McIntosh MCD500 SACD Player

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Introduction

McIntosh has been around as long as my memory of being fascinated with audio (started at age 12). I wanted a Mc when I was a teenager, but I was the only one in the family who was interested in having a high end (that term was not a buzz word back then) sound system at home, so I had to make do with low budget stuff. It was not all that bad, because at that time, tubes were still the basis of audio. I had a 35 watt per channel integrated tube amplifier, some Jensen speakers, and I ended up building my own turntable. Dad decided that a piece of

plywood with a wooden dowel for a tonearm didn't suit the room decor, so he bought a Dual turntable.

Anyway, in college, I still lusted for McIntosh products, but couldn't afford any of them. At graduate school, we used a borrowed card table for our dining room table, and I sat on a plywood box as a chair. We didn't exactly have the money to invest in good audio equipment. After graduation, and on my way to NASA for a post-doc, I managed to save $600 to purchase a Marantz receiver, which by that time, was solid state. Tube products were disappearing.

It was really not until I had finished my post-doctoral training that I had an income that would allow me to get something better, but I still could not afford a McIntosh, so I settled for less, for awhile.

Then, in my 50's, I finally purchased my first McIntosh product, which was the MC1201 power amplifier, rated at 1,200 watts RMS output. However, the 1201 is a monoblock amp, and . . . whoops . . . I couldn't afford the second one to make a stereo pair. I had to save money for two years in order to get that second MC1201. Those two monoblocks are the foundation of my lab reference system to this day. I also have some other terrific brands and models of various A/V items in the lab, but those two MC1201's have a big footprint, and they draw immediate attention of anyone visiting our main lab.

I used a McIntosh MCD201 SACD/CD player for a few years, and then Sally Goff, who is in the marketing department at McIntosh, mentioned that they were coming out with the MCD500 SACD/CD player, which improved on their previous players by lowering the noise floor. Of course, I requested one for review, and as you will see, the noise floor approaches the limits of my reference test equipment, an Audio Precision SYS 2722.

Specifications

- Design: SACD/CD Player
- Codecs: SACD, Redbook CD (16/44.1), MP3, WMA
- DACs: Four 24/192 ESS
- MFR: 4 Hz – 20 kHz (CD), 4 Hz – 40 kHz (SACD
- THD+N: 0.0015%
- Output Impedance: 600 Ohms
- Outputs: XLR and RCA Analog, Coax and Toslink Optical Digital
- Output Voltage: 2 Volts RCA, 4 Volts XLR (Fixed), 6 Volts RCA, 12 Volts XLR (Variable)
- Inputs: Coax and Toslink Optical Digital
- Dimensions: 6″ H x 17.5″ W x 16.5″ D

- Weight: 28.2 Pounds
- MSRP: $6,500 USA
- McIntosh

The Design

The MCD500 utlizes the ESS Sabre Reference 8-channel D/A converter in Stereo Quad Balanced mode. This basically means the DAC signal path is balanced twice. So, it is no wonder the variable volume control allows for a 12 volt maximum output at the analog XLR jacks (the fixed output is lower so as not to overload the inputs on your preamplifier).

On the rear panel there is a set of RCA unbalanced and XLR balanced analog output jacks. One set is fixed output and the other is variable using a volume control on the front panel. Therefore, you can, if you wish, connect the MCD500's outputs directly to a power amplifier, bypassing a preamp in the signal path.

There are also coax and Toslink optical digital input and output jacks. So, you can use the MCD500 as a DAC with a different digital source, and I did this, by connecting an iPod to a Wadia iTransport. You can also output the digital bitstream to a different DAC using the digital outputs, but the MCD500 DAC is so good, I doubt anyone would ever use the player this way.

The disc tray mechanism operates very smoothly, sounding more like it is gliding in and out instead of just being shoved out and pulled in. Not important necessarily, but it's just one of the little things that come with a product of this caliber.

From left to right on the front panel are push buttons for Mute, Input (selects coax or Toslink digital), SACD or CD, Time, Stop, Pause, Play, and Open/Close (the disc tray). There is also a headphone jack on the far left.

The remote control is reasonably large, which is good for people who have big hands like I do. It has backlighting. The buttons are in a different place than my other remotes, but all remotes seem to have their own unique button placement. I wish a standard would be developed for where the routine buttons are located, such as Play, Pause, Stop, Open/Close (this one is not on the MCD500 remote for some reason), and Power On/Off.

It's a beautiful player, no question about it. Uniquely, there is a diagram of the basic circuit layout on the top of the player.

In Use

I tested the MCD500 with a BAT VK-5i preamplifier, McIntosh MC1201 power amplifiers, and Carver Amazing Mark IV ribbon speakers. Cables were Legenburg and Emotiva. I used the XLR balanced connections for all the components in the signal chain.

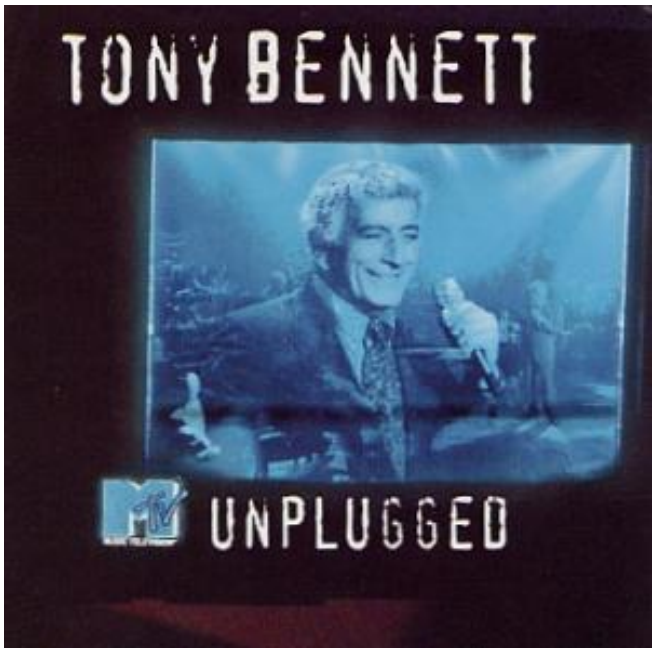
Hiromi's *Brain* SACD is a masterpiece not only of music and performance, but also the recording engineering. It has a combination of electronic synth music and acoustical instruments. I switched back and forth between the CD layer and SACD layer and listened for the differences. Basically, the CD version was more "in my face" than the SACD version, which had a very smooth, silky texture. But, the in-my-face sound was not harsh or edgy, it was simply more up front.

The difference was quite noticeable, probably because the recording has some intense high frequency electronic sounds. In this particular case, I think I preferred the CD version, probably because at my age, I don't hear high frequencies like I did when I was young, and the smoother sound of the SACD seems to have less "presence". But, that is my ears, not the SACD. A younger person with full spectrum hearing very well may prefer the sound of the SACD.

It's nice to have a choice, with both versions sounding terrific. In fact, I have never heard CD sound any better than with the MCD500.

When I put Dukas' *La Peri* in the player, at first, I had to check the cover art to make sure I wasn't listening to an SACD. The first few notes of the overture were so much more detailed than I had heard before, I was shocked that it was coming from a CD.

