Are you a 2-channel audiophile?
If so, I see a flat-panel TV in your future.

Reviewing the <u>Assassin Audiophile AR-1 Media Computer</u>

by John Mingo

I'm an audiophile. I was the last one in my group of friends to build a multi-channel home theater setup. Even now, while I love to watch football on the 1080p 92" projection screen, or watch a blu-ray film like Avatar, with the 5.1 channel setup, my main interest is in sitting and listening to the highest quality 2-channel sound

So why is there a flat-panel hi-def TV monitor sitting on my audio rack in my 2-channel listening room? Well, the short answer is that it was time – time to rip all my CDs into the highest quality digital format and be able to play these discs into a high quality 2-channel DAC. So many of these discs have sat unused in my library. When I thought of a disc I wanted to listen to, it would take long, precious minutes to find it. Sometimes, I'd look for the disc for so long, and not find it, that I'd give up and simply play one of my "favorites" sitting on top of the audio rack, right above my high-end CD player. Also, there were times that I picked up a long-lost CD and found it to be scratched, because someone had thoughtlessly taken it on a road trip without its protective jewel case. Other times I'd stand in front of my CD library cabinet trying to read the small type on the jewel boxes' leading edges – a "browsing" process that has been revolutionized by "music servers."

After all, this is the second decade of the 21st century. My audiophile friends were moving to systems such as Sooloos, Naim, and other high-end music servers. These devices are not the common, everyday variety of server that gives the masses their MP3 music. We are <u>not</u> talking about iTunes and their related devices. Rather, these audiophile components are, in fact, expensive music computers. The digital music is stored in the form of lossless (and somewhat compressed) files such as FLAC, or in WAV or Apple Lossless file form. The computer eliminates the possibility of "wow" by playing the music from memory (RAM) rather than from a spinning hard drive or CD player. The computers are designed to look like audiophile components, and the software is exceedingly diverse and allows for complete customization of the file ripping (copying), storing, and playback process.

These high-end music computers (to which we sometimes attach the term "servers") have most recently been improved to allow for multiple interfaces – the ability, for example, to control the system by sitting at your listening position and using an Android or Apple device such as a smartphone or tablet. The listener can scroll through all his album covers on his tablet device and choose an album simply by tapping the album cover. Traditional remote control features – such as pause, stop, repeat, fast-forward – are also on the control device. You can set up playlists,

including party lists, etc. just like you can on those iPod-type devices that play cheap sound over cheap earphones. But with the sophisticated music computer, the lossless sound comes out, unadorned by computer digital sound processing, straight to your expensive DAC, then to your very expensive pre-amp, amps, and speakers. For the audiophile, who has spent years auditioning each component of his/her system – the music server is a god-send. After 6 hard months of research on the subject, and many hours of ripping CDs (and editing the resulting computerized information files), I feel as if my 2-channel music system is brand new. Albums I haven't listened to in over a decade now are newfound favorites – my musical taste is once again very broad and very satisfying.

So, what's this got to do with a hi-def TV monitor on top of my audio rack? Well, it turns out that the many flavors of high-end music server have very differing sets of features and interfaces. This article reviews the latest high-end music computer – the Assassin Audiophile AR-1 – from a company that specializes in home theater PCs (HTPC). This is their first attempt at producing a full tilt boogey audiophile server aimed at the 2-channel market. I'll compare this system with others such as the Naim™ system, the Sooloos™ system, the Kaleidescape system™, Bryston's BDP-1™, Autonomic's Mirage™, Olive's 06HD™, and the Black Box™ .

In comparing server systems, in my view, the listener should focus on 5 sets of issues –

  a. the quality of the digital music file being delivered by the server to the DAC;

  b. The degree of noise, if any, associated with the music server that might diminish the listening experience.

  c. the ease of use and flexibility of the INPUT interface (the interface that allows the listener to rip the CD and obtain complete information on the CD in the software's filing system);

  d. the ease of use and flexibility of the PLAYBACK interface (the interface that allows the listener to quickly find a disc, begin playback, and manage the playback process); and

  e. the ability to digitize, without loss of quality, and then play back as many forms of music as possible (CDs, HDCDs, SACDs, blu-ray concerts, downloaded high-resolution audio files, and internet streaming hi-def music such as from certain live concert sites)

Before we get deeper into this discussion, let's remind the reader that there is currently no high-quality ripping process for SACDs that is stable, ensures perfect playback, and is readily available. So, the 2-channel audiophile still will need his high-dollar SACD player in his audio rack. This will change very soon, it appears, and the producers of the best music software already are improving their products to meet the needs of audiophiles with large SACD libraries. So, another issue has to do with the upgradeability of the music server.

