



The Repeater

Next Club Meeting
 Thursday,
 January 3, 2013, 7:00 PM
 Red Cross Building,
 60 Hawthorne St., Medford, OR
 Across from Hawthorne Park

Program: Limited / Restricted
 Space Antennas and Operating

Volume 2013, Issue 1 **January 2013**

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President's Letter

Our annual Christmas party was well attended this year and I for one had a great time. There was a lot of great food and conversation. Hopefully you had a chance to see Tom's new SDR project he has been working on. I would like to thank Tom and Jeanine for their hospitality in hosting our pot luck this year.

Our executive board will be meeting to discuss ideas about club meeting presentations for 2013. If anyone has an idea for a presentation they think the club would enjoy or if you would like to give a presentation please let me or any of the club executives know.

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Secretary's Report

There is no secretary's report for December as there was no business conducted at the meeting.

The Repeater is the official newsletter of the Rogue Valley Amateur Radio Club, Inc. It is published 10 times a year—once per month excluding July and August.

January chilly nights seem the perfect time to think about summer – recall the smell of fresh-mowed grass, conjure up the feel of warm breezes in the afternoon, and yes, of course, the excitement of Field Day.

In October, I sat in a Pacifcon session entitled 'Field Day Outside The Box'. The presenter, Jim Peterson, K6EI, explained their West Valley Club approach to Field Day which I'd like to share as food for thought. The first point Jim made was to list the typical Field Day flaws: limited club involvement, not located at a visitor-friendly site, that Field Day is a routine event and offers nothing new to either the club member or to the general public. Based on this insight West Valley attacked Field Day planning with a four-pronged plan:

- Participation
- Outreach
- Preparation
- Innovation.

Participation

Jim researched all the 2A/3A sites and found they have an average of 24 participants. To raise West Valley's participation, they needed more stations, more modes, and more GOTA opportunities. They looked at HF, SSB, CW, 6 meter, satellite, and VHF possibilities. To alleviate interference, they scheduled specific bands at certain times and paid attention to antenna placement.

Outreach

Primarily the site must be visitor-friendly. They meet in a park on a hilltop location where hikers and families pass. To assist making Field Day friendly, they have a Designated Greeter, someone with a cheerful personality, dedicated to welcoming each

new attendee. This title is spread between 2 or 3 people, working in 4-hour shifts. In the wired world, they ensure West Valley is listed on the ARRL Field Day locator. And they make sure the club web page has photos of the previous Field Day. A key to Outreach is to always have at least one GOTA station, somewhere the walk-on visitor can touch the dial or place finger tips on the paddle. And consider using a key board instead. Young people have less stage fright with a key board.

Preparation

Their planning calendar begins in January with a brainstorm session. They discuss what worked best and least last year. This is the time to decide what the focus will be. Should they play the score multiplier game to determine what and where? Should they focus on gaining members? Or is Field Day a fun day for members to play with radios running off emergency power? In the March to May time frame, the club has antenna parties to practice putting assembly. In May and June, they have logging training. At this time they survey members (using survey-monkey.com) to identify preferences for operating.

Innovation

One of the findings had been that Field Day remains the same year after year. Only a few of the dedicated attend and even fewer set up. West Valley brainstormed what could be done differently. How could they make the score higher? How can Field Day be a better experience? What could they do that might seem well, crazy?

They talked about different bands, modes, sites, power levels, and antennas. And if things didn't work this year, it's okay to fail

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President's Letter, Continued

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This past year saw some healthy growth for our club. Our membership has grown and hopefully we can continue that trend. We had a very successful Field Day in spite of the unusually cold and wet weather. Congratulations to the club on taking first place in Oregon 3A. I would like to encourage everyone in the club to consider taking part in Field Day 2013 at some level. Even just coming by to socialize and show your support is important. We will have a presentation later in the spring highlighting Field Day 2012 so if you've never participated in Field Day and have been curious, that's a presentation you will want to see.

Speaking of presentations, I will be presenting the topic "Limited / Restricted Space Antennas and Operating" specifically as it applies to HF operations (also known as "How to Build Invisible Antennas") at the January meeting. If you are in a situation where antennas are "not allowed" or have limited physical space, or know someone who is, I will present ideas to overcome this and show some specific examples of how some in our own club are dealing with it.

Happy New Year to you all and I hope to see you at the January meeting.

73,

Jeff W7KNX

Begin in January, Continued

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because you learn from it.