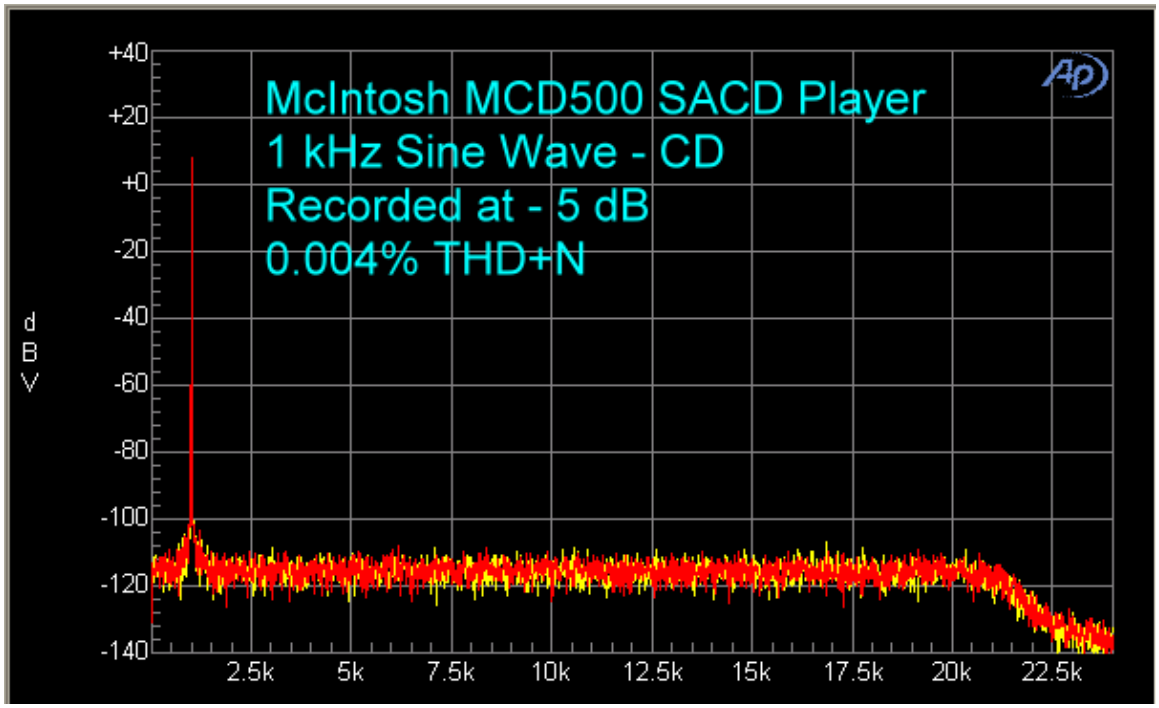
Human voices are always an appropriate test for any audio component, so I used two of my favorite albums, shown below. The sound quality was marvelous. Not too hot, not too cold. Just right.

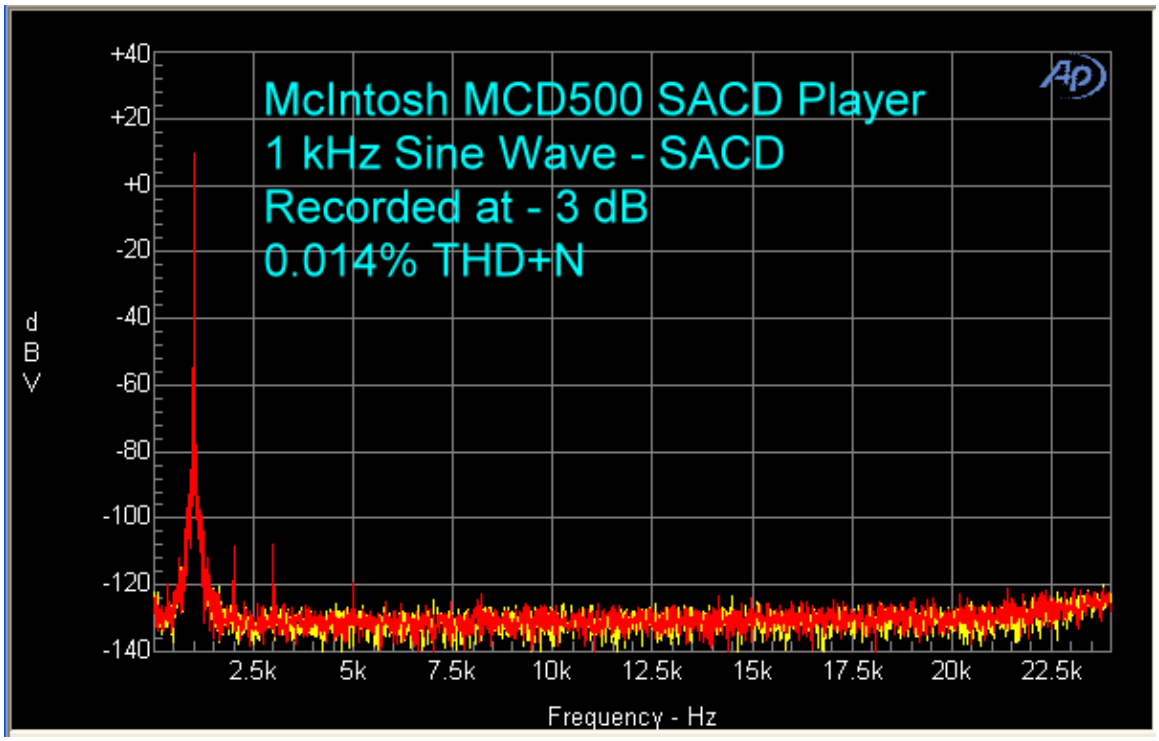


On the Bench

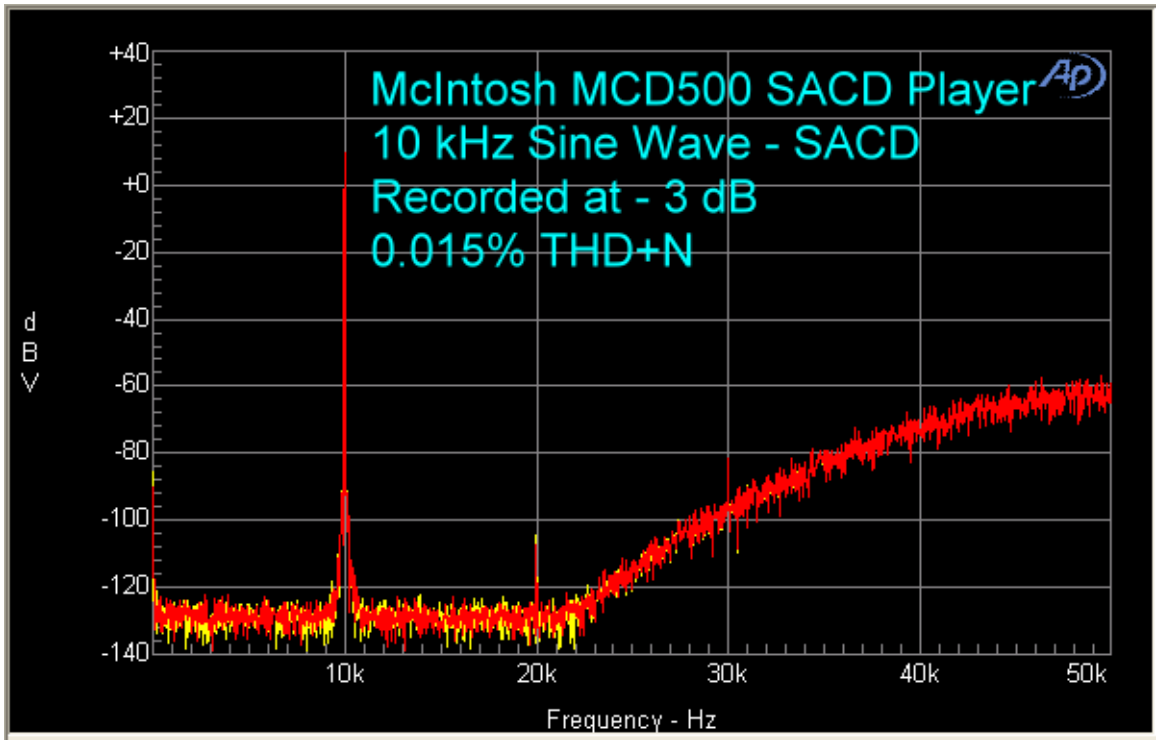
THD+N measurements for CD mode were within an 80 kHz bandwidth, and for SACD mode, within 22 kHz (to eliminate the inclusion of the out-of-audio-band noise that is characteristic of SACD). The XLR outputs of the MCD500 were used for the measurements. Except where noted, yellow graph lines represent the left channel, and red is the right channel.

