# TESTING THE VIRTUAL DYNAMICS POWER ONE A/C POWER CABLE

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## 1.0 ABSTRACT AND OVERVIEW

*This report is an edited version of the report prepared on August 13, 2007. The original report was edited for simplicity and/or language.*

The use of aftermarket a/c power cables is a controversial subject. The ability of an aftermarket power cable to alter the sound characteristics of an audio (or video) component is accepted by some, and disputed by others.

Virtual Dynamics Inc. is a specialty company based in Barrhead, Alberta, which manufactures aftermarket cable products for home audio and video. Virtual Dynamics uses primarily two technologies for their cable products: dynamic filtering and "speed of light" technology.

Dynamic filtering is based on dampening minute vibrations in signal conductors for an aftermarket cable. Metallic particles/powders are packed around insulated signal conductors to theoretically dampen and absorb vibrations that would otherwise alter the signal passed by the conductors.

According to the information from Virtual Dynamics, speed of light uses magnets (and their corresponding magnetic fields) to improve signal flow.

For our tests, we purchased a Virtual Dynamics Power One aftermarket a/c power cord. Virtual Dynamics was unaware at the time that the cable would be used for testing purposes.

The Power One power cable comprises a single 12 gauge solid-core copper conductor. This large gauge size increases conductivity by allowing for faster speeds, linearity and bandwidth of all electrical frequencies. Also, the use of a solid core also allows the entire signal to reach the end of the cable at the same time. The hot, neutral and ground conductors are separated for maximum shielding and vibration control. [1]

To determine the potential effect of the Power One power cable on audio signals, the output of a DVD player was compared using the Virtual Dynamics Power One a/c cable and a generic 14 gauge 'IEC' power cable.

To perform this test, three different digital signals were created of the following frequencies: 0 kHz, 1 kHz, and 10 kHz, which were stored on a DVD-R. These test signals were then converted to analog via a DVD player and recorded on a computer using an M-audio Audiophile USB.

## 2.0 HYPOTHESIS

The technology of the Power One power cable could facilitate noise reduction of the analogue output of the DVD player due to the dynamic filtering of the separate hot, neutral and ground conductors due vibration control within the conductors, and better shielding compared to the generic a/c cable.

In addition, if the use of magnetic fields increases signal flow through the Virtual Dynamics Power One a/c cable, there might be an improvement in the 'slew rate' of analogue signals generated by the DVD player due to the improved current/electrical supply.

## 3.0 EQUIPMENT LIST

- M-audio Audiophile ADC
- Standard USB Cable
- Primare DVD26
- Desktop Computer equipped with Windows XP
- Cables
    a. Virtual Dynamics Power Cables: 12 gauge, separate hot/neutral/ground
    b. KAS Maestro RCA Interconnect: 99.99% silver, Teflon coated single 18 gauge wire with silver-based Cardas RCA connectors
- Various Software:
    a. Generate signals: Virtins Sound Card Signal Generator
    b. Recording software: Live Lite 5
    c. Audio analysis: Adobe Audition 2.0

## 4.0 GENERAL PROCEDURE

The following sections outline the general procedure of the testing session.

The testing session consists of four sections:

1) Generating and storing on a DVD-R, digital signals of frequencies 0 kHz, 1kHz, and 10 kHz.
2) Setting up the Audiophile USB for recording the digital signals from a DVD player to a computer.
3) Recording the digital signals on to a computer; performing different recording tests for the different equipment configurations.
4) Analyzing the signals.

### 4.1 Equipment Setup

Two different test configurations were used for testing. Configuration 1 used the Virtual Dynamics Power One a/c cable for the Primare DVD player. Configuration 2 used a generic 14 gauge a/c cable.

For each configuration, the Primare DVD player, the recording device, and the computer were placed on audiophile-grade support platforms.

## 5.0 DATA

The following section provides numerical indices to the generated signals. Since our software was unable to properly read the 10 kHz wave; the data and analysis was based solely on the 1 kHz signals and the '0 Hz' signals.

### 5.1 Noise Amplitude Statistics

The following definitions are supplied by Adobe Audition's Help Contents:

**Peak Amplitude:** Highest amplitude in decibel form of the given signal, the signal wave's magnitude of oscillation
**Minimum RMS Power:** Minimum RMS amplitude
**Average RMS Power:** Average RMS amplitude, perceived loudness

Noise Only Signals: The following data is collected from the background noise only, isolated through the Software Procedure.

| Statistics | Configuration 1 | Configuration 2 |
|---|---|---|
| Peak Amplitude (dB) | -41.62 | -42.07 |
| Minimum RMS Power (dB) | -73.31 | -71.75 |
| Average RMS Power (dB) | -58.76 | -58.39 |

### 5.2 Slew Rate

Studies in electronics define Slew Rate as the maximum change of a signal in any point of a circuit. The 1 kHz square wave generated for the testing did not acquire characteristics of an ideal square wave. An ideal square wave has an infinite slew rate which most computer software is unable to create. Due to this reason, the slew rate of the original wave recorded on the DVD was measured and then compared to the waves that resulted after the testing performed on the different configurations.

The slew rates were calculated by measuring the average time interval between the -90% to +90% of maximum absolute signal voltage for 10 different square waves for each configuration.

| Test Cases | Slew Rate (V/µs) |
|---|---|
| Original Square Wave | 0.0617 |
| 1) Virtual Dynamics Power One | 0.0495 |
| 2) Generic Power Cable | 0.0482 |

## 6.0 DISCUSSION AND ANALYSIS

### 6.1 Noise Floor

Noise Floor is defined as the sum of oscillation created by unwanted noise sources and unwanted signals. The following graphs (Figure 1) compare the test configurations in terms of noise floor peaks.

