

Short Wave Listening with Kevin Hand ZL4QD for the New Zealand Radio DX League.

If you are like me and have not got a receiver with built in Digital Signal Processing (DSP), perhaps some help can be forthcoming through the combined use of your receiver and a computer loaded with a DSP program. Over the last six weeks or so I have been playing with some of the software described below. My own setup is an FRG 7000 receiver, an interface to go between the recorder output of the radio and the soundcard line-in or microphone input of the computer, a 800Mhz desktop PC with Windows XP and some of the appropriate software. The software is all listed on the DXZONE site at http://www.dxzone.com/catalog/Operating_Modes/DSP/index.shtml and has hyperlinks to the various developers Web pages. The freeware programs are sometimes in the development stage (BETA Versions) so may have some bugs in them but these will be fixed before the full versions are released. Some of the Demo versions are limited feature versions or fully featured with time limits on their use but overall you can gauge their usefulness before paying for the full version.

BINSTER - Freeware

This is an audio filter program for a PC equipped with a soundcard and uses the FFT (Fast Fourier Transform) technique. The incoming audio is sampled at 8000Hz and subjected to a 2048 sample FFT. The unwanted frequency "bins" are set to zero and inverse FFT carried out to reconstitute the original audio minus the unwanted bits. This has hitherto been difficult, probably due to the need for "windowing" of the data before the FFT to avoid spurious products with the result that one recreates "windowed" data.

I have got over this by using a special "window". The result is a band-pass filter with infinitely variable edges and a "house end" characteristic. There is also a band reject function available and, most importantly, there is a facility for BINAURAL STEREO whereby the band-pass is recreated in stereo with low frequencies sent to the left speaker and high to the right, with all shades in between. It is thought that this aids the brain in picking signals out of the noise. There have been a number of references to this over the years (e.g. see Technical Topics in RadCom) but it has been difficult to realise in hardware.

BR-universal-Filt - Freeware

Characteristics:

- Real time DSP filter particularly for applications of amateur radio
- IIR, FIR filter, low-pass, high-pass, band-pass filter, band suppressor (notch filter) individually adjustable
- noise filter, irregular signal filter, hum filter, peak filter
- frequency tuning and inverting
- mixer support
- support of several soundcards (also virtual soundcards) e.g. VAC - Virtual Audio Cable
- small file size
- simple to use
- multiple language support

Requirements:

- at least 1 soundcard full-duplex
- at least Pentium 200 MHz
- 32 bits Windows operating system
- installed soundcard driver

DSPFilter - MM Hamsoft - Freeware DSP filter by JE3HHT

This is a DSP filter tool using a PC with the soundcard.

With this tool, you even can design various types of digital filters including adaptive filters.

However, this tool is just experimental and will not afford the practical use for amateur ham radio.

You probably need a powerful CPU to make this tool run flawlessly. In addition, you need a soundcard with the full-duplex mode.

I made this program just because of my own interest.

As I was not quite familiar with the use of the soundcard, it still has substantial time lag from input to output and might not well work for CW. Needless to say, this program is freeware. (These notes are from JE3HHT)

FFTDSP – Demo Version by AF9Y, Mike Cook. FFTDSP is a PC program which can detect weak radio signals in real time. Uses the PC's soundcard and advanced signal processing techniques, extracts and displays weak signals from the receiver audio.

Key Features of FFTDSP42 are:

- Real Time Colour Spectrum Graph with 2 Hz Filtering (4096 Point FFT)
- Automatic Colour Gradient for Optimum Visibility
- Numerical Frequency display of Max Amplitude Signal (2 Hz resolution)
- Record and Playback WAV files for post spectral analysis
- Integration mode for signal detection below the noise
- Mouse point and click for selective recording
- On screen Moon Az/EI, TOD & East/West sequences
- True S/N (in 100 Hz ref) measurement & bar graph
- Selective area and mode for S/N display
- Display Smoothing Filters (Hamming, Cosine, etc.)
- Zoom In/Out for narrow (1300 Hz) or wide (2500 Hz) display
- Improved Graphics Interface and Setup Screens
- Find Call feature shows most probable calls
- Object tracking by RA/DEC
- Data Logging for long term unattended monitoring (such as SETI)

System Requirements:

- 386, 20 Mhz with Coprocessor
 - 486 recommended for future upgrades
 - Sound Card
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- Media Vision ProSpectrum-16
 - Thunder Card, Sound Blaster, Sound Blaster-Pro
 - Sound Blaster ASP-16, AWE32, AWE64

Free programmable DSP-Filter - Free programmable LOW/HIGH/BANDPASS FIR filter in the audio range 0-4kHz Zip file

SDRadio - Freeware version written by Alberto, I2PHD. An experimental Software Defined Radio, with AM, ECSS, SSB and FM demodulators, with a highly graphical interface.

RadioCOM – Demo Version from Bonito. Decode digital and analog signals out of any high quality Transceiver or Receiver, works as a DSP-analyzing system. This programme will enable you to decode digital and analog signals out of any high quality Transceiver / Receiver. It will also improve sound readability quality, This ability was only possible before hand using a High Cost DSP-Receiver and or complex active and costly filters. All of this is possible using the existing DSP capabilities of your Computer and (DSP) Sound, and all of this Without any complicated hardware interfaces, the signal from the Receiver goes directly into the computer for processing. With a COM-Port and Soundcard combination Transceiver / Receiver can be accomplished as well. The DSP processed and filtered signal will normally output from your computer-loudspeaker system. RadioCom 4.0 will be delivered in the basic version with BONITO -DSP-filter-analyzer, RTTY, CW, FAX, SSTV and DCF77-decoder.

Spectran – By Alberto I2PHD. Freeware Program designed to do spectral analysis and real-time audio filtering on audio signals for EME, VLF, SETI applications.

WD6CNF DSP Filter – Freeware Audio Digital Filter, two bandpass filters, three notch filters, two noise filters, graphical setting of filter centre frequency and bandwidth. Drag vertical lines on top of signal, Microphone input, speaker output Mono, 5 kHz bandwidth.

The software is just a sample of what is available and there are upgrades to some of it being developed as well as new programs being written. The interface I have used is one I built for decoding digital modes (PSK31 etc) on my computer and consists of an appropriate sized plug on each end of a cable which is terminated on a 1:1 transformer of 600ohms per side. Information on various interfaces have appeared in Break-In from time to time or can be found on the Internet if required.

Happy listening.

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