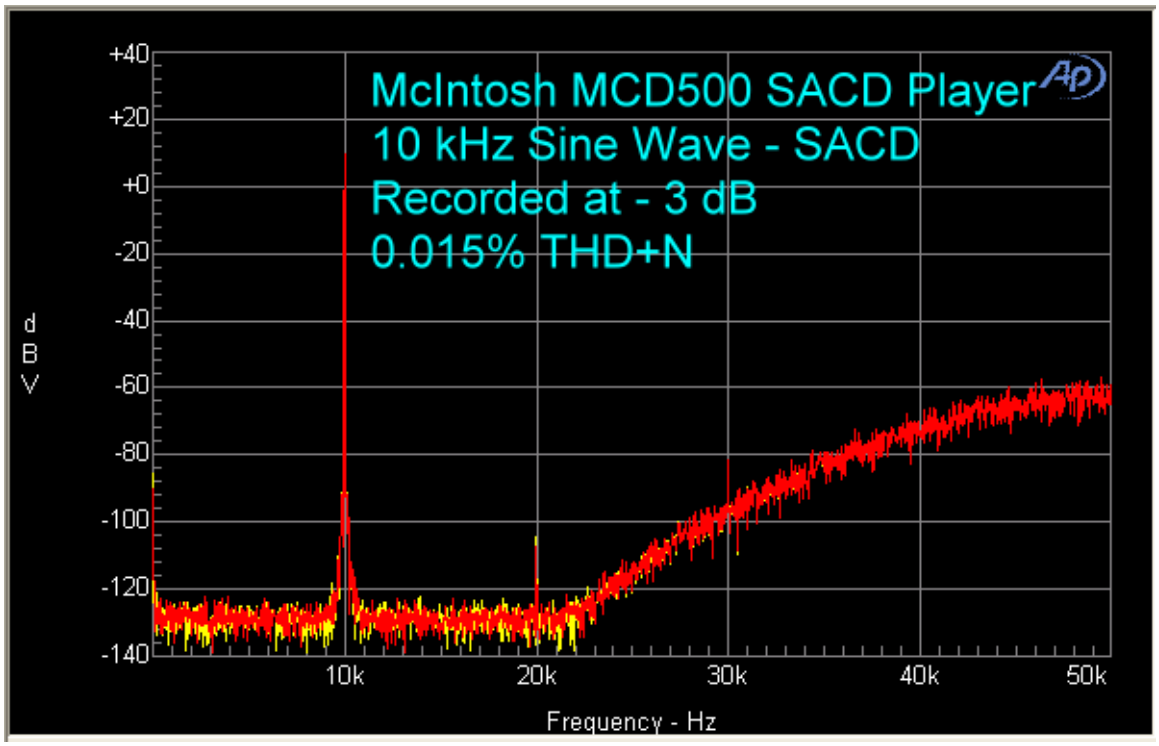
At 1 kHz, THD+N for CD was 0.004%, while for SACD, it was 0.014%. You can see that the noise floor in SACD mode is at – 130 dB, far lower than with the McIntosh MCD201 or the Marantz SA-7SI. The greatly improved noise floor is at the cost of small distortion peaks becoming visible.



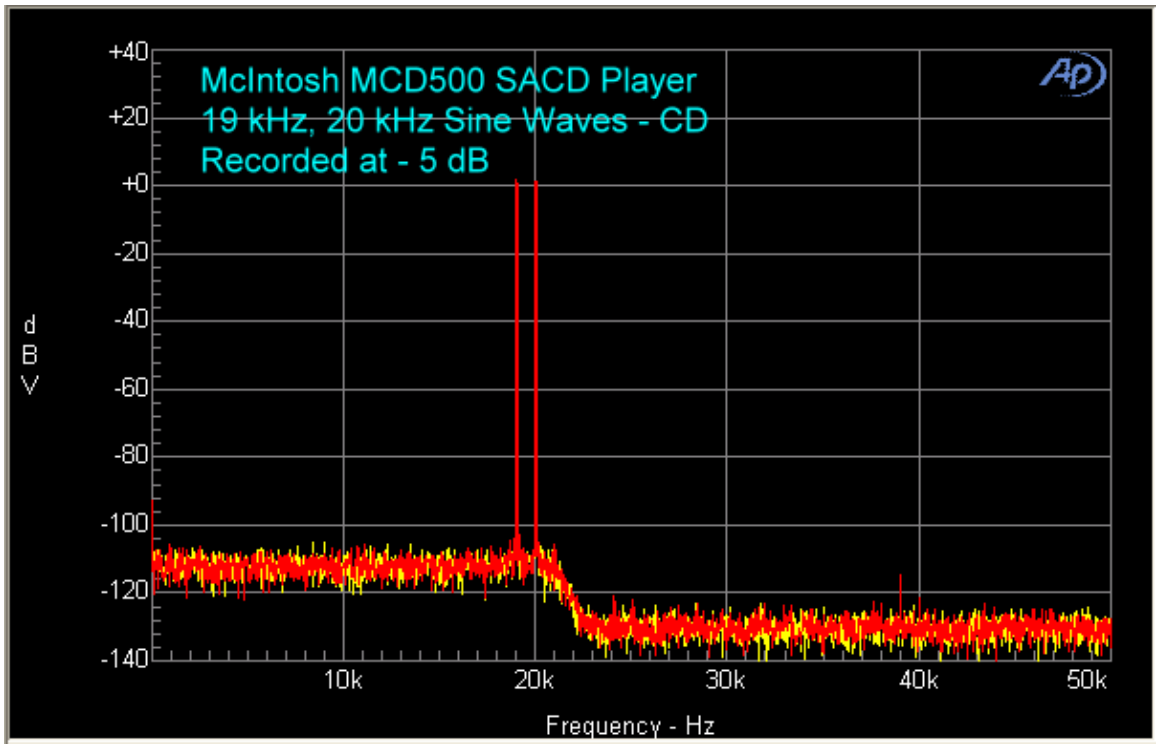


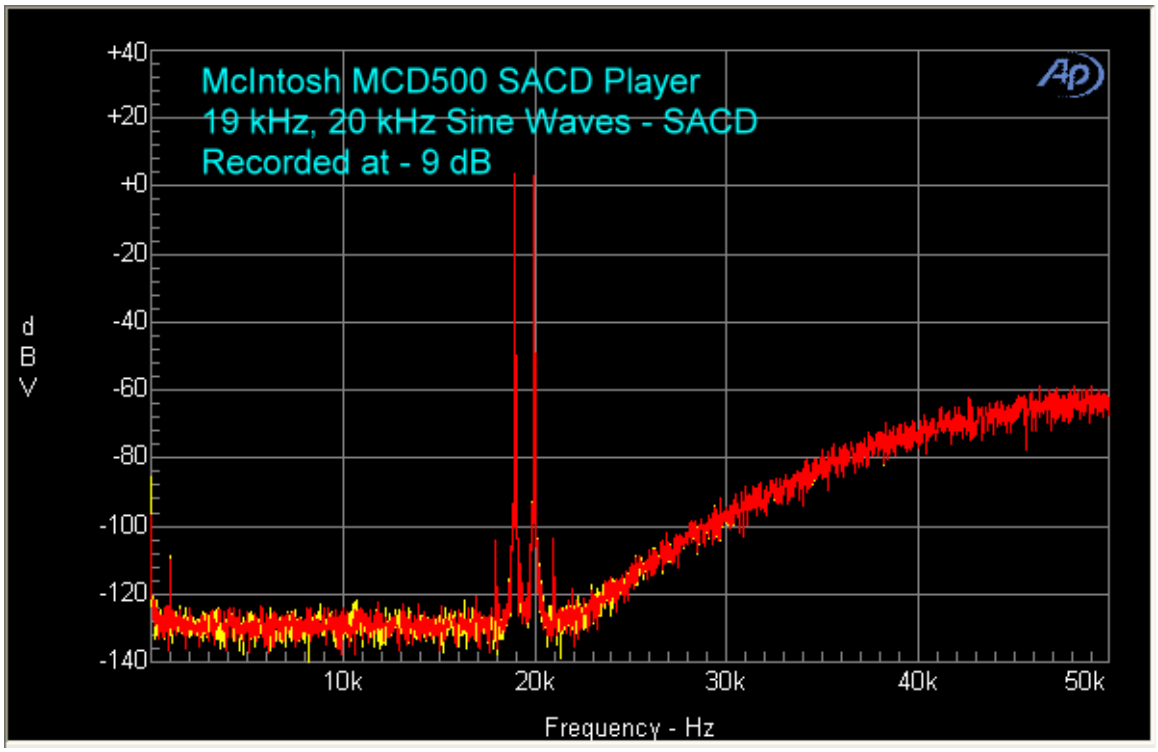
At 10 kHz, distortion for CD was 0.003%, and 0.015% for SACD.



