR* and hopes to find a few good writers, particularly ham radio operators working on the digital side of our hobby, who would like to write about their activities and have them published here in *PSR*.

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 [wallou@tapr.org](mailto:wallou@tapr.org), she can handle it!

The deadline for the next issue of *PSR* is March 15, so write early and write often.

If *PSR* publishes your contribution, you will receive an extension to your TAPR membership or if you are not a member, you will receive a TAPR membership.



## On the Net

By Mark Thompson, WB9QZB

### Facebook

As you may know, TAPR has a Facebook page, [www.facebook.com/TAPRDigitalHam](http://www.facebook.com/TAPRDigitalHam).

However, I also created a TAPR Facebook Group, [www.facebook.com/groups/TAPRDigital/](http://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.



### On Twitter, Too

### Access the TAPR Twitter account at [www.twitter.com/taprdigital](http://www.twitter.com/taprdigital).



### Also on YouTube

TAPR now has its own channel on YouTube: the TAPR Digital Videos Channel: [www.youtube.com/user/TAPRDigitalVideo](http://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!



###

## PSR

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Phone 972-671-TAPR (8277)

E-mail [taproffice@tapr.org](mailto:taproffice@tapr.org)

URL [www.tapr.org](http://www.tapr.org)

Facebook [www.facebook.com/TAPRDigitalHam](http://www.facebook.com/TAPRDigitalHam)

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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 ([wallou@tapr.org](mailto:wallou@tapr.org)) 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.

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PSR Editor:

Stana Horzepa, WA1LOU

E-mail [wallou@tapr.org](mailto:wallou@tapr.org)

## TAPR Officers

President: Steve Bible, N7HPR, [n7hpr@tapr.org](mailto:n7hpr@tapr.org)

Vice President: Scotty Cowling, WA2DFI, 2018, [wa2dfi@tapr.org](mailto:wa2dfi@tapr.org)

Secretary: Stana Horzepa, WA1LOU, [wallou@tapr.org](mailto:wallou@tapr.org)

Treasurer: Tom Holmes, N8ZM, [n8zm@tapr.org](mailto:n8zm@tapr.org)

## TAPR Board of Directors

Board Member, Call Sign, Term Expires, e-mail address

John Ackermann, N8UR, 2019, [n8ur@tapr.org](mailto:n8ur@tapr.org)

Steve Bible, N7HPR, 2020, [n7hpr@tapr.org](mailto:n7hpr@tapr.org)

George Byrkit, K9TRV, 2021, [k9trv@tapr.org](mailto:k9trv@tapr.org)

Scotty Cowling, WA2DFI, 2021, [wa2dfi@tapr.org](mailto:wa2dfi@tapr.org)

Stana Horzepa, WA1LOU, 2020, [wallou@tapr.org](mailto:wallou@tapr.org)

John Koster, W9DDD, 2021, [w9ddd@tapr.org](mailto:w9ddd@tapr.org)

Bruce Raymond, ND8I, 2019, [bruce@raymondtech.net](mailto:bruce@raymondtech.net)

Darryl Smith, VK2TDS, 2020, [vk2tds@tapr.org](mailto:vk2tds@tapr.org)

Mark Thompson, WB9QZB, 2019, [wb9qzb@tapr.org](mailto:wb9qzb@tapr.org)

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Full Page Ad for 1 issue: \$100, 4 issues: \$350

Half Page Ad for 1 issue: \$75, 4 issues: \$250

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# Membership Application

TAPR

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## Benefits of a TAPR Membership:

- Subscription to the quarterly PSR
- 10% off most TAPR kits and publications
- Access to the TAPR digital library
- Latest information on TAPR R&D projects
- Co-sponsor of the annual TAPR-ARRL Digital Communications Conference (DCC)

Name \_\_\_\_\_ Call Sign \_\_\_\_\_

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E-mail Address \_\_\_\_\_

New  Renewal  \$25 X \_\_\_\_\_ number of years = \$ \_\_\_\_\_ total

Payment Method: Check  Money Order  Credit Card

**STOP!** Provide the following information only if paying by mail with a credit card:

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**TAPR is a community that provides leadership and resources to radio amateurs for the purpose of advancing the radio art.**