It is also the case that the SACD format still is the best multi-channel sound format out there.   So you can't sell your SACD player on Audiogon (the internet's main secondary market for quality audio equipment) any time soon.

In the systems being compared, there is little issue over the quality of the ripping (copying) process for CDs. Most listeners will want to use FLAC files simply because they benefit from some degree of compression (but nowhere near as much as MP3 files) while remaining absolutely lossless. Since all of the major systems can have unlimited storage capacity (in the form of inboard or outboard hard drives), all we really care about is that the digital file is lossless. Compression is not that important. I have spent many hundreds of hours listening to FLAC files played through a high-quality DAC and I cannot hear any difference between the FLAC file and the CD as played through a high-quality CD player. Theoretically, if the DACs are the same, the sound going to the pre-amp should be the same (assuming the same type of XLR interconnects, etc.).

The comparison of apples to oranges is difficult, however. That is, a traditional CD in 16bit/44.1khz does sound better through my newest 2-channel DAC than through my CD/SACD player (the DACs in the dedicated DAC are better than those in the CD/SACD player).   But the same music on SACD played through the CD/SACD player sounds very similar to the CD music through the higher-dollar DAC. In either case, though, I'm listening to the best sound I have ever heard from any system.

So, let's go through the 5 areas listed above:

a. <u>The quality of the digital music file sent by the server to the DAC</u>. In principle, the audiophile would like the audio file to be sent to the DAC (if the DAC is of sufficient quality) without the computer doing any Digital Signal Processing ("DSP") on the audio file. Unfortunately, all the major systems' websites, except for Assassin, are silent on this issue. The website might say, for example, that the music software "handles" audio files with resampling frequencies of 32.0, 44.1. 48.0, 88.2, 96.0, 176.4, and 192 khz. But what isn't said is whether to "handle" particular frequencies the computer must resort to DSP for any particular audio file. The potential user has little choice but to try the system on various audio files and see whether the stream being outputted to the DAC matches the known native resampling rate of the computer file. A DAC with a good display that instantly shows the resampling rate of the file is a must. Also, most DACs do NOT decode HDCD™ encrypted audio files, as does the Berkeley Alpha, so these other DACs cannot confirm that the computer is bit-streaming such an HDCD file properly.

Most systems provide for S/PDIF digital output which is considered by audiophiles superior to fiber-optical output of the digital file to the DAC. The Sooloos and Naim have both optical (Toslink) and coaxial digital audio outputs, while the Assassin AR-1 and Kaleidescape have these two plus a HDMI output (the latter flowing from Assassin's background as a high-end HTPC maker and Kaleidescape's background as a very high-end movie system).   Note that many audiophiles that are into music computers have legacy media servers based on the Mac operating system, with sound cards that output the audio digital files via a USB port. These USB ports have their own problems, and there have been many attempts to solve these problems. My own belief is that the fewer steps that the digital audio file must go through before

it gets to the high-dollar DAC, the better. Thus, some of the very best DACS do NOT have USB interfaces to connect to the music computer. Those that do also have S/PDIF digital inputs as well as Toslink and AES (XLR) digital inputs.

In the case of most of the systems, the music playing software is proprietary and allows the user to have the computer set the output format in terms of the bit-rate and resampling rate, if any. That way, you can set the output to perfectly match the characteristics of your high-end 2-channel DAC (although DSP may or may not be used for some resampling rates as noted above).   Rather than use proprietary software, the Assassin unit utilizes the JRiver™ Media Center software, because the Assassin machine itself is nothing less than a very high-end PC, running Windows 7 Ultimate (64-bit).

The JRiver software is highly customizable. For example, in my own 2-channel system, my older DAC, which I have only recently replaced, must use a 24-bit output with resampling limited to 48khz, not the newest 88.2 to 192khz rates. The JRiver software automatically recognizes this need and adjusts the output accordingly. Some older media computers utilize very expensive soundcards (cards costing well over $1000). However, the generally acknowledged best sound output from these cards involves no digital sound processing whatsoever – the JRiver software simply bit-streams the audio file to the high-end DAC (costing a multiple of the price of some high end sound cards).