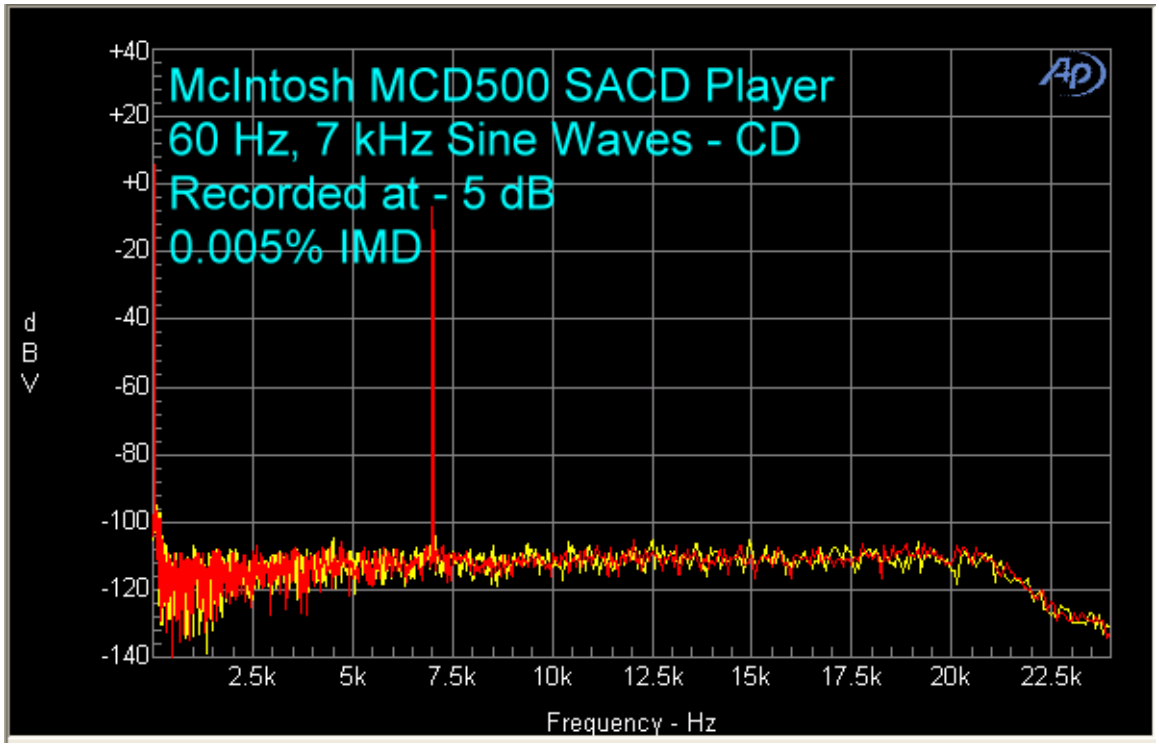


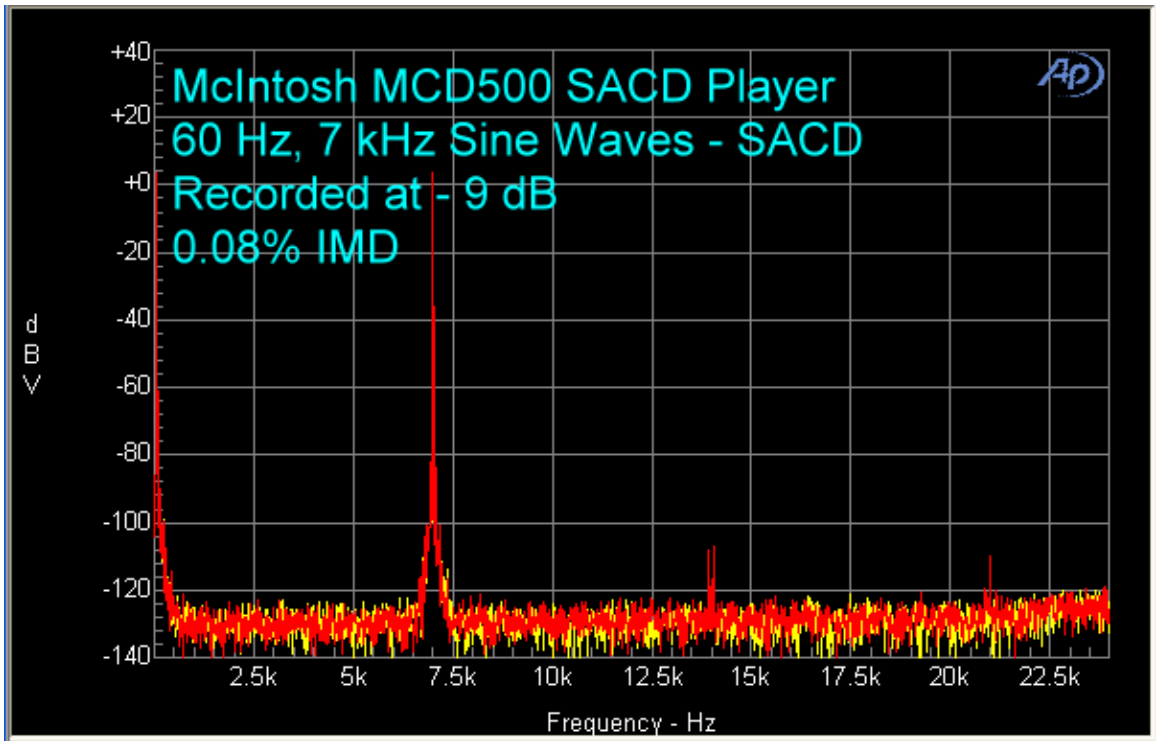
The results for 19 kHz, 20 kHz combined test frequencies are shown below. Although there is no visible B-A peak at 1 kHz for CD, it is visible for SACD at –109 dBV. There are also visible side bands in the SACD spectrum (on either side of the 19 kHz and 20 kHz input peaks).



