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**FA mode USER HINTS for DHNRDS V1.4...  
Updated for V1.4.2A  
Example decodes included to use new V1.4.2A features**

This contains user hints for doing the EQ on the V1.4X versions of the FA mode of the DHNRDS decoder.

At the end of this note -- good performing equalization settings for recordings in my own library.  
The current default --tone= value is -13.425. Sorry about the change!!!

First, in the FA decoder, there are three general equalization modes for FA decoding. All of the variations are on the EQ and stereo imaging portion of the decoding process. The DA portion of the decoding is ALL the same. 'Calibration' (or --tone=xx.xxx) is the major parameter that reaches into the DA decoder itself.

\*\*\*\*\* NEW NOTE: \*Important\*

As the decoder has become more clean and more accurate, a certain quandary has appeared... The FeralA encoding does manipulate the stereo image, and sometimes it appears that adding a switch '--wof=1.19' helps a lot. Basically, this widens the stereo image by  $2^{(1/4)}$ . There are lots of numbers in the encoding/decoding that are related to powers of two -- interesting, heh?

\*\*\*\*\* NEW addition for V1.4.1F and newer:

Certain recordings have a 'phase twist' in the 3k to 9kHz frequency range. There are two new add-on options for the '--fa', '--fb', '--fc' and '--fD' modes. Along with the normal 'x' through 'Z' mode modifiers, and the 'm' modifier for the LF twist, there are two new modifiers that add an 'HF' twist. The modifiers are 'a' and 'b'. The modifier would be used like '--fb=bX', where the 'X' would have previously been used, and the 'b' modifier is added BEFORE the 'x' through 'Z' modifiers.

The benefit for the 'twist' is difficult to describe. It can improve the stereo image, fix distorted sibilance, and soften the HF intensity to a more normal level. The 'a' twist is a little weaker than the 'b' twist, and it is possible that the 'a' twist is actually more accurate, but the 'b' twist can also be helpful

It is possible that using the 'a' or 'b' phase twist might sometimes be a superior alternative to using the '4' level EQ filter (which is the 12kHz rolloff.)

**\*\*\*\*\* NEW additions for V1.4.2A and newer:**

There are some cases where sibilance is a problem. That is often due to the 3kHz shelving boost being too strong. When this persistent sibilance is happening, then a new modifier can often be helpful: '-', just add the minus character. There are several possible levels for the needed boost, so multiple '-' characters can be used. Very often, 2 or 3 minus characters are needed. (They shift the shelving boost by -0.75dB for 2 or -1.0dB for 3 minus characters.

Also, sometimes the sound can be fuzzy or soft, but no other available method helps the problem (e.g. using 'a' or 'b' do not help.) Sometimes filters with alternative Q values are helpful. The available characters are 'Q', 'q' and 'R', 'r'. The 'uppercase' versions tend to be the most useful. I have used these options on ancient Carpenters recordings.

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decoding testfile.wav in the distribution (olivia newton john snippet):

**da-avx --info=1 --fc=4 --tone=-13.425 --basic --wof=1.19 --input=testfile.wav --overwrite --output=output.wav**

(--overwrite is used to overwrite the 'output.wav' file if it already exists)

\*\*\*\* Warning about simplicity -- this doc blathers on a lot, just look at the parameters for each recording at the end of this note. Remember, as one example, the command line can be trivial, like for windows can look like this:

\*\*\* EXAMPLE COMMAND

da-avx --info=1 --fb=4 --tone=-13.425 --normal --input=infile.wav --output=outfile.wav

\*\*\* EXAMPLE COMMAND

The magic parameters are '--fb=x' and '--tone=-13.425' and aren't difficult to come up with. '--fb=x' is one of many EQ values, basically a 'tone control', and the '--tone=xx.xxx' number is a calibration number, and usually it can be selected from a small set of numbers like: --12.85, --13.35, --14.40. They aren't terribly critical, but with a good ear, you can tweak them in!!!

\*\*\* --tone= always comes after --fa,--fb,--fc,--fd !!!!