They decided their first goal was to share the hobby with people. Contesting would be secondary. Jim stated that if CW was an animal, how do you get people to the zoo? Some of the innovative things they did were to set up a rotating satellite which is a sure people-magnet and news worthy. One year they did a build-your-own-antenna seminar to draw attendance. Another year they had a solar cooker baking cookies and an ice cream maker running off the generator. One year they had a vintage radio display to draw the public and, oh, by the way, other radios are in use over there.

One last item of interest was to build an 80 meter full-wave loop which was balloon-supported (see QST magazine articles July 2007 and January 2009). Yep, that got them on the cover of QST.

Can RVARC apply any insights from this session? Stay tuned.

73, Rita Derbas, KI6SSQ

Gnuradio

In the November RVARC newsletter, I wrote about the ARRL / TAPR DCC conference and the new Hermes 0.5 watt digital software defined radio (SDR). At that conference was a 4 hour introductory seminar on Gnuradio, a free open software program (written for Linux) that allows generating real-time digital signal processing on a PC without needing to write any code. It has pre-defined processing blocks that you can drag and drop on the screen, and wire together with a few mouse clicks.

Gnuradio provides interfaces to a couple pieces of real hardware, the Ettus Research USRP, and the DVB-T dongle (see January QST for an article about the dongle). I decided to write C++ software to interface the Hermes radio to Gnuradio. Going from never having seen or installed Linux, and no behind-the-scenes familiarity with Gnuradio, it took about 9 weeks to dig for documentation (thank you Google) learn Linux, how to modify cmake files for Linux, and then write and debug the C++ code (which is threaded, so there's a few tricky bits) and a bit of XML.

Because all the I/O is done with the Hermes board and Ethernet, the computer does not need a soundcard. The PowerSDR software uses the Hermes on-board audio amp to provide audio with no analog done anywhere in the PC. My Gnuradio implementation does use the PC audio card just to drive the speakers as it's nice to listen to what is being received. I have not yet gotten around to writing the software that uses the Mic pre-amp and audio amp that are on the Hermes radio board itself.

The net result is that the Hermes radio, which communicates with the PC using a 100M or a 1 Gigabit Ethernet connection can now be wired up to other software processing blocks just like any other Gnuradio block. The first thing to do was build a SSB

demonstration transceiver. It is based on the phasing approach. In analog circuitry, it can be difficult to make and adjust phasing networks for good amplitude and phase balance, but it's a piece of cake in software. The filters that produce the 90 degree phase shifts are drop in blocks called a Hilbert transform, which acts just like a filter but with some unusual symmetry in the taps.

The demo provides two independent receivers, adjustable filter widths, independent transmit frequency control and is full duplex (now that's unusual in an HF radio!). The basic receiver demo took a couple hours to prototype in Gnuradio and have running. The hardest part of the receiver is the AGC, since in the phasing receiver it is all done at audio. The default blocks in Gnuradio were used, but the AGC performance leaves a bit to be desired. Chatting with some of the authors of the commonly available SDR software, they spent a lot of work to get good AGC.

One of the things Gnuradio can do is to display signals in various ways—spectrum, waterfall, time domain, and constellation domain. Building a simple spectrum scope is almost no effort, just two or three blocks. The first time this was done, I set it to look at the AM broadcast band. The receiver has a maximum sampling rate of 192 KHz, so the widest spectrum that can be seen at any instant in time is 192 KHz (because the radio provides I and Q samples, the spectral width is the same as the sampling rate). It was immediately apparent that some of the AM stations in the Rogue Valley are transmitting digital HD signals on their AM carriers, the digital modulation is very readily apparent.

Another simple configuration was to build a setup for measuring the carrier frequency of WWV. The Hermes radio has an input to lock itself to a 10 MHz reference, and I con-