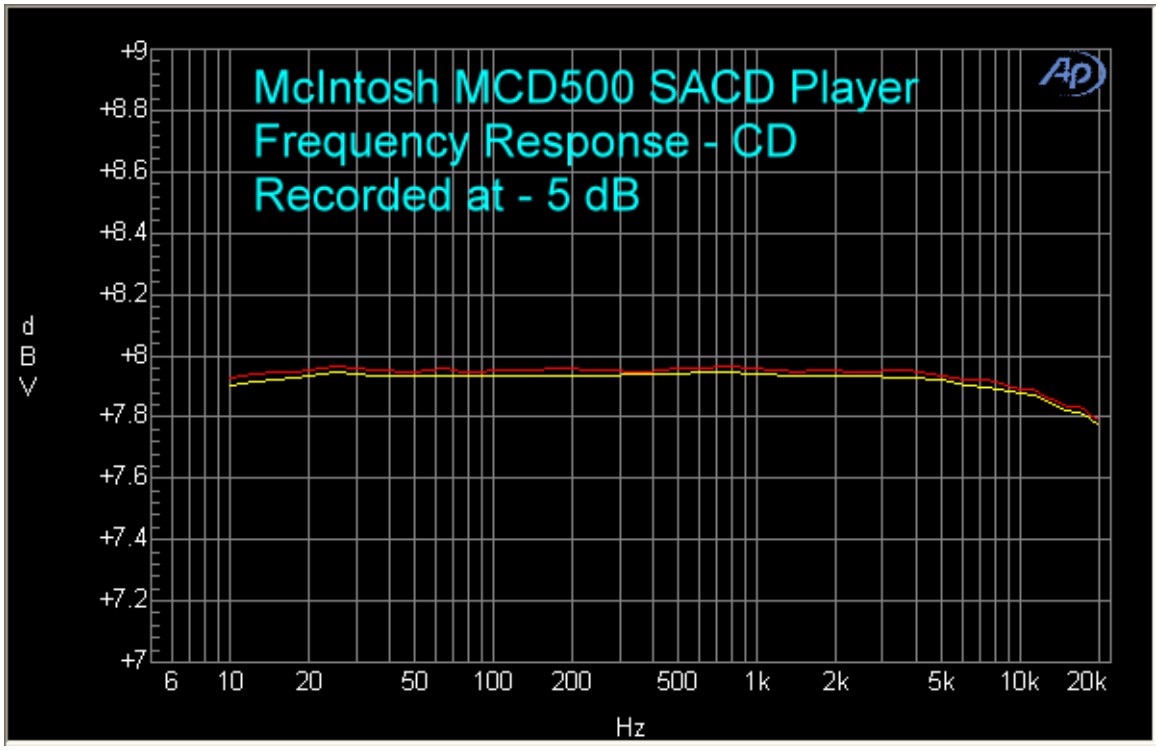


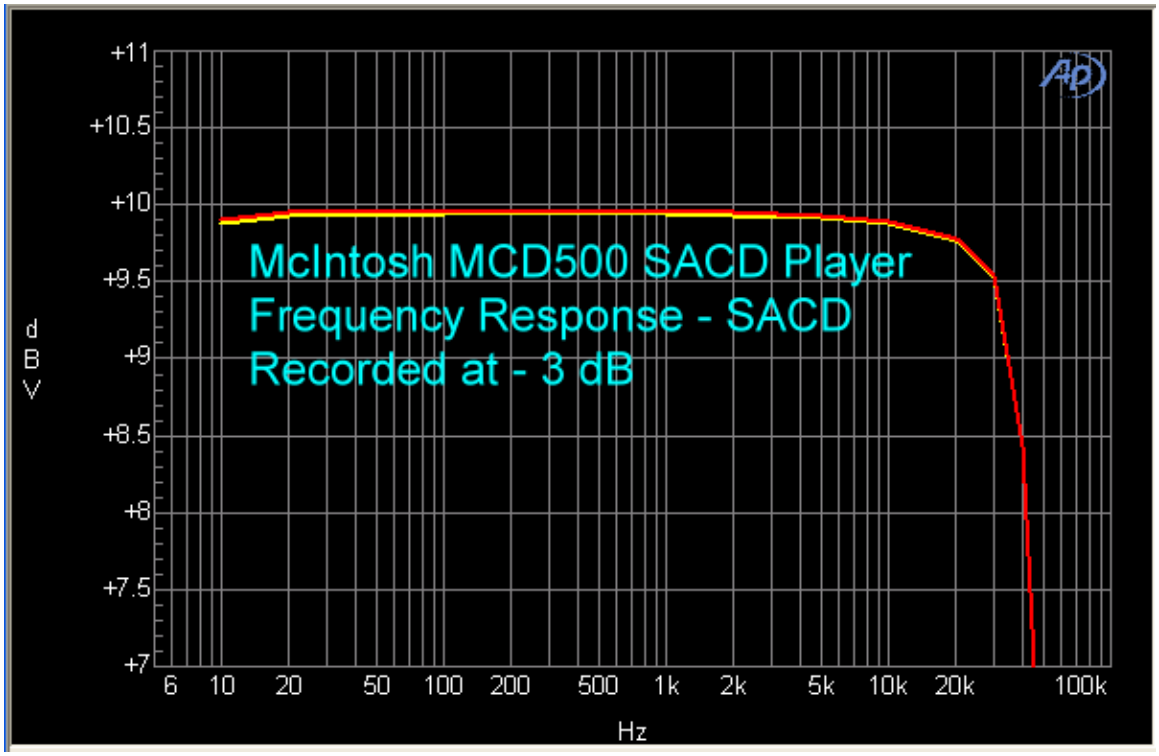
The IMD measurements were 0.005% for CD, and 0.08% for SACD.





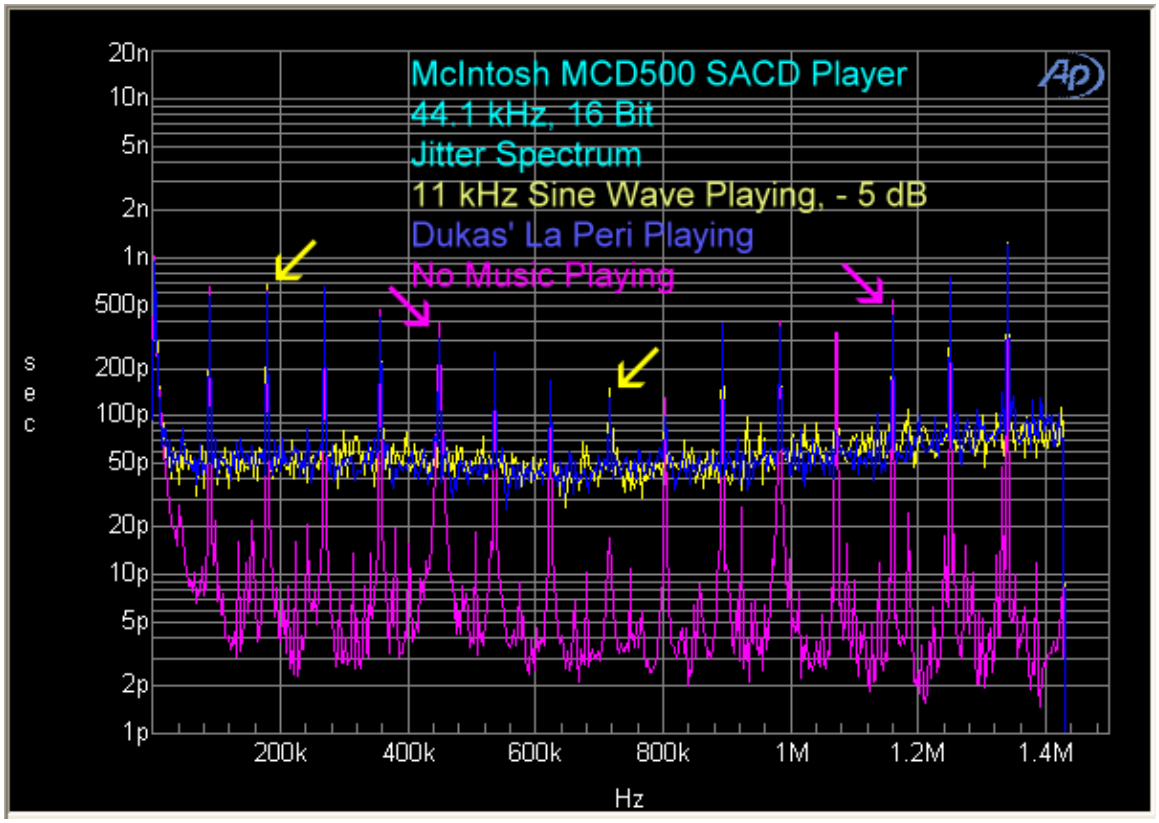
The measured frequency response for CD was 20 Hz – 20 kHz, – 0.2 dB, and for SACD, it was 20 Hz – 30 kHz, – 0.45 dB.





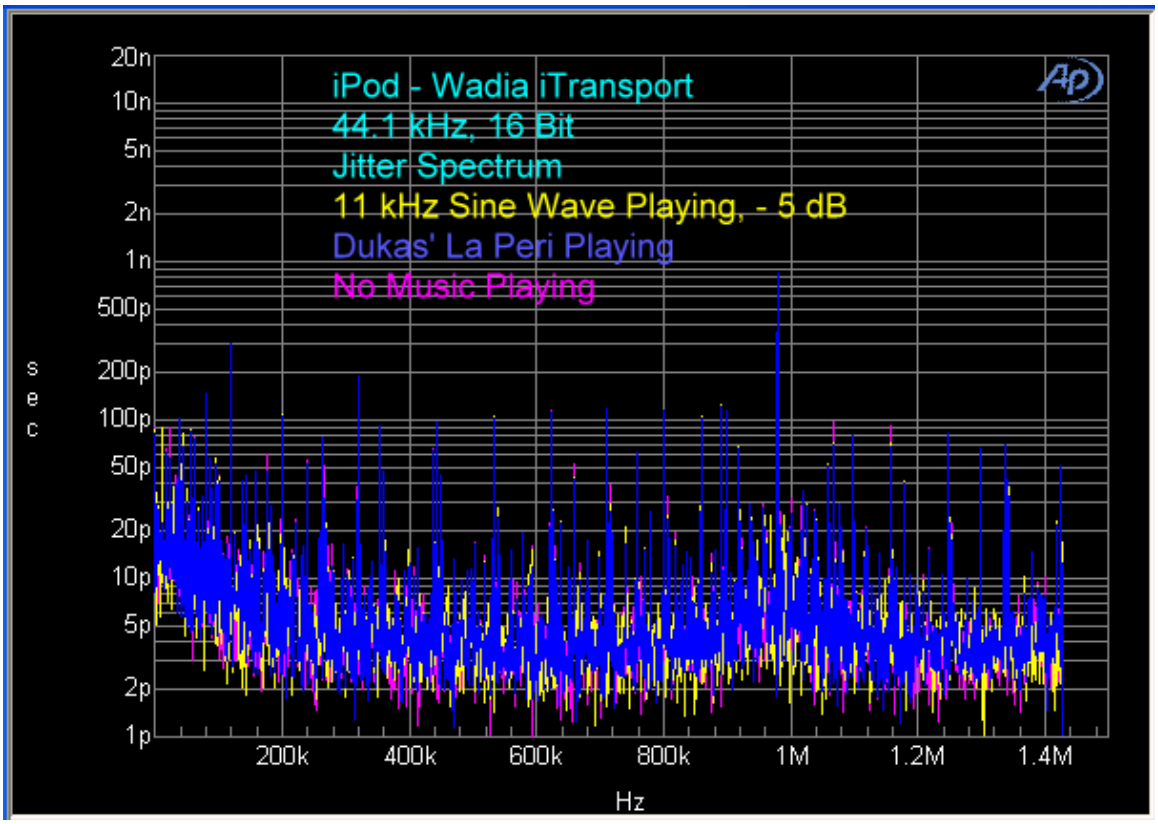
The jitter spectrum (graph shown below) for CD mode indicated an average of about 60 ps (picoseconds or trillionths of a second). The yellow and blue lines are when a test signal or music was playing. This is quite excellent performance. The spectrum was gathered by connecting the digital coax output from the MCD500 to the digital coax input on the Audio Precision. You can see very slight differences when a test sine wave was playing vs. no music playing (yellow and magenta arrows). The no music playing spectrum is simply the clock which sends its signal out of the coax jack whether music is playing or not, and jitter is in the clock by itself (magenta graph), with 16 peaks along the 1.4 MHz spectrum. The baseline jitter (excluding the 16 high peaks) is about 5-10 ps.

