MATH MATTERS

Apply It.

The math behind... Music Restoration

Technical terms used:

Chaotic Compression Technology, Fourier Transform

Uses and applications:

Recover severely damaged recordings, decomposing songs

How it works:

In order to restore a severely damaged recording, like one recently recovered from a live Woody Guthrie performance, a mathematician first uses the Plangent Processes algorithms to adjust the speed and timing of the music – in some places it may play too fast and in others too slow, perhaps because of a warped LP. Next, the restorer works on stabilizing the pitch and clarity of the sound, and finally, on reducing noise. Each of these steps requires studying the frequency of the music and using this function to predict what the original function was before these transformations and errors were introduced.

Interesting facts:

In 2008, Dr. Kevin Short of the University of New Hampshire won a Grammy award for his restoration work on the album "The Live Wire: Woody Guthrie in Performance 1949." This is the only known live recording of a Woody Guthrie concert.

In 2008, the mystery of the opening note in the Beatles' "A Hard Day's Night" was solved with these methods. (It was their manager playing a chord on a piano!) As an added bonus, this technology is what allows us to download music on our cell phones.

References:

Author undefined. (October 29, 2008). Beatles Unknown "A Hard Day's Night" Chord Mystery Solved Using Fourier Transform. In Science 2.0. Retrieved May 2, 2011, from http://www.science20.com/news_releases/beatles_unknown_hard_days_night_chord_mystery_solved_using_fourier_transform.

Gregoire, M. (February 12, 2008). UNH Professor Wins Grammy Award. In College of Engineering and Physical Sciences UNH. Retrieved May 3, 2011, from http://www.ceps.unh.edu/news/news_releases08/Grammy.html.

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