My new DAC – a Berkeley Alpha -- can handle all resampling frequencies up to 192 khz. The JRiver software recognizes these greater abilities and responds accordingly. Also, it should be noted that unlike all the proprietary music software on the competing computers, the JRiver software, from the perspective of internal handling of an audio file, uses 64-bit bit-depth for the audio file. There is no test of which I am aware to show how this improves audio quality, but it does mean that the JRiver software is set up to be compatible with future DACs that can handle 32-bit or even 64-bit bit-depths.

In the Assassin server, the system utilizes the latest 2nd generation (Sandy Bridge) Intel i-Core 3 chip with integrated Intel soundcard. These new chips perform the bit-streaming exactly as would any ASIO-compliant sound card on the older systems. The only digital signal processing that would occur is if you asked the server to convert a multi-channel source (coming from, say, a blu-ray disc) to play on your 2-channel system. The new 2nd generation Intel chips, for the first time, allow a cheaper, integrated sound card to perform exactly at the level of the high-end sound cards, when it comes to bit-streaming audio to the DAC (or pre-pro) of your choice.

Because the sound card is integrated, however, there are no latency issues that might arise from using a PCI or PCI-e soundcard to output the lossless audio file in its original, unprocessed state. Also, for all the music servers being reviewed, the audio file can be played from RAM, not from a spinning hard drive, thus eliminating "wow" associated with a turntable moving at inconstant speeds.

It is extremely difficult to compare all of the features of the audio software on these machines, because of the proprietary nature of the software on all but the Assassin PC. However, any interested party can download a free trial version of the JRiver software (www.JRiver.com) to look deeply into issues of ease of use and diversity of choices in setting up the ripping, storing, and playback

processes. All the major machines, at least the ones with an optical CD drive, allow auto ripping and booting automatically into a Theater view (the sexy one that shows the album cover art), etc.

When I say major systems, I have researched quite a few but have not listened to them all. Some systems have quite a few followers among audiophiles that I know to have quality DACs, pre-amps, amps, and speakers. So when they say that their machines are clearly outputting unaltered bit-streaming of the audio file, at least the audio files they have on their hard drives, I believe them. But I'm not convinced about all of the brands. For example, Bryston has a relatively inexpensive music server (list $2195) that uses a separate sound card and Realtek software, as does the Mirage. Nowhere in the literature I've found on these machines does it say that the Realtek software achieves pure bit-streaming (i.e., does so without absolutely any DSP) at all possible resampling rates. I've researched the Realtek line quite a bit in the context of building highest-quality music computers and, indeed, some of their sound card drivers will NOT achieve pure bit-streaming, for some resampling rates, when using S/PDIF digital outputs (as opposed to HDMI outputs). Further, I'm not convinced that one piece of software's bit-streaming is identical to another piece of software's bit-streaming. One of the high-end DACs could probably tell the difference if someone were set up to test all the servers with the same DAC and other high-end components.

Indeed, my research into all of these high-end music computers suggests that there is a real shortage of information on these servers at the manufacturers' websites. There are probably some good reasons for this. First, I suppose, many audiophiles simply can't be bothered with the details – they trust their high-end retailer and that's the end of it. But a retailer who has been carrying a major brand for a long time cannot, to put it bluntly, be fully forthcoming about the shortcomings of his product. All products, without exception, have shortcomings. Good sales technique requires, sometimes, incomplete information.

Second, the last half of this decade has seen an explosion in the audiophile community's interest in building for themselves the very best music computers. Some websites, blogs, and forums are devoted to this discipline. One thing that strikes the reader on these sites is that there is no such thing as universal agreement on what is "the best." Perhaps this is because audiophiles, as a group, are so hard to please, and this may be why there must indeed be some amount of less-than-full-disclosure. One thing that strikes me as special about the Assassin product is the specificity of their website materials.

For example, Assassin uses Microsoft drivers not Realtek drivers for the HDMI and S/PDIF Toslink outputs. These drivers achieve perfect bit-streaming of ALL 7 resampling rates when the output is via HDMI. But when the output is via S/PDIF coax, the specific 176.4khz resampling rate requires JRiver to down-sample to 96khz (i.e., requires use of DSP). The resulting sound is still amazing when played on my high end system (although I own only one of the 20 or so albums currently available with 176.4khz resampling). The Assassin machine has as an optional a separate PCIe sound card that can bit-stream the 176.4khz resampling rate without any DSP. From my own perspective, I've listened to both and can tell little difference, siding slightly with the integrated sound card. For all other resampling rates, including 88.2, 96, and 192khz, I side with the integrated sound card. No matter, I know I'll be buying additional 176.4khz audio albums from Reference Recordings, whose HRx downloadable albums are the mainstays in this small but growing market (www.referencerecordings.com).