You can also get an idea of what jitter is doing by looking at the analog spectrum (the analog output of the DAC) of a single input sine wave peak and its surrounding symmetrical side bands that are the same height and the same distance from the fundamental. However, this is not actually a jitter spectrum, but rather, the effects of jitter on the analog output (the music), and includes whatever correction the DAC has performed on the jittered signal as well as any distortion produced by the analog output stage. The best way to measure jitter is by looking at the digital signal before it is processed by the DAC.



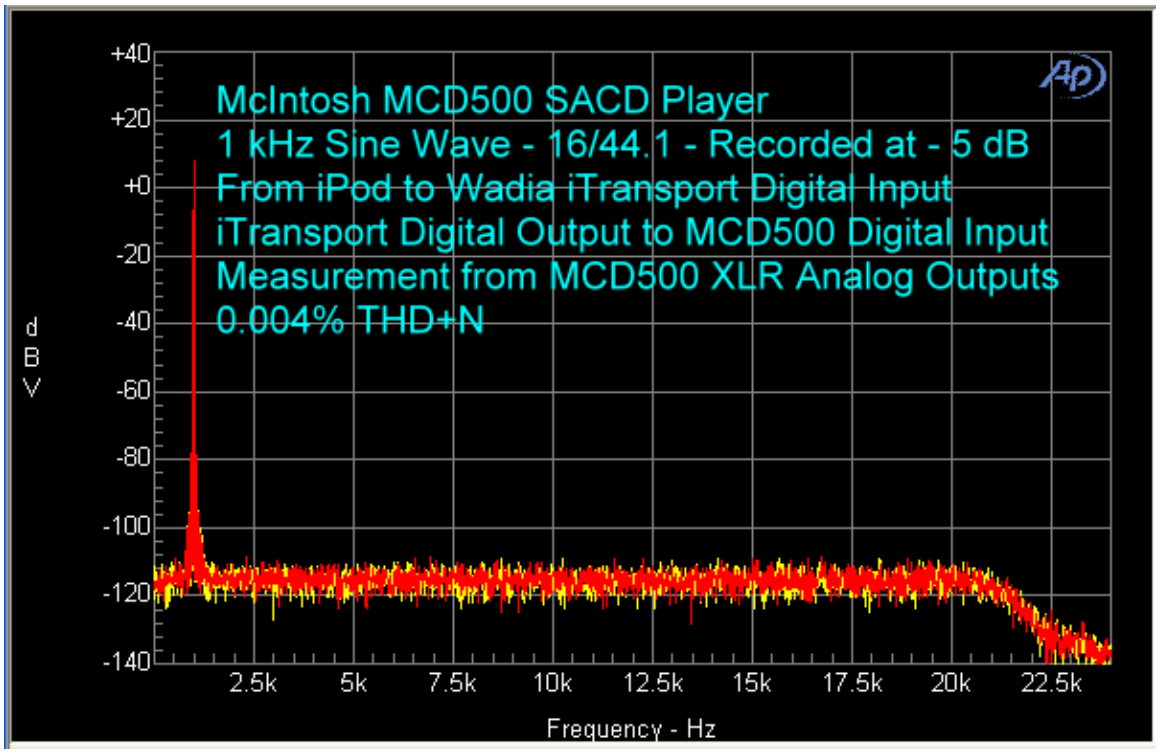
Because the MCD500 has digital inputs and outputs, I ran a little experiment with my iPod, which has many of my favorite albums stored on it in uncompressed *.wav format, and a Wadia iTransport, which is an iPod dock that outputs the digital bitstream from the iPod connected to it. This forms a rather small, and very manageable, music server. I connected the coaxial digital output of the Wadia (which is an RCA jack) to the coaxial digital input on the McIntosh MCD500 (which is an RCA jack), and selected “Coax” as the input which is indicated on the MCD500 front panel.

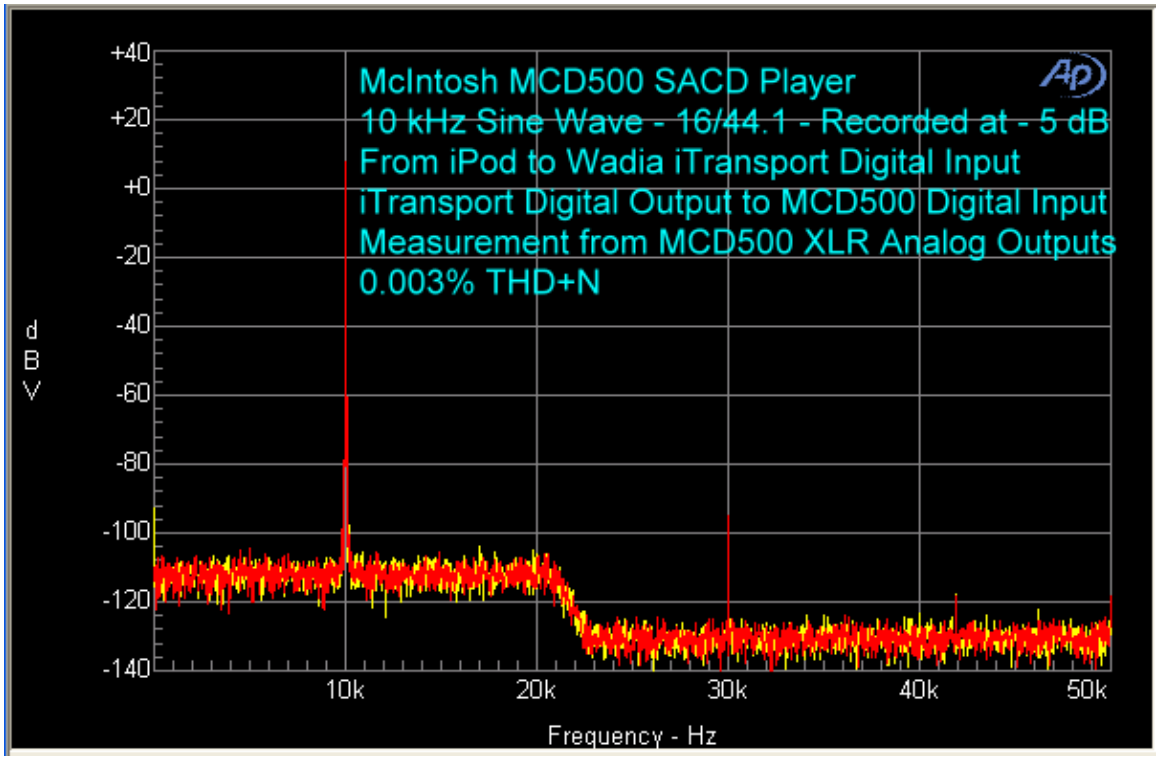
So, here is the digital jitter spectrum from the Wadia coax digital output with the iPod. You can see that the jitter is all over the place, with at least 40 tall peaks. With music playing (I used *La Peri*), jitter ranges from 5 to 20 ps, which is surprisingly good at first glance. However, the presence of so many of the higher peaks in the iPod-Wadia transport jitter spectrum compared to the jitter spectrum of the McIntosh MCD500 may actually represent worse performance for the iPod-Wadia combination. I just don’t really know yet. This remains to be determined as we accumulate more such graphs in future jitter analyses of digital bitstreams.

