How to dehiss an archive soundfile

About DART DeHiss

Archive recordings are corrupted with many different kinds of disturbances. Among the most frequently encountered ones are impulsive disturbances (clicks, pops, scratches) and wideband noise (tape hiss, surface noise of vinyl records) caused by aging and/or mishandling of recording media such as vinyl records or magnetic tapes. The DART's (Digital Audio Restoration Technology) **DeHiss** plug-in is a wideband noise reduction utility based on a standard noise model.
Even though **DeHiss** was not designed to cope with impulsive disturbances, it is capable of reducing clicks - small clicks are completely eliminated in the process of removing wideband noise; the large ones are reduced in size.

How to tune DeHiss

There are five parameters you can use to control the process of sound renovation - one primary parameter, deciding upon the rate of noise reduction (*gain*) and four secondary ones which can be used to adjust degree of spectral smoothing (*smoothing range*), degree of high frequency attenuation (*frequency carving*), the size of the local analysis frames (*frame size*) and degree of frame overlapping (*overlay*). We recommend you start tuning **DeHiss** by adjusting the primary parameter only, keeping the other processing parameters fixed on their nominal values. As long as it becomes clear what are the most appropriate gain/weight values you can try to further improve the results by means of fiddling with the remaining "tuning knobs".

Gain

The gain coefficient, deciding upon the amount of noise the program attempts to reject from an audio file, is the most important "knob" you have to tune when using **DeHiss** (you can pick one of the five standard gain values from the gain list; for fine tuning use the slider). The best results are obtained, of course, if the assumed noise intensity matches the true one. If you set the noise intensity at a too low level the renovated signal will contain an audible residual noise; if the level is too high the sound may become dull, muted and/or distorted. Be aware that since the gain is expressed in logarithmic units, even small changes in its value may cause significant changes in the renovation results.

Smoothing range

A special spectral smoothing technique is used to reduce the residual noise. If the degree of smoothing is too low the renovated signal will sound rough and/or mechanical. In extreme cases it will be corrupted by a specific disturbance called "musical noise" - a random combination of different tones as if someone was casually striking different piano keys. If the smoothing range is too large the restored signal may sound hollow and lifeless.

Frequency carving

Lowpass filtering is perhaps the simplest way of reducing broadband noise. Even though **DeHiss** suppress the high frequency components of the processed sound you will usually get improved results if some extra attenuation is forced in the range of high frequencies. The degree of high frequency attenuation should be chosen in accordance with signal characteristics, e.g., to preserve rich sound of some musical instruments (a church organ, for example) you have to use this tool with caution. On the other hand, without frequency carving the renovated signal may sound mechanical and/or the residual noise may be too emphasized.
The choice of the rate of frequency carving should depend on the sampling frequency (you can safely use large and very large rates for 44.1 kHz recordings but in most cases you should pick small or normal rates for the 22.05 kHz files) and on the noise level (for very noisy audio files large rates are advisable).

Frame size

In the course of processing, the signal is divided into the partially overlapping analysis frames. Longer

frames yield more uniform renovation results - use them when the signal to noise ratio is small. For high and moderately high signal to noise ratios try shorter frames as short frames will help you preserve freshness and liveliness of the original sound.
Use shorter frames to process speech signals and longer ones to deal with songs and instrumental music.

Overlay
You can use this parameter to control the degree of frame overlapping. By decreasing overlays you can speed up the renovation algorithm - at the price of a slight deterioration (if any) of the restoration quality. Since short overlays may occasionally produce buzz-like artifacts we recommend you use the longer ones for high quality restoration.

General guidelines
The following two guidelines, summarizing the detailed discussion carried out above, should help you use the **DeHiss** interface in a rational way

- In order to achieve ***greater noise reduction*** try to ***increase*** the noise reduction gain/weight (first choice) and/or to ***increase*** the remaining processing parameters
- In order to make the restored signal sound ***more natural, fresh and lively*** try to ***decrease*** the noise reduction gain (first choice) and/or to ***decrease*** the remaining processing parameters (except *overlay*)

Instead of trying to tune **DeHiss** using the whole recording (which may be very time consuming for large soundfiles), you may consider performing several quick tests on a short 'representative' fragment of the original material. If necessary, you can repeat this procedure several times for different parameter settings until the results are satisfactory.

When tuning the renovation filter, you have to rely on your own subjective evaluation of the results. Even though, as the Romans used to say, "De gustibus non est disputandum" ("There is no accounting for tastes"), we beg you: please, do not forget about the signal in your pursuit of removing the noise. Adopting values that are too large in the gain factor may result in a sound which is noiseless, but sounds DEAD.

Upgrade to DART PRO 32
DART DeHiss provides you with the best dehissing algorithm on the industry. DeHiss is one of the six reiteration functions found in DART PRO 32 (DeClick, DeHiss, DeNoise, ReTouch, Duplicate, and Filter Builder). DART PRO 32 is the best audio restoration system in the business and it works on both instrumental and voice recordings. You can upgrade to DART PRO 32 which includes the best and most complete audio restoration functions in the business, a complete audio editing and signal processing system, graphics interfaces, CD-R playlist organizer and writer, and a multimedia audio restoration tutorial. You can call us toll-free at 800-799-1692 or 612-844-0217. A special upgrade price is available to all DART customers.

Need more info? Check out our web page, http://www.dartpro.com

Copyright © 1998 ZH Computer. All rights reserved.