

# Natural Radio

News, Comments and Letters About Natural Radio

April 2012

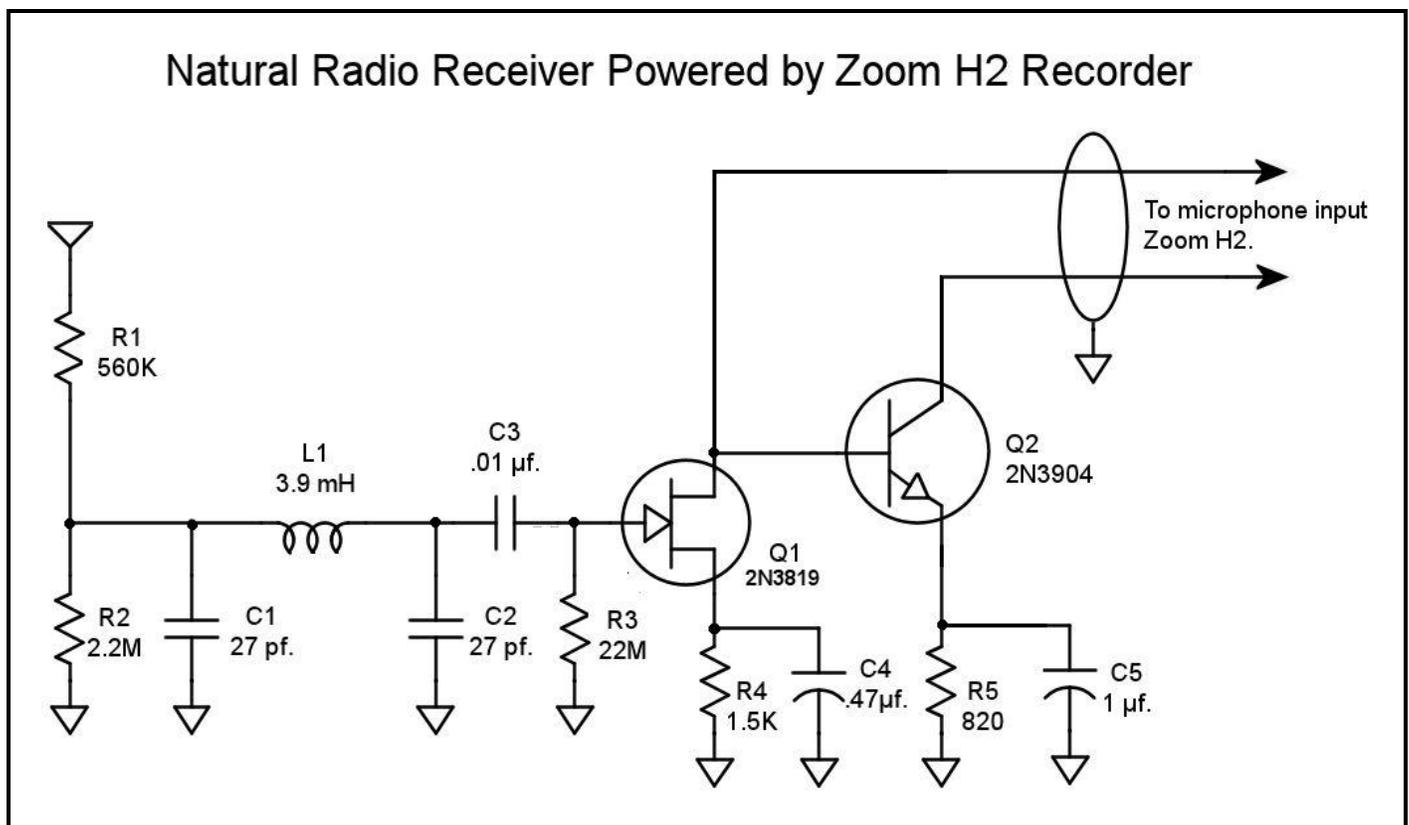
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We cooked up the traditional corned beef and cabbage for St. Patrick's Day but this year was the first time we were able to have our dinner out on the deck with flowers blooming. We celebrated in the 80-degree warmth during a string of summer-like weather that broke many records. This was quite welcome, especially after the heavy wet show of a few weeks earlier that brought down some trees and my long-wire antenna.

