FIR Filters for RIAA

There are two folders containing minimum phase FIR filter coefficients for RIAA equalization in both text and wav format. There are files for 48K, 96K and 192K sampling rates as well as duplicates employing the extra 50K time constant that some recommend to compensate for cutter head roll-off/phase.

The text files are in the SoX .dat format as shown below.

```
; Sample Rate 48000
; Channels 1
0.000000000e+00 5.966590663e-08
2.083333333e-05 -5.982466236e-08
4.166666667e-05 5.998405294e-08
6.250000000e-05 -6.014408199e-08
…
```

Here the first two lines contain the sample rate and the number of channels and each subsequent line contains the sample time and value at that time. Excel can be set to import just the second column skipping the first two lines from its import dialog so a simple text file of just the coefficients can be easily created.

The files all have the peak value and hence the processing delay at different points, in general a slight delay which is equal in both channels does not matter for the purpose of simply listening. The text version of the files are all normalized to 1.0 so the peak can be found by a simple search in the second column if this is important in a particular application.

SoX Batch Files

It's very easy to create a drag and drop .bat file to facilitate file conversions and other signal processing in SoX. It only requires an awareness of a small subset of DOS batch file commands and syntax. For instance, to convert a .wav file to a .dat (plain text) file one would do this…

```
cd %~dp0

FOR %%A IN (%*) DO sox -D %%A %%~nA.dat

Pause
```

When you drag a set of files onto this batch file ~dp0 contains the directory that the batch file is in and you cd to that directory first. Then for each file in all the files dropped run sox with no dither (-D) and save the result in this directory as a .dat

file with the same name. Whenever possible SoX uses the file extension to figure out the “right thing” to do so dropping a .wav file results in the simple translation of .wav to .dat with no dither. There are many web resources for translating the sometimes cryptic batch file syntax, and the SoX manual describes building a command line which can include both IIR and FIR filters as well as several options for adjusting gain or normalization of the output.

The reverse process…

```
cd %~dp0

FOR %%A IN (%*) DO sox -D %%A -e signed -b32 %%~nA.wav gain -2

pause
```

Here we read a .dat file and set the output format to 32bit signed integers, the highest resolution 32 bit format. I have set the gain to 2dB below full scale for .wav files because I have run across some low cost sound cards that clip internally with files that go to full scale.

For both of these SoX has to be in your $path or the same folder as the batch file.