The Assassin people earn my praise not only for the extremely high quality of their product but also for the quality of their information given to customers BEFORE the customer spends his money. No other manufacturer, on their websites, specifically uses the phrase "perfectly bit-streams the following resampling rates without any DSP."

This specificity of information, of lack thereof, when discussed in the context of the vast and diverse discussions on the audiophile sites, suggests that the high-end audio industry still is not fully tuned in to the massive achievement Intel and Microsoft have come up with in their 2nd generation Core iX chips with integrated sound card, powered by Windows 7 (64-bit).   In particular,, the days of the expensive sound card in a PCI slot are over, in my view, so long as the ONLY objective is the perfect bit-streaming of audio (and video as well). This is NOT the case for the professional audiophile who must have such things as Analogue-to-Digital conversion within his sound card. But for the audiophiles that are interested only in the very highest quality sound *to listen to* (and the highest quality video to see) – well, within a couple of years, the use of these PCI or PCIe cards will be disappearing.   It is simply a matter of months, for example, before the Microsoft drivers for the integrated sound cards directly address the issue of those few albums with a resampling rate of 176.4khz over S/PDIF digital outputs.

It is also worth noting in passing that some audiophiles will want their pure-bit-streaming to be achieved through an AES digital output rather than a coaxial digital output. For these audiophiles, the Assassin AR-1 has the option of replacing the less expensive coaxial-output integrated sound card with a very expensive PCI card with AES/XLR connections.

Finally, in addition to the latency issue, the PCI/PCIe sound card also poses the issue of additional heat that might conflict with the audiophile's need for SILENCE in the operation of the computer. Keep reading.

b. <u>How much noise, if any, does the media server make</u>? All computers make noise when booting, when ripping a disc, and when performing other functions. Even just sitting at standby, an audio system can produce heat, which moves air, which causes measurable (but not hearable) noise. It is vitally important to the audiophile that computer noise be minimized. I can't speak for the major brands because I have not had the opportunity to actually measure noise when listening to them in dealer showrooms. However, an often quoted advantage of the Naim machine – to name just one -- is that it has only a solid state drive and no spinning hard drives or fans. This obsession with noise has led to the reliance on such "passive" machines – ripping and storage is done elsewhere, over a network, and the music computers are not fully functional computers. But a price is paid for trying to achieve absolute silence and this price is unnecessary and way too costly in terms of foregone pleasures.

The Assassin AR-1machine is specially built to minimize noise via a) a special cooling system involving ultra-low-speed fans coupled with unique heat sinks); b) the use of a solid-state main drive to run the software, including Windows 7 and JRiver; c) ultra-quiet hard storage

drives that minimize the already minimum noise for the brief portion of a second while the software loads an audio file into RAM, and d) the use of special sound-absorbing materials within the large aluminum case.

Measurements made with a digital SPL meter, show that functional noise when playing an audio file with the AR-1 are zero (not above the transient noise in the listening room when playing a file with the pre-amp on MUTE). Noise during booting the machine is also almost non-existent – about 0.1 to 0.2 dba (due to the spooling of an internal HD if the user chooses that configuration).[1] Noise during ripping CAN be heard, but is less than for a high-end audiophile CD player loading a disc, by quite a bit.

Remember, all audio or computer machines produce heat, which moves air. But the question is whether this noise is measurable by a high-quality sound pressure meter.
The Assassin sound tests show that the new AR-1 does not make enough noise that is evident to the listener beyond the standard 1-meter-away position of the SPL meter. At a listening position of 9 or 10 feet, even when ripping a disc, the computer cannot be heard. Most interestingly, the sound of the AR-1 for all functions except the one-time ripping of a disc, when the optical drive is spinning at a much higher rate than normal, is about one-third of a decibel lower than the sound of the listener breathing![2] These measurements show that the old view of insisting on a fan-less computer with no spinning hard drives is no longer necessary. And the AR-1, as will be discussed later, has a much more powerful CPU and software that allows the music server to output highest-definition audio from more sources than the fan-less, storage-less computers without generating excessive heat that can compromise longevity.