Late winter and early Spring also treated us to a sky show with the conjunction of Jupiter and Venus in the west each evening. For the past couple of days the crescent moon joined in the show. I was hoping to see some aurora display during the recent geomagnetic storms, but, of course, the weather was cloudy and rainy during the storm.

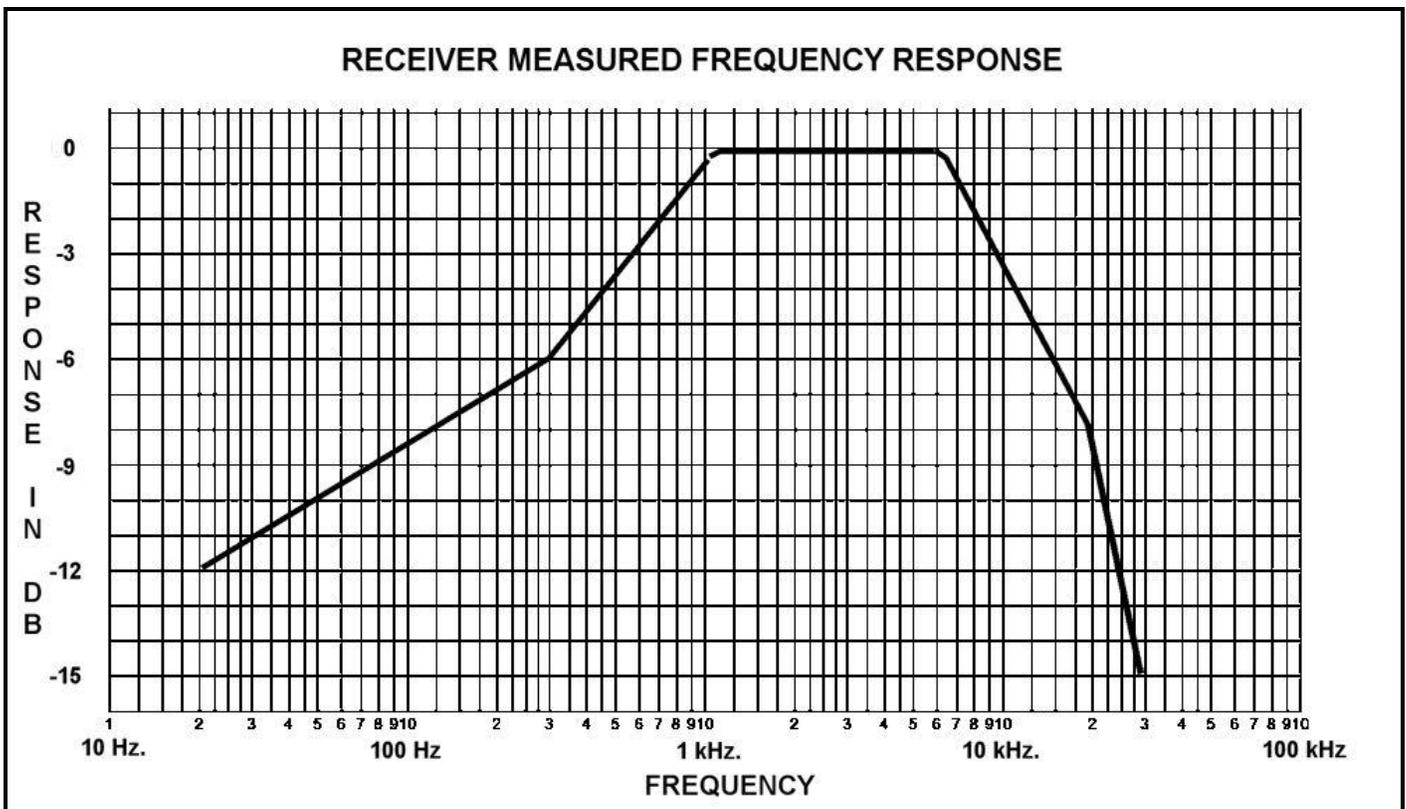
Despite the nice weather, I was able to force myself inside long enough to build up a final circuit board for the receiver that I wrote about in the December column. This was my first opportunity to use my new soldering station, and working with it was a breeze compared to the old cheap irons I had been using.