In many cases, on a non-normalized, raw, CD in FeralA form, a simple use directly on wav file input and output like might be sufficient:

(NOTE THE UPPERCASE 'D' in --fD)

```
da-avx --input=inputfile.wav --output=outputfile.wav --fa=<letter> or <number> --tone=xx.xxx  
or  
da-avx --input=inputfile.wav --output=outputfile.wav --fb=<letter> or <number> --tone=xx.xxx  
or  
da-avx --input=inputfile.wav --output=outputfile.wav --fc=<letter> or <number> --tone=xx.xxx  
or  
da-avx --input=inputfile.wav --output=outputfile.wav --fD=<letter> or <number> --tone=xx.xxx
```

or

```
da-avx --input=inputfile.wav --output=outputfile.wav -fa=classical,N --tone=xx.xxx  
(N is probably 3 or 4)
```

```
da-avx --input=inputfile.wav --output=outputfile.wav --fb=classical --tone=xx.xxx  
da-avx --input=inputfile.wav --output=outputfile.wav --fc=classical --tone=xx.xxx  
da-avx --input=inputfile.wav --output=outputfile.wav --fD=classical --tone=xx.xxx  
(sometimes using --fa=<letter>,classical helps, where an example might be --fa=x,classical)
```

where N might be 0, 1, 2, 3 or 4. Also, classical' mode is a lot different than the default mode!!!!

--fa is used for recordings with little EQ, and --fb/--fc/--fD are for progressively greater EQ.

--fb is similar to --fa=2, but has a more accurate behavior for many recordings.  
Where --fa=2 might have been used in the past, --fb might sometimes be better yet.

Note: --fb is now usually the best starting point, except for classical material.

Note: The ability to specify multiple filters in the same command... Cannot repeat the same one twice.

### About the --fa, --fb, --fc, --fD modes....

These modes are the coarse grained setting. It seems usually best to use these modes rather than, for example using '--fb=4' instead of '--fa=2,4'. This isn't always true, as the filter put in place for the --fb mode \*is different\* than the --fa=2 mode, but there are similarities. Each one has very very subtle differences in character, but my experiments are showing that the 'dot level' filters (that is, the numbered filters) should be used for adjustments of the highest frequencies, while the general shape of the curve should be set by the --fa,--fb,--fc, or maybe --fD.

**\* IMPORTANT REPEATED STATEMENT: The numbered filters should be used for adjustments of the high frequencies while the general shape of the EQ curve should be set by '--fa' or '--fb' or '--fc' or maybe '--fD'.**

I found this out when trying to adjust certain material, with a high frequency edginess or slight grain left in the sound when using the numbered filters alone. So, I brought out some previously developed/tested 2nd order (letter) filters for the coarse grain adjustments, where they seem to work much better.

Generally, the filtering is still very similar, but I felt that it would be a good thing to add in an additional layer of flexibility. \*I resisted the addition\* because I wanted the tuning to be as simple as possible, but the decision was made because SOUND QUALITY IS PARAMOUNT.

Note: difference between --fb and using --fa=2, the --fb uses a special series of 2nd order filters vs. a single first order filter when using the 'fa=2'. There is a small audible frequency response difference, plus a different delay characteristic. For many applications, a mix of the 1st order and 2nd order filters sounds much more correct than using the 1st order filters alone.

(--fbp NO LONGER NEEDED, and --mfm is unlikely to be needed as the mode is automatically enabled now.)

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The modifiers for the --fb, --fc, --fD modes are: x, X, y, Y, z, Z or numbers 0 through 4  
The '--fX' commands are specified like --fC=x or --fb=z or --fb=z,4

\* V1.4.1F and newer have the twist modifiers: 'm' for the MF twist, and 'a' or 'b' for the HF phase twist.

The --fb, --fc, --fD specify the general shape of the EQ curve. However, sometimes there is benefit to adjusting the rolloff (sound too grainy.) Each successive mode modifier 'x through Z' generally has a stronger decrease in HF grain. Usually, x or X are needed. z is moderately strong and Z is fairly strong.

An alternative modifier is to use the 'number' version like '4, 3, 2, 1'. '4' starts off with the least modification and is the most used with --fb through --fD. '3' is also sometimes needed instead.

'4' corresponds to a EQ 12kHz rolloff, and '3' corresponds to a 9kHz EQ rolloff.

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--fb, --fc, --fd run a very carefully selected sequence of EQ at 3k, 6k, 9k and if the y through Z modifier is used, then 12kHz or perhaps 15kHz is added on. The EQ sequence is NOT simple and is designed to mitigate IMD. The numbered filters can be used as add-ons with a comma.

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**The 'Calibration issue'... Which should I use -- the -12.85dB range, the -13.40dB range or -14.40dB?**

**Ans: Yes.**

Since we are undoing a DolbyA compression, we are dependent on the calibration used when creating the file, and also the sound effects created by calibration mismatch. Both calibrations appear to be correct at one time or another, and some of the calibration difference doesn't only come from the recording, but also the EQ match/mismatch.