To drive this point home, the Assassin machine comes with software that measures both the heat of the unit and the speed of its two, very large, very slow fans. When the audiophile is simply playing a FLAC file, no matter the bit-depth and resampling rate of the file, the machine generates very little heat. For this function, the machine could survive without any fan, although I wouldn't want to risk it. But when the audiophile decides that he wants to LISTEN to an audio track that is part of a ripped blu-ray disc, the machine has to work harder and heat rises. Again, it is possible that a fan-less machine could do this and still live a long time. But why risk it, when the sound of the fan is so low that the digital sound meter cannot hear it above the ambient noise of the room?

Nevertheless, audiophiles are a slow-to-change lot (I know, I'm one of them). For such a customer, Assassin will make a completely passive machine, with only a solid-state hard drive, and no fans. The trade-off is that heat will be higher if the user actually uses the machine's ability to play a ripped blu-ray disc's audio track. Each to his own.

c. <u>The INPUT interface</u>. This interface has to do with the process of ripping the CDs (or blu-ray discs). If you have ever tried this process you know that the media management software often does an excellent job of searching the internet for the album's cover art and for

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[1] It is important to note that physical measurements differ from computer to computer. So, even when using identical components in 2 "identical" PC cases, measured noise levels will vary. In several Assassin machines I've tested, these noise differences can be several tenths of a decibel.
[2] See the PDF file regarding sound measurement on the AR-1 at the Assassin website: www.assassinaudiophile.com

information such as the name of the artist, the year of the disc's release, etc. You probably also know that, if the disc is rare or old or foreign, this information-gathering process (known as applying the "tags") can be, well, quite incomplete. In some cases, the software will not be able to find any album art, or the name of the composer will be found but not the name of the artist. If your CD collection is large (I have a friend with a collection something like 10 times the size of my own 2000+CD collection), then you'll have quite a few of these CDs. This is especially the case if you have older (pre-1995) classical albums, albums released only overseas, or older jazz releases.

In these cases, all the major software systems allow you to manually input the missing information. The Naim, Sooloos, Kaleidescape, Olive, and Mirage machines have *touch-screens* for when these manual inputs are required. The Kaleidescape and Mirage screen is in the form of a Crestron touch screen, at least in the installations I've seen and listened to. The Naim is in the form of a 5-inch screen on the unit itself, while the Sooloos (Control 15) is in the form of an integrated 17-inch screen that also houses the music computer itself (think of an iMac). From the point of view of us older listeners with poor eyesight, the Sooloos' larger screen is a necessity, but even a 17" screen might not be enough for some of us. Naim recognizes this problem, and therefore provides the listener with a VGA output so the user can set up his own flat screen on the audio rack. Similarly, Sooloos understands that 17" may not be large enough for the eyesight-challenged user, and thus provides a VGA output as well. The Assassin, being nothing less than a PC, has both a VGA and a high-speed HDMI output.   For myself, I started out with a 32" display, which was very nice because well more than a quarter of my albums were older classical CDs. I was doing a lot of typing in the fields for "Artist", "release date", "conductor", etc.

Which brings us to the other essential interface for INPUTTING information – the keyboard. Of course, the touch-screens on the Naim and the Sooloos allow typing right on the screen. But have you ever tried to type quickly on a touchscreen, especially a <u>small </u>touchscreen? For those of us who type on a regular keyboard for a living, a wireless keyboard is a necessity. Again, the major makers provide for an external keyboard – the Naim has traditional wired mouse and keyboard plugs in the back of the machine. A USB wireless keyboard/mouse combo can also be used, but the only USB port on the Naim is on the back of the machine and thus the machine itself may cause interference when the wireless keyboard and mouse are being used in front of the machine. On the Sooloos, its iMac-inspired design incorporates a wireless keyboard.   The Assassin, meanwhile, has 2 USB ports on the front of the machine just for this purpose. Also, it has several more USB ports on the back, including 2 of the new USB 3.0 ports which are really useful for attaching the new high-speed external drives that run on USB 3.0. None of the other music servers have the 3.0 USB ports, yet.

Some audiophiles may worry that a large TV monitor sitting on the top of their rack will look out of place. Maybe -- but, again, this is the 21st century. You will find out below that a larger screen has other uses besides making the task of inputting CD information lots easier.

d. <u>The PLAYBACK management interface</u>. When it comes to the music software's interface, diversity is the name of the game. Some folks will settle for the software's default settings; others will spend several months tweaking the settings . I have lived with the JRiver software for more than 6 months now, with playback sessions lasting 10 hours a day or more, each day. It is an incredible bit of software engineering with just about any option you would like.