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Gnuradio, Continued

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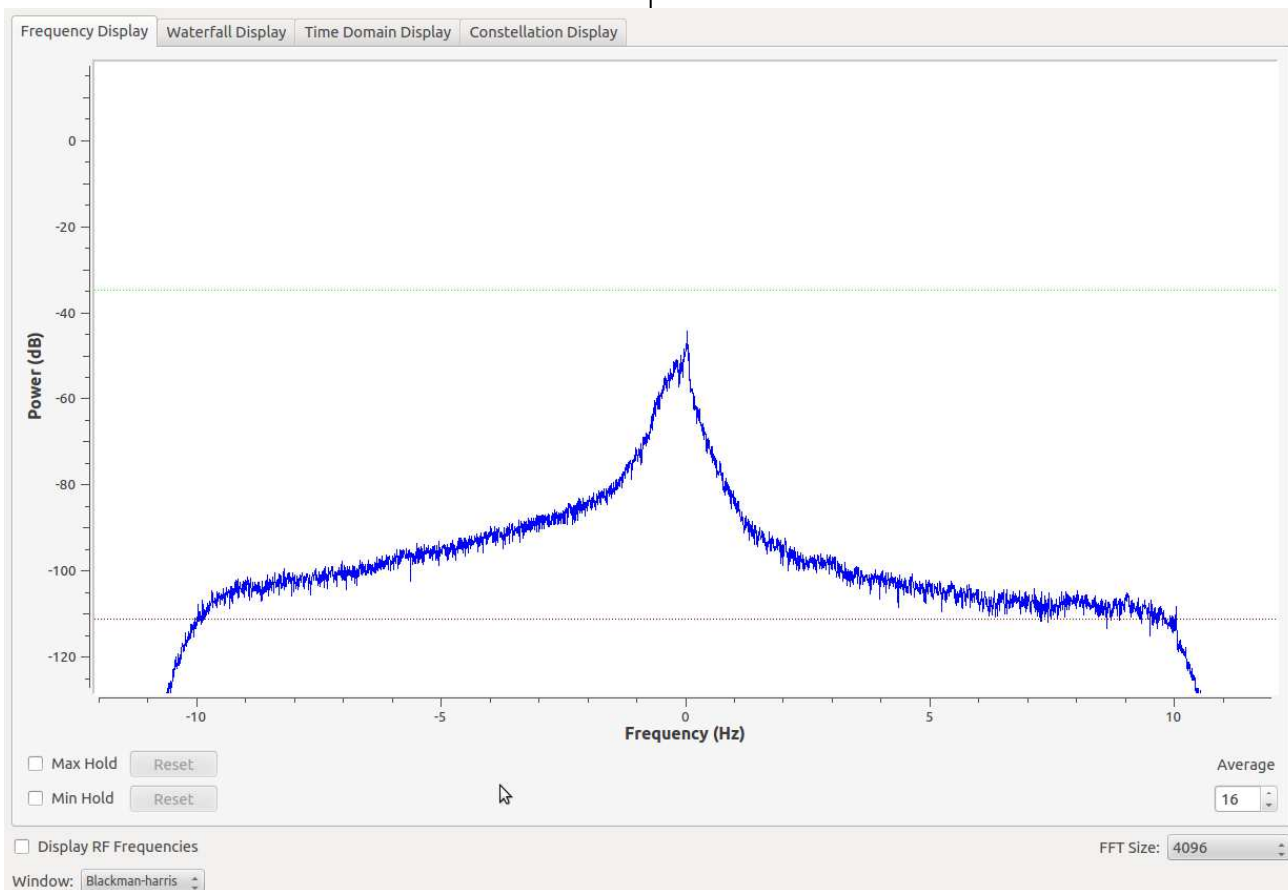
connected an HP Z3801A GPS disciplined oscillator to it.

The audio I and Q samples are sent to the left and right channel of the speaker producing binaural audio—a slightly strange sounding audio but quite listenable.

The same samples were sent to a 10 Hertz low-pass filter (providing a passband from negative 10 Hertz to positive 10 Hertz around the carrier, a total of 20 Hz width) and then to one of the Gnuradio instruments. The test run collected many samples

to look at the frequency closely. It was possible to isolate the carrier to a resolution of about 0.005 Hertz.

In an evening run, there was about -0.14 hertz of Doppler shift on the carrier due to the ionosphere drifting upwards. During a daytime run, the ionosphere was more stable, and the frequency was within about 0.02 Hertz. The deterministic frequency error of the Hermes radio is roughly 0.01 Hertz at 5 MHz (the accuracy changes with frequency due to roundoff error in the digital frequency generators within the radio), but that error can be precomputed and compensated for.