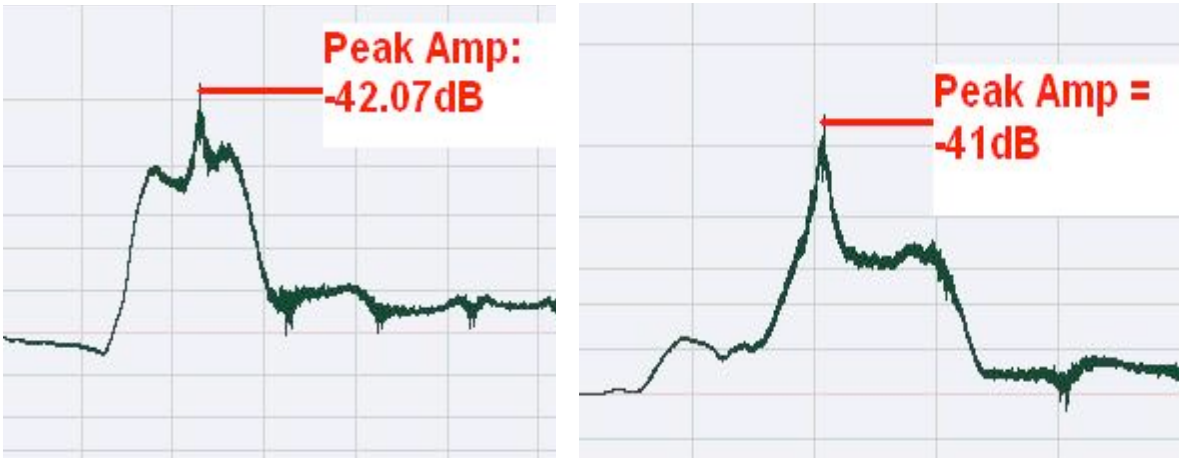


**Figure 1:** Configuration 2 vs. Configuration 1, Noise Floor (Note that scales are slightly different for each graph.)

The above graphs show that while the peak noise generated by the Primare DVD player was higher using the Virtual Dynamics Power One cable (-41.6 dB for the Virtual Dynamics cable versus -42.1 dB for the generic a/c cable), the amount of sideband noise was significantly lower compared to the generic a/c cable.

### 6.2 Noise Profile

Figure 2 display the noise profiles. Green indicates noise floor.
Red indicates original audio. Yellow indicates processed audio.

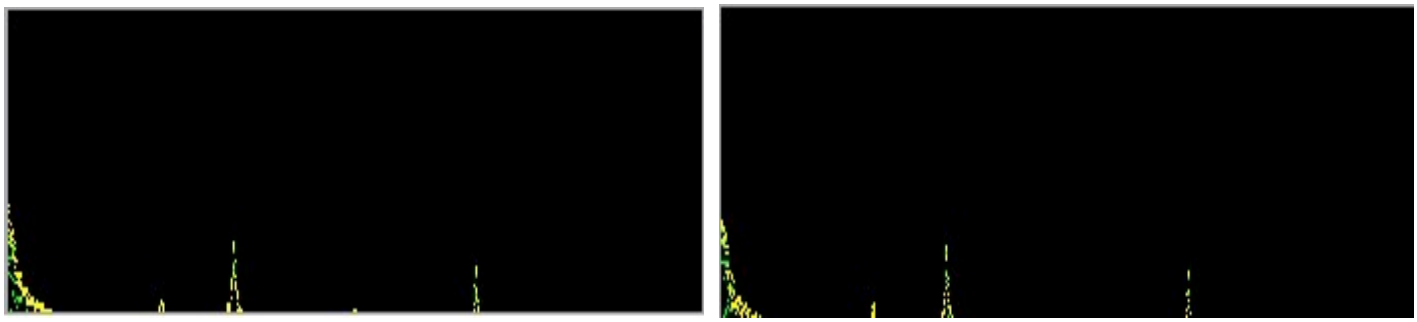

**Figure 2:** Configuration 2 vs. Configuration 1, Noise Profile

These noise profiles were captured from the moments of silence between the tracks. While the peak noise amplitudes are similar between test configurations (as noted in the 'Peak Noise Amplitude' in 5.1 and 6.1), there are small spikes for Configuration 2 that are not measured for Configuration 1. Also, the noise frequencies are more distinct for Configuration 1, whereas Configuration 2 exhibits greater 'sidebands' of noise. There is also more processed audio from Configuration 2 when compared to Configuration 1.

### 6.3 Slew Rate

Even though the difference in slew rate only differed by a very small amount, the Virtual Dynamics Power One power cable produced a higher slew rate in the analogue signal generated by the Primare DVD player compared to using the generic a/c cable.

## 7.0 CONCLUSION

The Virtual Dynamics Power One power cable improved the fidelity of the resultant analogue audio signal compared to the original, exhibiting a 2.6 % increase in signal slew rate compared to a generic power cable, as well as reducing low-level noise by 1.55 dB, and average noise levels by 0.35 dB.

The results show positive signs in improving the fidelity of the signal by using the Virtual Dynamics Power One power cable.

Future testing will attempt to isolate the effects of dynamic filtering and the "speed of light" technology of the Virtual Dynamics cables.

* Noise level reductions were given to the closest 0.05 dB

## REFERENCES

**[1]** Virtual Dynamics, 'Power One' [Online documents], 2007 August 12, Available HTTP: http://www.virtualdynamics.ca/content.php?id=118