Like many other audiophiles, I am somewhat compulsive in my insistence that every bit of information I can find is entered into the computer regarding a particular disc. Also, I like to toggle back and forth between the very popular Theater View (which shows all 2000+ albums' cover art) and the Standard View that allows me to read and edit the extensive information on the disc. Importantly, I sometimes read and edit this detailed information from my listening position at 13'9" feet from the music server. So, for me, a large screen, coupled with a choice of oversize icons is a necessity. Others might not mind getting up off the couch to do this reading/editing, but once I'm listening to a piece of music at the sweet spot, I don't want to move.

Yes, you can do your editing of one album while simultaneously listening to another album. For the record, the JRiver software permits *reading* the CD information from the Theater View as well as the Standard View, but *editing* requires use of the Standard View.

Also, the JRiver software, like the other systems, provides for the collection and showing of art and photographs related to the music while the album is being played. When you first rip a CD, the software begins looking for information, photos, etc., from such internet sources as Gracenote™. As long as the music computer is connected to the internet, the software looks for and updates this information. For an album by Celine Dion, for example, the software will download perhaps a dozen photos of the artist in various concert venues (such as the Las Vegas show) or in private life, which are shown in a kind of big-screen slide-show. Some of my guests think this is the greatest invention since the telephone, while others find it distracting from the music. Often, for pieces of music I know extremely well, I simply turn off the monitor so that nothing will detract from the music.

In this brief overview, I cannot go into detail regarding the JRiver software. Much more can be found at their website and their wiki and forum (www.JRiver.com).

Another important issue regarding the various brands' playback interfaces has to do with "remote controls." That is, how can the music computer be manipulated while seated 10 feet away (or 50 feet away while enjoying a meal in another room)? In this regard, all major music computers have physical remote controls with the usual functions such as play, pause, stop, etc. In any event, the listener still will need his pre-amp remote control at this position. This is because, with no digital signal processing going on within the music computer, loudness still must be controlled by the pre-amp. Of course, the user can choose to use a loudness process within DSP (digital signal processing), but no audiophile I know would let this happen. I have experimented, for example, with DSP "loudness leveling" (making a classical album and a rock album produce the same level of loudness). I find the results to be way less than satisfying. I want pure music coming from my music server and going into my DAC. I'm willing to pay the price for this by having a separate remote control for loudness at my listening position.

In practice, none of the major systems really rely on physical, traditional remote controls (although such controls exist). All use proprietary or 3rd party tablet devices for such controls. Naim and Sooloos provide software to go on Mac devices such as iPods, iPhones, and iPads,

some of the others use Crestron remote pads, while the JRiver software provides for control either by iPad/iPod or Android devices or a physical remote control. I use a tablet running Android 3.2., which I recommend be single-tasked, to be used ONLY for your audio system. This is an extremely useful device when I'm away from my listening position, such as sitting at the dinner table. The device can be used in either of two modes – as a standard remote showing only the usual controls for Stop, Pause, Fast Forward, etc., or as a tablet version of the Theater View. In this latter mode, you have at your fingertips most, but not all, of the features of the software as shown on your monitor. For example, you can browse through your hundreds of albums by flicking your finger tip on the tablet's touchscreen to scroll through all the album art. You can choose an album by touching its cover art on the tablet's touchscreen. When the album is playing you can see a screen showing a larger version of the album art along with the various Stop, Pause, Fast Forward commands. And when you want to Search, for example, by "name of the conductor", you can do so from the Android tablet.

The only shortcoming of the tablet remote control is that it doesn't appear to show all the detail regarding the album (it *does* show the critical information such as the names of the tracks, artist, conductor, date of release and a few other pieces of information). Nor can you edit the album's information from the tablet, so far as I know. But I find these shortcomings to be exceedingly minor, especially since I have a large monitor, easily seen from my listening position.   Moreover, when I am at my listening position I always use the best device known to man for controlling any kind of software – the wireless mouse. I can change anything in JRiver's options from my listening position, because I can see with ease all of information on the screen, without having to sit on a stool in front of the screen and without having to squint. I move the wireless mouse on my thigh or on the seat cushion – and I am much faster with the mouse than I can be with a touch tablet.

