

Research Status Report #6

In preparation for my test of digital audio tape distortion and wear over time, I consulted a few classical articles warning users about the impermeability of digital audio tape. The need for these warnings is as pertinent today as it ever was considering that digital audio tape still remains a viable mastering/mixdown medium in many studio. Tascam's 24-bit version of DAT will only increase the use of this format and probably keep it in existence even through the "bit wars." The real question that faces consumers and professional engineers is whether this format is truly the best choice.

A mere two years ago, Stephen St. Croix (monthly columnist for Mix Magazine) contributed an article that addressed most people's unworried use of digital audio tape. He reminded us that when digital audio recorders were first released onto the market, they included error indicator lights to report the amount of errors being registered on the tape. A common scenario were three lights for a DAT machine, 1) a green light indicating data correction was occurring but without any pitfalls, 2) a yellow light indicating data correction powers had been surpassed by the error but that interpolation was being used to recreate the samples, and 3) a red light that signaled the breach of both interpolation and error correction powers of the player, thus resulting in a muted signal. The scary thing about these error indicator lights was how often they flashed yellow or red. Apparently, the more tapes were played, the increase in yellow and red lights also became disturbing.

As a result, manufacturers ceased including these blinking light features onto their DAT machines in the effort to conceal from the engineer the imperfect digital audio data that was being read and recorded. Stephen St. Croix is not, however, arguing for people not to use DAT (since they are rather affordable for the sound quality they offer), but just to realize the potential dangers that are involved in storing and replaying information stored digitally on analog tape. He advises making multiple master copies (requiring multiple DAT machines) and also advises treating the masters with care.

It really should not be such a surprise that digital audio tape is not the perfect medium for data storage. The head gap, tape track width, and tape speed are all extremely small compared to analog recorders; a speck of dust becomes gigantic in comparison to the digital information and thus poses a larger threat than dust on an analog tape.

To explore this imperfection of data storage, I will record a sine wave, ten seconds of music, and then some pink noise onto a DAT tape. I will then play the tape multiple times and then make digital (AES/EBU and S/PDIF) and analog copies of the tape, repeating the whole process many times. I have also sent away to the Audio Engineering Society for their exact specifications on the AES/EBU interface to enable me to compare how it technically compares to the semi-professional format on paper. After the copies are made, I can analyze the pink noise with a spectrum analyzer and see exactly how the errors are affecting the spectrum. Spring break will be a perfect opportunity to conduct such tests; I just hope that the DAT machines themselves can hold up to such rigors.

Bibliography

Gow, John. "The trouble with digital audio tape." Popular Music and Society.
Spring 1992, pp. 31-48.

Trevor de Clercq
March 8th, 1999

Digital Audio Processing II
E85.2601, Prof. K. Peacock

Gow, John. "Whatever happened to DAT?" Popular Music and Society. Spring 1990, pp. 35-45.

Katz, Bob. "More Bits Please..." Mix. November 1998, pp. 114-122

St. Croix, Stephen. "DAT's all she wrote." Mix. February 1996, pp. 20+

Van den Enden, A.W.M and Verhoeckx, N.A.M. "Digital Signal Processing: theoretical background." Phillips Technical Review. VI. 42, 1985, pp. 110-144.