



Well Tempered Lab

Amadeus/Amadeus GT Technical Measurements

RUMBLE

Rumble is another name for bearing and motor noise. The bearing designed for Amadeus is unique in that there is no metal-to-metal contact on the spindle but rather the contact is metal-to-teflon. The small dc motor is mounted on a neoprene vibration absorbing damper. This results in a very low total noise. There is no widely used standard to describe the level of bearing noise in turntables. As a result, there are widely varying numbers published. In March 1965, Edgar Villchur, the designer and inventor of the famous AR turntable, published a land-mark paper describing how to measure turntable rumble. In this paper, he reveals that the lowest rumble noise he ever measured was -40 db using NAB standards of reference. WTL have measured the rumble level of Amadeus with a test record that compares the total rumble noise to a 100 hz tone recorded at a 1 cm/sec velocity. The 100 hz tone is recorded at levels of -50 db, -40 db, -30 db and -20 db. When played back, it is possible to determine the level at which the tone can be heard. With Amadeus, one can just barely hear the 100 hz tone at the -50 db recorded level so WTL can safely say that the rumble level of Amadeus is lower than -50 db compared to a 100 hz tone recorded at a level of 1 cm/sec. When comparing rumble noise levels, it is mandatory to know the reference level.

Wow/Flutter

A very important part of Amadeus' overall musical quality is low wow/flutter. Wow is the low frequency tone variation and flutter is variation at higher frequencies. WTL have spent many hours looking at the W/F meter and optimizing the factors that effect frequency stability. These factors include the motor, the belt, the spindle bearing, the concentricity of the platter to the spindle, and the contribution of the cartridge to frequency instability. I use as a reference the results of an investigation by the Japanese researcher H. Saki in 1970, published in JAES vol 18. He and his team learned that human hearing can detect as little as 0.06% wow/flutter on a complex 5 khz signal when the modulation frequency is 3 hz! Amadeus has wow/flutter of 0.03% to 0.04% using the Japan Industrial Standard (JIS).

Tonearm Geometry

When I was researching Amadeus, I decided to try a non-standard tonearm geometry. I introduced a tracking angle error of 15 degrees and was surprised to find the musical result was better!! This led me to investigate tonearm geometry further with unexpected results. To make a very long story rather short, tracking angle errors generate 2nd harmonic components to the musical signal and many people interpret this as "sweeter music". I have written a computer program to show the amount of 2nd harmonic as a function of tracking angle error. At tracking angle errors less than 5 degrees, the 2nd harmonic level is essentially negligible.

I have 21 phono cartridges. I used these cartridges to determine a statistically valid fixed tonearm geometry so the user is relieved of a complex set-up. All who have used this approach have commented on the ease of set-up and all have been more than satisfied with the result. Users of Amadeus simply mount the cartridge on the tonearm and proceed to the music.

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