All this equivocation aside, which one is correct? actual answer: which one sounds best. The FeralA process is a distortion process, and undoing the distortion is a matter of 2nd guessing what the mastering engineer did. It appears that when the 2nd order filter modes are enabled (--fb, --fc), then the -12.85dB tends to decode more correctly more often.

Note: the actual distortions happen more in the LF range up to about 1kHz, with a diminishing effect. A small calibration error, when it is in error, even without the anti-distortion modes, create slight amounts of distortion when compared with the gross amounts from FeralA encoding that we are undoing.

Note: the calibration sounding 'correct' appears to have steps of 0.60 through 0.80dB. However, in each 'correctness' range, there will be a noticeably different frequency balance. I have found that usually the lowest or 2nd lowest correct sounding calibration is best/most accurate WRT reference recordings.

No matter if there is a calibration error, there will very likely be a major improvement when 'undoing' FeralA at all.

### The technical intermodulated sibilance issue...

This is a challenging one, but has been mostly mitigated by the FA decoder. DolbyA has a super fast attack/release time, but is variable. This variable attack/release is designed to mitigate distortion effects from IMD between the audio and the gain control signal. The frequency range between 150-1kHz appears to be very vulnerable to distortion effects though -- moreso than one might guess. The FeralA encoding also appears to have a lock and key scheme, where the filters are designed to create IMD when decoding the FeralA without due consideration of the 250Hz filter offsets. Somewhere, somehow, there will be a 250Hz intermod mixing with the sibilance & other signal between 250Hz and 1kHz. This is an ugly sound indeed. One advantage of that ugly sound is that it is much better mitigated when the calibration is set accurately, but there is still the latent distortion -- even if the calibration is nearly 100% perfect. A special set of filter frequency offsets are utilized to further mitigate the apparent 250Hz modulation of the resulting audio. This has been very problematic, and the major left over problem in the audio. The carefully chosen filter frequencies will cancel most of the distortion effects.

At the time of writing this note, these corrective offsets cannot be disabled. I am considering a facility to disable the offsets, so that the distortion is more audible perhaps allowing easier 'tweaking-in' of the calibration and EQ.

Using the decoder is already difficult enough -- so I resist adding more complexity at this time, but there JUST MIGHT be a facility to disable the offsets added and documented in an addendum.

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#### 'Pop mode':

This mode does a unwrapping of the stereo image that is all packed up so that some of the effects of the compression are somewhat hidden. Also, the EQ on this mode is generally focused on the need to compensate for a treble boost that is used to brighten FeralA pop recordings. However, there is a default mode which does a raw compensation without anything but the basic MF/initial HF boost. This mode is invoked by a 'number', starting with '0'. However, this most basic mode is --fa. This will tend to be the most 'bright' sounding of this series, but after the '--fa' without an argument, then the modes start with '--fa=0', which is the most 'dull' sounding, and then becomes progressively more bright up to a maximum value. A lot of recordings do like each level of EQ. --fa by itself is sometimes needed all the way up to --fa=4.

Typical examples for this mode: '--fa'/'--fb'/'--fc' or '--fa=2', '--fb=3', '--fc=4'

#### 'Classical mode':

This mode does no manipulation of the spatial image, and generally is based upon the encoding having only minimal amounts of HF enhancement. That is, there is generally less low pass filtering in this

decoding process. Also, some recordings require an HF boost above about 3kHz. This mode is invoked when using the '--fa=classical0' or '-fa=classical1', on up to '--fa=classicalN'. Each progressive mode tends to be brighter than the previous. (It is NOT a monotonic increase, but is generally true.) '--fa=classical2' might be a good place to start, and might be good at that level.

Typical example for this mode: '--fa=classical' or '--fa=classical,4'

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~~These '////' comments below are old commentary, still might have useful information—but not probably needed anymore.~~

~~///(NOT NEEDED ANYMORE) 'Harshness modification': (the most likely needed of secondary switches)  
/// Some recordings might appear to be hard sounding, or maybe too bright—but the response is correct.  
/// This is because of the Q of a certain filter, and some recordings appear to be made with one  
/// response shape or the other. There is a general purpose switch for changing the Q of one of the  
/// equalizers (a 2.75kHz shelving boost). The gain is by far, usually correct, but the curve is sometimes  
/// too aggressive. By specifying the 'fbq' switch with no arguments, the alternative shelving boost  
/// shape is chosen. (The fbq switch also supports specifying the Q value—not often/ever needed.)  
/// The switch from the Butterworth Q=0.707 vs the Bessel Q=0.50 are practically always sufficient.  
///  
/// Typical use would be: 'fbq' (means, 'boost Q value'), theoretically values like fbq=0.8409  
/// might also be an alternative, but the most useful value change 'fbq' synonym is 'fbq=0.50'.~~