The receiver was dead when I powered it up for the first time, and after a little probing with my multimeter I determined that the FET was dead. I didn't have another NTE 132, so I substituted a 2N3819 and didn't notice any difference in performance from the original breadboard. I assume an MPF102 would also work. The final schematic is shown below with the only change to the circuit being the substitution of the 2N3819 for the NTE132.



I wanted to roughly measure the frequency response of the unit, so I removed the antenna and injected a signal through a 10 meg resistor and measured the output, choosing the 1 kHz. output level as a 0 db. reference. The measured response was close to what I had calculated, with a flat response from 1 kHz to about 7 kHz. The -3db point on the low side is at about 600Hz. with a low frequency fall-off of about 3 db per octave.

On the high end the -3db point is at about 10kHz. and the high end response drops off at about 6 db, per octave which should be more than adequate rejection in most cases, unless you are close to one of the Navy VLF stations. Also, from an operational standpoint, if you want more roll-off to get rid of hum than this circuit provides, you can engage the low-cut filter in the Zoom H2.



Again, this is not an optimum receiver design due to the constraints of low supply voltage and having to use the internal resistors in the recorder. One could probably design a better circuit by powering it with its own 9V battery, but the intent here was to build a simple functional receiver that could be powered from the plug-in power of the Samson Zoom H2.

Be aware that because of the way the receiver derives its power from the recorder, the outputs from each of the stages of the receiver feed the right and left inputs of the recorder. In most recording situations, you'll want to use the louder of the two channels. The other channel can be used as a lower gain alternate if the receiver is overloaded by the use of a longer antenna or other large signal condition.

I haven't heard any whistlers or chorus yet, as I unfortunately missed all the geomagnetic activity a week or so ago due to work commitments, but as we are on the upside of cycle 24 there should be many more opportunities for testing.

In a rough A-B comparison with my WR-3, the sensitivity seems to be about the same although the frequency response sounds different. I designed this receiver for the Zoom H2, but it could work with some of the other recorders that use plug-in power. If further real-world testing goes well, I'll see if I can talk my son Jeff into producing a circuit board for the unit.

I am still investigating using the Broadcast Wave Format (BWF) capabilities of the Zoom H2 to timestamp Natural Radio recordings and I found some software that can read and edit this data. BWF MetaEdit was developed by the Federal Agencies Digitization Guidelines Initiative (FADGI) supported by AudioVisual Preservation Solutions. BWF MetaEdit permits embedding, validating, and exporting of metadata in Broadcast WAVE Format (BWF) files. I don't know yet if the timestamp that is written by the Zoom H2 is accurate enough for the correlation of Natural Radio signals with recordings from other locations and other types of events. That's my next project now that I have BWF MetaEdit and I'll research this software and report on it in an upcoming column.

***Audacity Version 2.0 Released*** – Audacity is a superb freeware program for recording, filtering and editing Natural Radio files as well as encoding them to .MP3 for distribution over the web. In addition to being free, Audacity will run under Windows, Mac or Linux operating systems.

The filtering effects of the program allow for the removal of hum and noise. The recorded file can be displayed in waveform or spectrum mode. While the spectrum mode is certainly not as versatile as Spec Lab, it is quite useful for a quick look at you files while you are editing.

According to the Audacity website, some of the major changes in 2.0.0 over 1.2.6 are:

- Many effects significantly improved, especially Equalization, Noise Removal and Normalize. VAMP analysis plug-ins now supported.
- Improved label tracks with Sync-Lock Tracks feature in the Tracks Menu. Multiple clips per track. Tracks and selections can be fully manipulated using the keyboard. Many more keyboard shortcuts.
- New Device Toolbar to manage inputs and outputs. Timer Record feature. New Mixer Board view with per-track VU meters.
- Automatic Crash Recovery in the event of abnormal program termination.
- Fast "On-Demand" import of WAV/AIFF files if read directly from source. FLAC now fully supported. Added support for optional FFmpeg library for import/export of AC3/M4A/WMA and import of audio from video files.

Audacity is a good program with many features that make it useful for processing Natural Radio recordings. Audacity will also read Broadcast Wave Format (BWF) files that have many advantages for archiving. I took a quick look at this new version and didn't see any capabilities for viewing or editing the BWF meta-data, but I'll investigate that while I am looking at the capabilities of BWF MetaEdit.