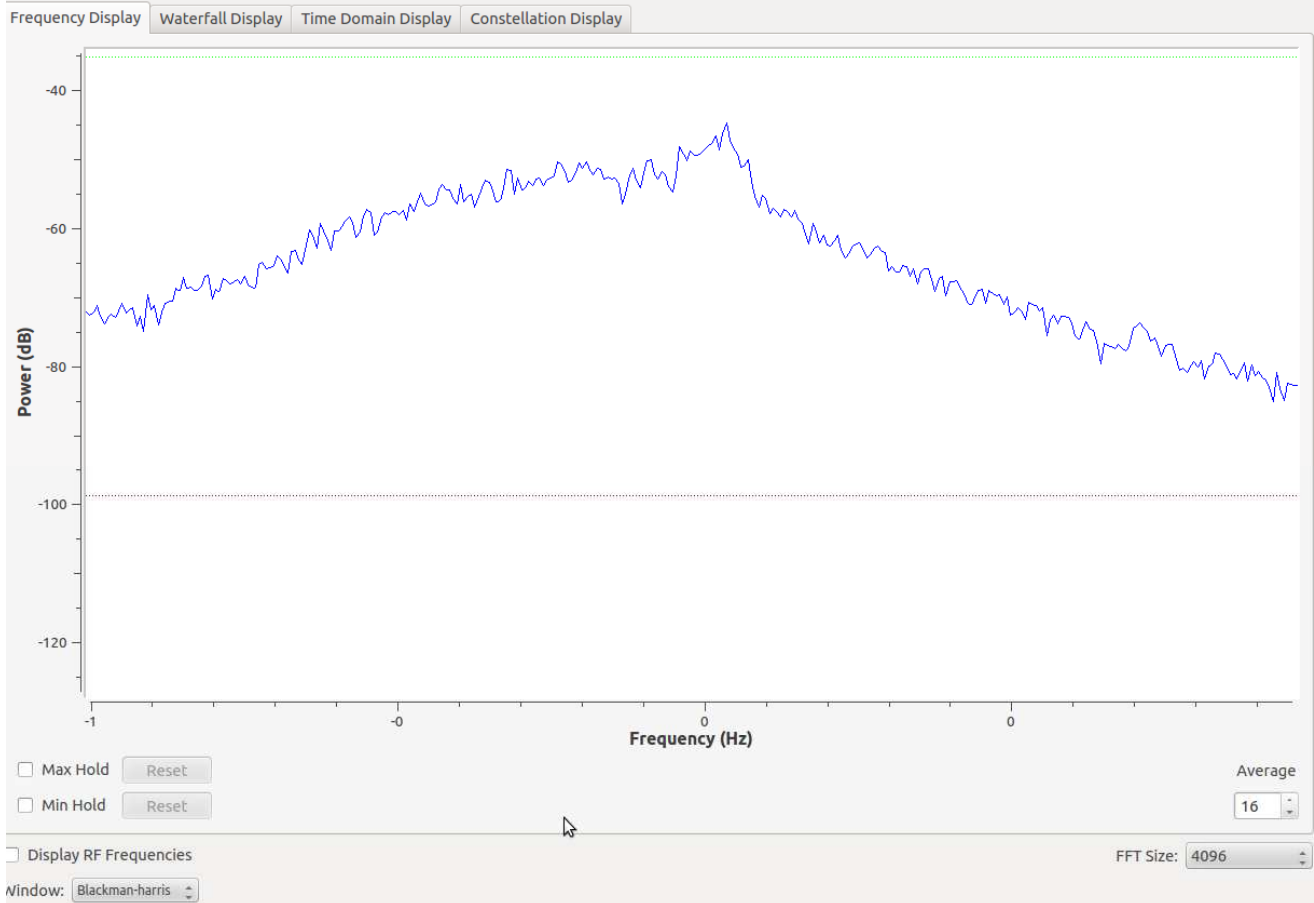
5 MHz WWV baseband spectrum—span width is 20 Hertz

and performed a FFT (Fast Fourier Transform) of 4096 complex samples to look at the frequency domain from the time domain samples. The carrier of WWV was readily apparent. 16 different FFTs were averaged