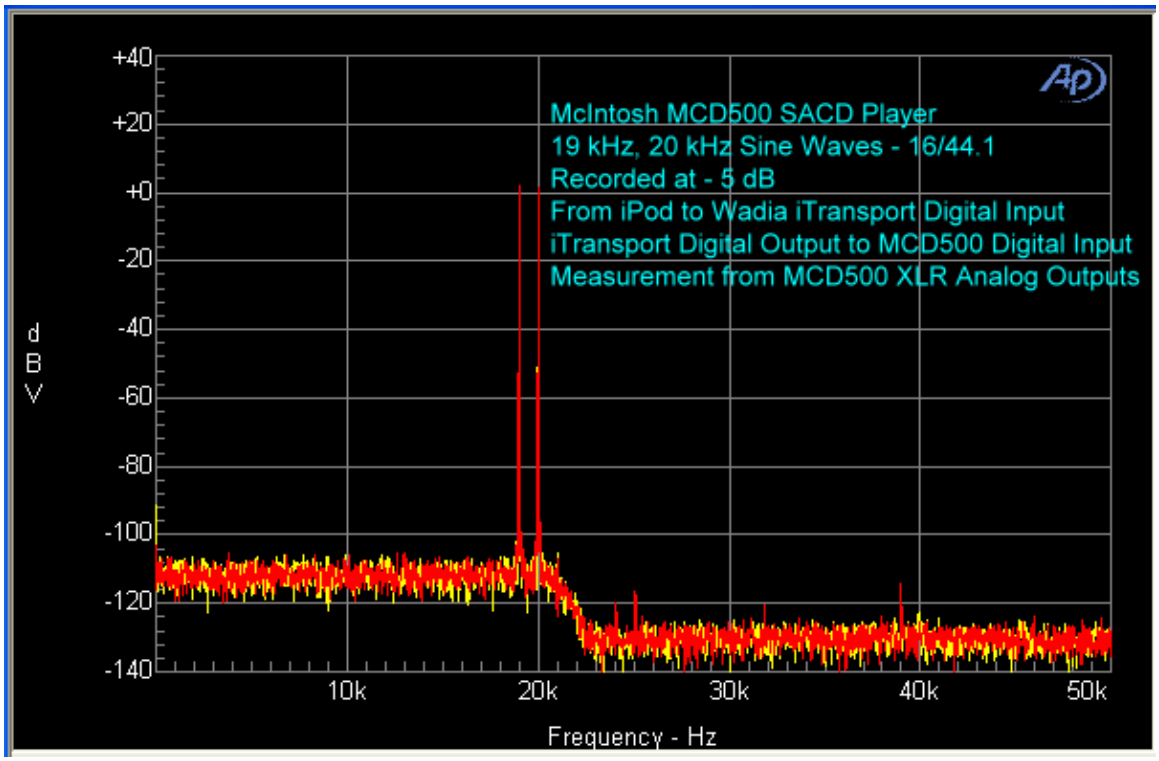


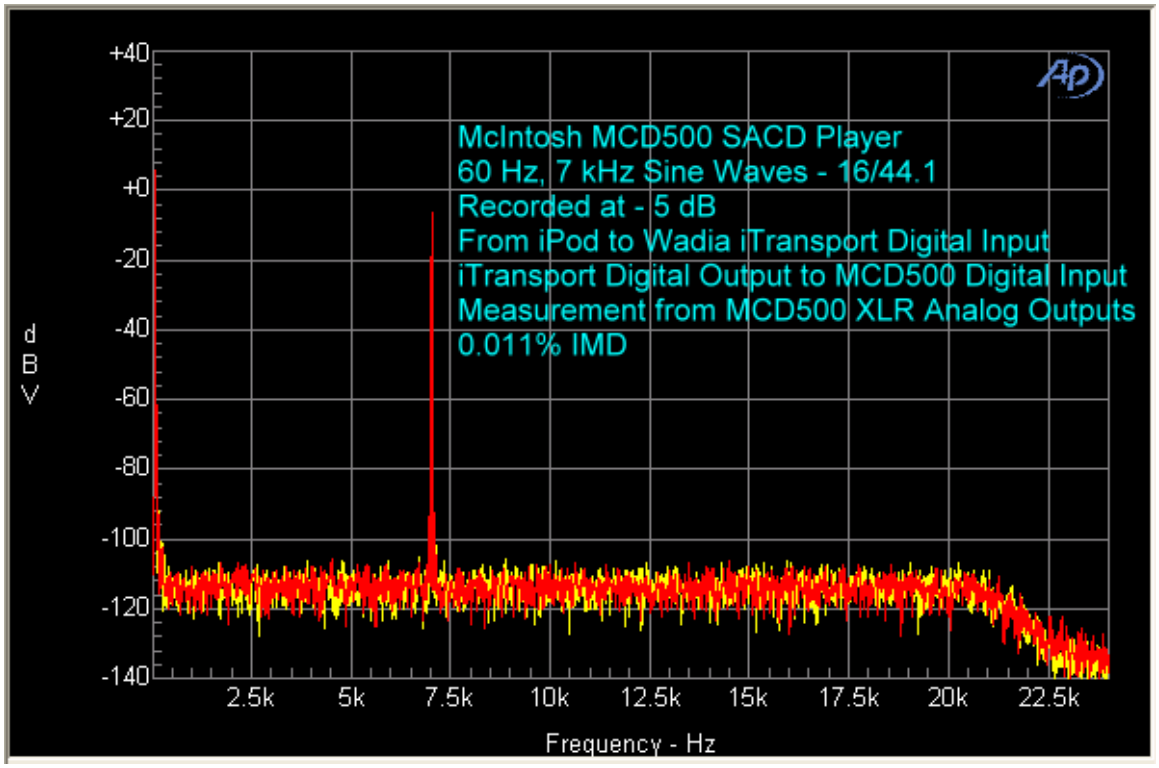
When I then connected the digital coax output from the Wadia to the digital coax input on the MCD500, and gathered analog spectra from the MCD500 analog outputs, there was more distortion than when the MCD500 was taking its digital bitstream from its own transport. But it was mainly in the IMD area where the increased distortion was seen. So, even though the jitter spectrum was lower with the iPod/Wadia combination, analog output IMD was higher. This probably is due to additional jitter produced at the coax connection jacks, and the fact that the jitter was not confined to a narrow band as it was with the McIntosh transport.

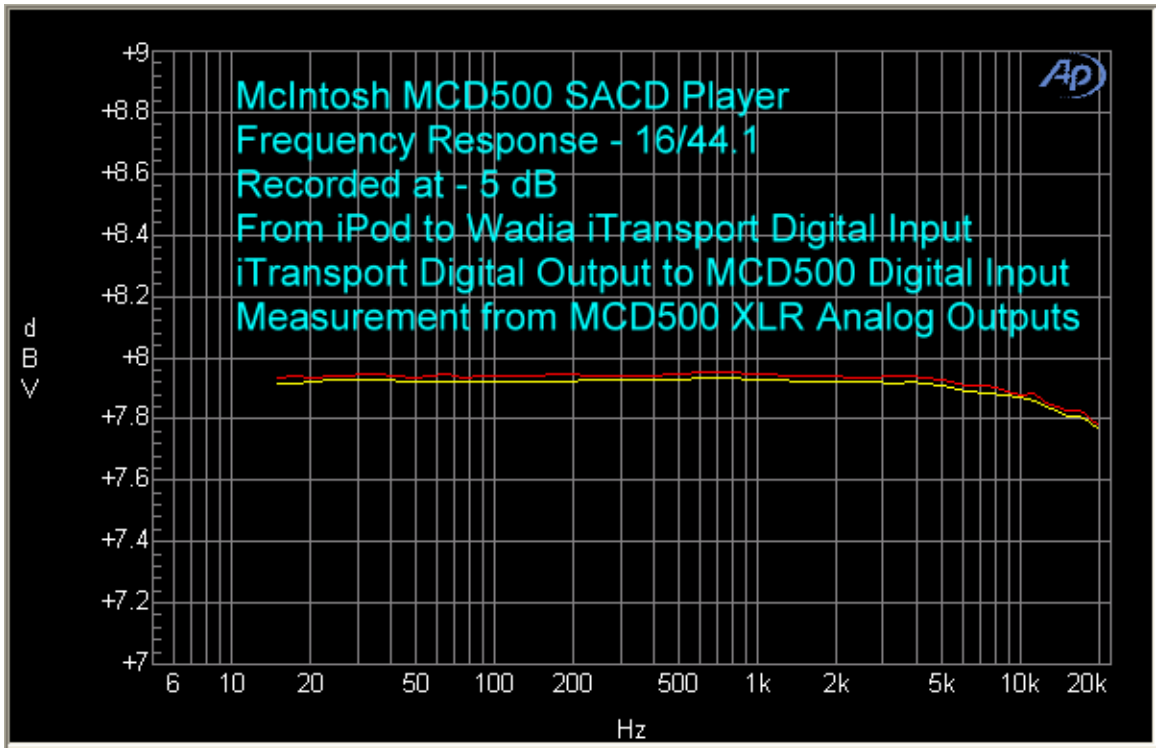
The bitstream is read into a memory buffer in the MCD500 for error correction, but it obviously cannot correct everything. The results illustrate that having a separate transport and an outboard high end DAC does not necessarily give you better results than a transport with DAC in one chassis. In fact, the results could be slightly worse, as shown here.