Still the tablet is quite useful. It is also one of the things that turns on casual listeners that visit me and my system. Some people apparently could care less about sound quality and want to know only what the Android can do versus the iPad! Oh well, there will always be Philistines.

In summary, I find little to differentiate the major systems when it comes to the input or output interfaces of their respective software set-ups. The Naim does seem to suffer from its 5" LED touchscreen compared with the 17" screen of the Sooloos system. The Assassin's HDMI output allows the user to choose any screen he wishes and look at the results in high-definition video.   The larger the screen the easier it is for the user to edit the massive information regarding his collection of CDs. A wireless keyboard and mouse, quite usable at the listening position, are a major advantage when coupled with the benefits of the large screen.

Meanwhile, some sort of small tablet device is sexy and useful when you are sitting at a distance from where your mouse resides at your sweet spot listening position. I suspect, but cannot confirm, that there are only minor differences across the major systems in what these tablets can do. Of course, any tablet is limited by the speed of the listener's household wi-fi system; same thing for the speed at which the systems' software can access the outside internet. Users in major cities with 20+ mps internet speeds will be at an advantage to those of us

who live in rural areas. Finally, all of the tablet/phone devices, so far as I know, can be used to control the music server from outside the house's wifi – i.e., you can shut off the system if you happen to remember on your way to the airport that the system is still running.

Now, what about music that does not reside on a ripped CD audio file on the music computer? Here is where the full-fledged Assassin computer with a blu-ray optical drive and the JRiver software simply shines.

e. <u>Other sources of high-definition music</u>. First, consider blu-ray disc music. It is important that, recently, some blu-ray concerts are available that have the latest DTS HD Master audio tracks or DD TrueHD. These concerts are no less that spectacular when played on a high-end blu-ray player that bit-streams the video and audio tracks via a HDMI connection to a high-end "pre/pro." Such pre-amp/processors have been around for a while (e.g., Anthem, Theta, Krell, Classe and others) but the blu-ray menu with the DTS HD Master audio tracks had been previously limited to films. Now, there are new concert blu-ray discs utilizing DTS HD Master from major groups, singers, classical orchestras, etc., and the list is growing.

Like many audiophiles I enjoy listening to such music and viewing the orchestra play on my 5.1 channel home theater setup with the large screen. But I often wondered what it would be like to hear the music played over my higher-dollar 2-channel system. Well, now I can with my Assassin Audiophile computer.   While I can play the blu-ray disc directly on the audiophile computer's blu-ray drive, I find it better to first rip the blue-ray disc using software such as makemkv™ or DVDfab™.[3] Then, I play the video and audio tracks on my two-channel system with its small (by home theater system standards) hi-def screen.

I found that I love the music coming from the 2-channel system even better than when it is played in its native DTS HD Master format from my pre/pro in the home theater. Presumably, this is because I've spent a lot more money on the speakers and amps in my 2-channel room than in my 5.1 channel room. Once I've already seen the blu-ray concert on the large 92" home theater screen I no longer need the large hi-def screen and am content with the 32" screen on my audiophile rack. That is, my Wilson Audio MAXX2 speakers with their Krell monoblocs sound better than the multi-channel setup – even though some amount of digital sound processing must be used to convert the multi-channel audio track to a 2-channel stream going to my 2-channel Berkeley DAC. For this 5.1 to 2.0 channel conversion I use the DSP function of the JRiver software. I often sit and listen to this music with the monitor turned off (!) and, I swear, it sounds at least as good as SACD versions of the same music.

Not being an audio engineer, I can't prove that a DTS HD Master or DD TrueHD audio track is as good as an SACD audio track of the same music. I do wish to point out that the JRiver software, like the Assassin computer itself, prides itself on giving the user lots and lots of information. For example, the software shows that for some of my MKV files (rips of blu-ray concerts), the audio track is 48khz/32-bit.

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[3] I am not advocating the copying of blu-ray discs that violates copyright laws. Until court cases show the opposite, I am assuming that ripping a blu-ray disc that you obtained legally, and using the resulting AV file only for your own enjoyment, is permissible.

This, and some files that are 96/32, compare favorably to DSD files (that are the inherent file within any SACD). Moreover, the latest version of the JRiver software (Media Center 17), can play DSD files on my 2-channel DAC with the appropriate DSP.