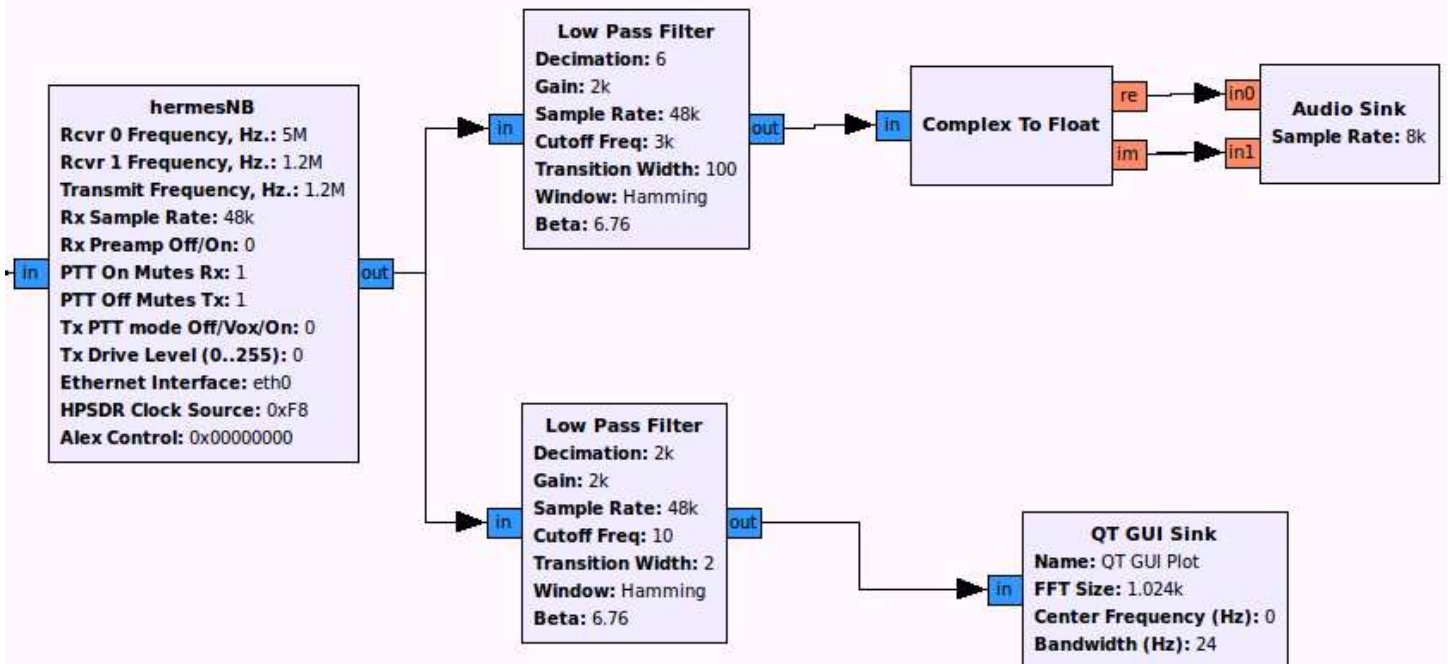
The three experiments were extremely fast to setup, run, and collect and analyze data for. Here are some screenshots of the WWV

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Gnuradio, Continued



5 MHz WWV baseband spectrum—span width is 2 Hertz, test setup (below)



RVARC Dues are Due

RVARC membership dues run from January 1 through December 31. Please bring cash or a check payable to RVARC to a club meeting, or mail (checks only) to:

RVARC Membership
c/o 102 McDonough Rd.
Gold Hill, OR 97525-9626

Regular Member:	\$20.00
Senior Member (62 and over):	\$15.00
Family Member:	\$20.00
Student Member:	\$10.00

Gnuradio, Cont'd.

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spectrum obtained and the simple configuration required for the setup.

The peak of the spectrum is about -0.05 Hertz. There is some error due to the radio itself, and some due to ionosphere Doppler shift. This is just the tip of the iceberg for what could be done with Gnuradio.

If you want to learn DSP without writing code, this is a good and a free way to do it.

Amateur Radio Examinations

In the Rogue Valley, amateur radio exams are provided by the RVARC and the SOARC. New exam participants need to provide identification, while upgrading amateurs need to **provide a copy of their current license** as well as show identification. The exam fee for 2013 remains \$15.00. All license candidates must provide a picture ID. Upgrading amateurs must also provide a photocopy of their current license to send in with their application. To search for other exam locations, see:

<http://www.arrl.org/arrlvec/examsearch.phtml>

Medford—Phoenix, OR

Time: Saturdays, 8:00 AM. Walk-ins welcome.

Location: Fire District 5 HQ. 5811 South Pacific Highway, Phoenix, Oregon 97535

Dates 2013: Feb 23 June 22 Oct 26

Contact: Don Bennett, Email: kg7bp@rfwarrior.com Phone: (541) 973-3625

Grants Pass

Time: Arrive 6:00 PM. Exam session starts at 6:30 PM. Walk-ins welcome.

Location: Fruitdale Grange. 1440 Parkdale Dr., Grants Pass OR 97527-5288

Dates 2013: Feb 22 May 17 Aug 23 Nov 15

Contact: John Stubbe, K7VSU, email: K7VSU@arrl.net, Phone: (541) 218-2244

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