~~///(Automatic now: POSSIBLY USEFUL to DISABLE) 'Lower MF modification': (secondary importance)  
/// I found that some recordings have an lower MF de emphasis that is apparently intended to get rid of  
/// muddy sound that DolbyA can cause. Raw DolbyA material can smear the middle lows and make them sound  
/// woody and 'heavy'. This modification (which does have multiple modes) can be invoked by using  
/// the 'mfm' switch. The 'extra' modes are not normally needed, and not worth the complications in use.  
/// However, the very simple mfm switch might help mitigate some apparent odd distorted lows. This is  
/// not an optimal bass boost switch, but can be used as such because the effect tends to be gentle.  
///  
/// Use this switch for subtle upper bass distortion improvement, if needed: 'mfm', 'mfm=no', 'mfm=yes'  
/// (some of the modes enable mfm, so mfm=no might be useful)~~

~~{spc: Probably not needed}  
/// 'Special mode': (maybe not needed—tertiary interest for now.)  
/// This can be thought of as a modification of the 'pop mode', where the recordings were actually  
/// softened a little. The special mode is the longest sequence of values, starting with 'fa=spc0'  
/// that has the most mild brightening all the way up to a maximum value. Even though it might  
/// seem like this is an 'enhancement', but it is NOT an enhancement unless used as such. It actually  
/// compensates for EQ done during the mis-mastering process.  
///~~



~~/// Typical example for this mode: '--fa=spc0'~~

The major adjustment other than EQ is the 'calibration', which uses the '--tone=-xx.xxx' switch. The default value is --tone=-13.30. A first cut on using it -- sibilance is modified by this switch, and if sibilance sounds 'stunted', then decrease this number by 0.02 or 0.03. If the sibilance sounds like a snake, then increase this number by 0.02 or 0.03. If this number is too far off, then gating or surging can happen. Large amounts of adjustment are needed most often when the material has been normalized.

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Summary:

Other than the input/output file specification, or the quality mode specification (--normal, --basic, --xtraplus, etc), the two most important parameters are for enabling the FeralA mode and setting the base decoding EQ with the '--fa=XXX' switch. The other important parameter is the 'calibration' using the '--tone=-xx.xxx' switch.

Use of these two important switches: --fa, --tone, are explained above...

**Until you are comfortable with using the decoder, don't even worry at all about the decoding quality selection.** The default mode: '--normal', is almost always good enough. '--basic' mode is quickest, '--normal' is a little slower & better quality, but the super high quality modes are very slow.

**EQ modes for each album. Here, I am only showing the EQ switches & calibration**

Example command:

```
C:\> da-avx --info=1 --fb=X --tone=-13.425 --input=carpenters.wav --overwrite --output=carpdecode.wav
```

All of the below can use a similar command, with just the correct --fb,--fc, --fD value and correct tone.  
**(WARNING - each disk release is different, yours might be different from mine, these are just guides)**

Carpenters:

1969 Ticket To Ride

Basic switch: --fb=--Rb4

Tone: -13.75

1970 Close To You

Basic switch: --fb=--Rb4

Tone: -13.75

1971 Carpenters

Basic switch: --fb=--Rb4

Tone: -13.35

1972 A Song For You

Basic switches: --fD=--Rb2

Tone: -13.35

1973 Now and Then

Basic switches: --fc=--Rb4

Tone: -14.475

Linda Ronstadt:

Greatest Hits

Basic switches: --fa=--b

Tone: -13.49

Suggestion(maybe): --wof=1.19

1977 Simple Dreams

Basic switches: --fa=--b4

Tone: -13.49

Suggestion(maybe): --wof=1.19

Nat King Cole

Nat King Cole Story/Analog Productions

Basic switches: --fb=--b3

Tone: -13.49

Suggestion: --wof=1.19

Sergio Mendes, Brasil'66

The Very Best

Basic switches: --fc=---b4

Tone: -13.49

Suggestion: --wof=1.19

Herb Alpert & Tijuana Brass

Basic switches: --fb=b

Tone: -13.49

Suggestion: --wof=1.19

London Philharnomic 50 Greatest Classics

Basic switches: --fa=a,classical

Tone: -13.45