The key point here is not that DSD files are playable with JRiver, but that only a real, high-end computer with blu-ray capability allows me to enjoy DTS or DD multi-channel music in my 2-channel high-end system. But the advantages of the Assassin Audiophile computer over the Naim and Sooloos systems – and other music computers that are not full-fledged computers with browsers -- does not stop with Blu-ray music. Recently, I've become a member at the Berlin Philharmonic Digital Music Hall. For something slightly above $150 a year, membership allows you to listen to and view live performances of the orchestra, so long as you have a computer with a browser. None of these performances are available in disc format or for permanent downloading – a brilliant marketing scheme on the part of the Philharmonic.

The browser can show the performances in full screen mode, while the 2-channel audio track is hi-definition (albeit not quite up to the standards of 24/96). The sound is VERY good through the 2-channel setup. The only problem is that there are the occasional hitches in the video due to the fact that we live in a rural area where the only broadband is via tower-to-tower wifi, with speeds of only around 2 mps. Those of you in large cities who are classical music buffs and audiophiles will definitely want to avail yourself of performances like these. The Berlin membership also allows you to stream any of hundreds of past performances in the same HD video and audio. So far as I know, the only other piece of electronics equipment that has the Berlin Philharmonic Digital Music Hall built in is a rather shabby Sony blu-ray player that lists for less than $200 and has quality to match.

By now you get the picture. There are times when a music source is neither from a CD or a blu-ray disc, but over the internet. Some of these sources allow the performance to be seen and/or heard only via a browser. Other music sites can install software on your computer that can stream the music/video without using a browser, but your music server has to be using a real operating system such as Win 7 64-bit. Here's my bottom line -- in this decade, no "dedicated" music server can any longer compete with a real computer when it comes to audiophile music (or videophile video). At the same time, the diversity of programming suggests that a larger hi-def monitor on your audiophile equipment rack will be preferable to a 17" monitor/computer using proprietary software. And we have already shown that larger monitors and wireless keyboard/mouse combinations allow for greater ease in editing the audiophile's vast library of CDs (and now blu-ray discs).

The end result is that the Assassin AR1 machines, available in various configurations, and the JRiver software, dominate the Naim, Sooloos, Kaleidescape, Bryston, Olive, and Mirage systems, in my view.[4] One of the reasons for this domination, is that some of these systems – the

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[4] This review has not touched on the multi-room capabilities of the JRiver software. Since the audiophile's PC is set up as a DLNA server, the digital sound and video can be sent to any room of the house over the household wi-fi. All that is needed in the "client" room is a small fan-less computer (including an Android tablet) and, say, a pair of speakers with DAC and integrated amp built-in (or speakers plus a separate DAC, pre-amp, amp box such as made by, say, Bel Canto or Wadia).

Sooloos, and Kaleidescape systems (probably the most expensive out there) – are designed to keep the user completely out of the loop. Storage must be either over the internet or on dedicated machines that are costly. In the case of Sooloos, which is a 2-channel system, not a multi-channel system like Kaleidescape, a user must ask the dealer to delete a file! A chart at the end of this article provides a checklist of hardware differences. The software differences are much harder to catalogue, but I'm betting that the JRiver software either comes out on top or has deficiencies of minor consequence to the audiophile (in over 6 months I have yet to find something I want the software to do that it doesn't).

For all of this analysis it comes down to the things that matter – the quality of the digital audio going into the DAC or pre/pro; the ability to fully and easily edit the information on each album in the server; the inherent noise associated with the server; and the ability to use the very widest array of audio files in whatever form. Only the AR-1 has shown me that it does each of these things the best.   Most importantly, the AR-1 has helped me to discover music that I have never heard before. Music from Reference Recording, HD Tracks, and Mobile Fidelity comes on computer files that are massively large. The result is sound that is better than anything I've ever heard before from my large library of CDs and SACDs. And until you've listened to a blu-ray concert in DTS HD Master or Dolby TrueHD on your high-dollar audio system, you haven't lived. All of these choices have renewed me – I am now nothing less than a born-again Audiophile.

If you are also an audiophile, and especially if you enjoy a high quality 2-channel or multi-channel DAC, I suggest you give the Assassin a try. It provides, in both my systems, the best sound I have ever heard, and I've visited quite a few high-end retailer listening rooms around the country. But don't just use your ripped CD files (by the way, make sure these ripped files are FLAC for best results). Get yourself some of those Hi-Def downloads – such as from HDTracks.com or ReferenceRecordings.com, and have a go at it.