McIntosh MCD500 SACD Player
1 kHz Sine Wave - 16/44.1 - Recorded at - 5 dB
From iPod to Wadia iTransport Digital Input
iTransport Digital Output to MCD500 Digital Input
Measurement from MCD500 XLR Analog Outputs
0.004% THD+N
+40
+20
+0
-20
-40
-60
-80
-100
-120
-140
d
B
V
2.5k
5k
7.5k
10k
12.5k
15k
17.5k
20k
22.5k
Frequency - Hz


McIntosh MCD500 SACD Player
10 kHz Sine Wave - 16/44.1 - Recorded at - 5 dB
From iPod to Wadia iTransport Digital Input
iTransport Digital Output to MCD500 Digital Input
Measurement from MCD500 XLR Analog Outputs
0.003% THD+N
+40
+20
+0
-20
-40
-60
-80
-100
-120
-140
d
B
V
10k
20k
30k
40k
50k
Frequency - Hz


McIntosh MCD500 SACD Player
19 kHz, 20 kHz Sine Waves - 16/44.1
Recorded at - 5 dB
From iPod to Wadia iTransport Digital Input
iTransport Digital Output to MCD500 Digital Input
Measurement from MCD500 XLR Analog Outputs
+40
+20
+0
-20
-40
-60
-80
-100
-120
-140
d
B
V
10k
20k
30k
40k
50k
Frequency - Hz


McIntosh MCD500 SACD Player
60 Hz, 7 kHz Sine Waves - 16/44.1
Recorded at - 5 dB
From iPod to Wadia iTransport Digital Input
iTransport Digital Output to MCD500 Digital Input
Measurement from MCD500 XLR Analog Outputs
0.011% IMD
+40
+20
+0
-20
-40
-60
-80
-100
-120
-140
d
B
V
2.5k
5k
7.5k
10k
12.5k
15k
17.5k
20k
22.5k
Frequency - Hz

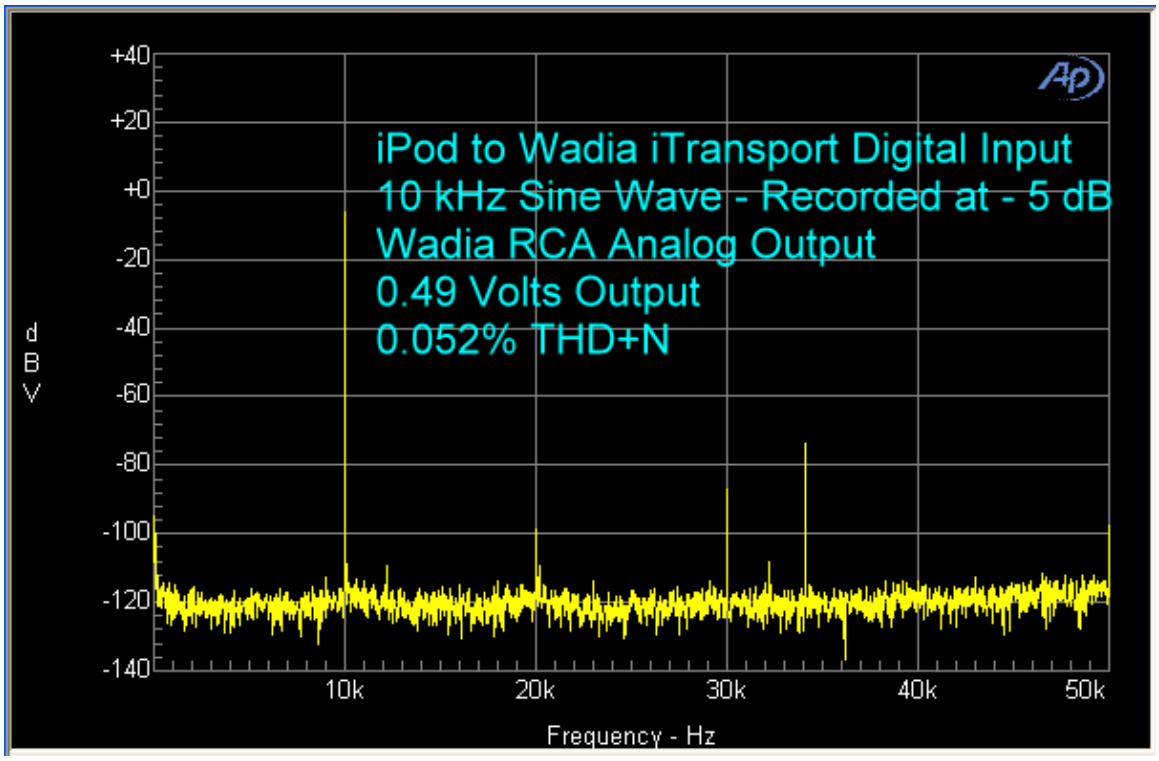


Jitter is a controversial topic. No one can agree on how much jitter produces an audible effect. But, it seems that it is dependent on the frequency in the audible band where it is occurring. Jitter represents the bits arriving at the DAC's input sooner or later than the DAC is expecting them, and this can make the DAC interpret a 1 as a 0 or a 0 as a 1. There is a digital clock reference, which generates a very steady signal by applying a voltage to a quartz crystal that oscillates at a defined frequency, in the MHz range, such as 24 MHz for a high end clock generator (in the world of Pro Audio, outboard clock generators are used to synchronize all the digital components used in the recording process). This is down-converted to a "word clock" which is at the same sampling rate as the music, such as 16 bit, 44.1 kHz, which is then synchronized to the flow of the audio digital bits in a precise fashion. The DAC, using the clock as a reference, expects to see the audio bits arriving at a certain time. If they arrive early or late, jitter occurs.

Jitter was pretty bad in early digital audio systems, but these days, the DACs are really very good, and jitter is low. The DAC can deal with jitter and other problems because in fact, for each 16 bit sample (in Redbook CD), there are 32 bits. The first three are the "Preambles", which tell the DAC what is coming. Bits 4-27 are the audio bits, with the first 16 being the audio and the last 8 being 0's. Bits 28 – 31 are administrative, which includes parity. So, if you really look at the 16 bit word, there is a lot of associated information to make sure that the DAC interprets that word correctly, and sends it out as the right voltage value. Of

course, error correction is not perfect, so we still get the effects of jitter in the analog output.

As an aside, the Wadia iTransport has its own DAC, if you wish to use it. Here is a 10 kHz spectrum from its RCA analog output. THD+N is an order of magnitude higher than with the MCD500's DAC. So, if you plan on using an iPod and Wadia iTransport, connect it to a good outboard DAC rather than simply feeding your hifi system with the analog output from the Wadia's built-in DAC.



Conclusions

McIntosh's MCD500 is state of the art for SACD/CD players. I have never heard finer sound quality. It is marketed as an SACD player, and it does very well there, but even if you don't have many – or any – SACDs, the MCD500 is worth a very close look just as a CD player, because it is not going to get any better than this.