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## The Ah! Super Tjoeb CD Player

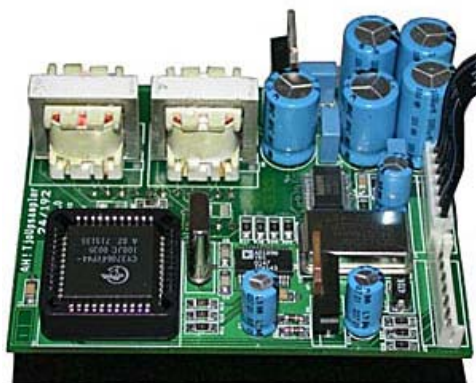
by Dick Olsher



We start our journey with a retrospective look at the stock Ah! Njoe Tjoeb 4000 CD player. The full review (by yours truly) was published in our May 2001 issue. My conclusion back then was, and I quote: "the Njoe Tjoeb represents a fantastic bargain - a clear 100 on our value for the money scale. Outfitted with the Ampere Bugle Boys, the Njoe Tjoeb remains my reference in the under \$1,500 price category. If you're a music lover on a budget, look no further, and treat yourself to this Dutch Bonbon. The old Tjoeb is dead. Long live the Njoe Tjoeb!" OK, the stock Njoe Tube is very good, but just how far up does the Super Tjoeb nudge the sonic bar? Since the cost differential is several hundred dollars, is the return on investment marginal or substantial? This is an important question for anyone on a budget. Well, the answer surprised me. I was expecting the usual subtle improvements, the sort of nuances only audiophiles seem to hear, but instead I heard a night-and-day advance in sound quality. The Super Tjoeb no longer sounded much like the Njoe Tjoeb I remembered; its performance now was definitely prime time.

### Technical Details

To my mind, the major factor in this dramatic transformation is the Tjouplesampler 24-Bit/192kHz upsampling board, available separately for \$349. There remains residual confusion in the marketplace over the technicalities of oversampling versus upsampling digital filters and the reasons for the sonic improvements that result from a correctly implemented upsampling scheme. Mathematically, the two processes are identical. Both interpolate additional data points along the digital bit stream time line. Some audiophiles naively believe that interpolated data represent newfound detail. That just isn't so, in the same way that a blow-up of a photograph doesn't contain more information about the original event. It is correct to say that the interpolated data add ultrasonic energy to the bit stream. Enter Doug Rife of MLSSA fame. If you haven't done so already, you should check out his white paper on this subject. He defines upsampling as a "poor" oversampled digital reconstruction filter having a slow roll-off rate. As a consequence, some ultrasonic images of the base band spectrum are allowed to appear at the output of the digital filter and this ultrasonic energy is input to the DAC.



I'm going to turn the podium over to Doug Rife, since he has me convinced of the usefulness of ultrasonic dither in linearizing the performance of a DAC. The following are quotations (with permission) from several email exchanges with Doug Rife. His thesis is that "the vast majority of upsampling DACs have slow roll-off anti-imaging filters which permit varying amounts of ultrasonic energy to leak through in the digital domain thus adding desirable ultrasonic dither to linearize the output DAC device. But most manufacturers, at least before my paper appeared, believed that the improvement in sound quality was due to the better time domain behavior of their digital filters. As I said in my paper, when you design a digital filter to reduce time smearing you automatically allow some ultrasonic energy through and it is this and not the reduction in time smearing that is audible. However, many still probably believe that it is the reduced time smearing that is the salient characteristic of their filter designs and not the ultrasonic dither produced by them.

There has been resistance to my unique explanation for the sonic improvements of upsampling. Mostly, it stems from the prior statements made by many DAC manufacturers that the sonic improvements are due to reduced time smearing. Nobody likes to admit they were wrong and some of these digital filter designs are patented, which means that their erroneous explanation of upsampling is permanently filed with the US patent office. The other factor is that upsampling is a great equalizer. You can take a mediocre DAC and make it sound like a super linear but much more expensive DAC. Of course, those making the pricier DACs would rather have people think they must purchase theirs to get the sonic improvements they seek and see my upsampling theory as something that could hurt sales, if widely accepted."

He also shared the results of measurements conducted on a MSB Platinum DAC using his HP spectrum analyzer: "I have an MSB Platinum DAC that includes a built-in upsampler. MSB will also install one of their small upsampler boards into any DVD or CD player and its output is sent to the Platinum DAC via the MSB link, which is a high-speed digital interface. The MSB upsampler card has a DIP switch that selects either a sharp or slow roll-off of the on-board digital filter. MSB normally sets this to the sharp position but when I suspected it could be changed, I asked MSB and they told me what DIP switch position selects the filter roll-off on the upsampler board. As you may know, the Platinum DAC itself has such a switch on its front panel that sets the digital filter to either fast or slow roll-off. When BOTH switches, the one on the upsampler and the one on the Platinum DAC, are set to use slow roll-off digital filters, I discovered that there is big and measurable increase in the ultrasonic energy around 60 kHz imaged from the high treble of the program material. I can clearly see this ultrasonic image energy with an HP spectrum analyzer. Unfortunately, the HP instrument I have goes down to -70dB relative to the main signal so it's not possible to see any ultrasonic energy with the typical upsampling DAC. But this I think is only due to the limited dynamic range of my HP instrument. I suspect that typical levels are less than -80dB which would still be enough to improve the sound. In any case, I found that when two MSB upsamplers are cascaded with both using a slow roll off digital filter, there is a double imaging effect (image of an image) which allows even more ultrasonic energy through, measuring about -55dB. The image energy around 60 kHz comes from signals in the very high treble on the recording. Because many recordings have dither in the high treble this also tends to get imaged up to 60 kHz. This energy corresponds to a significant audible improvement in the sound quality even over the normally very good sound quality of the MSB Platinum DAC. Setting either the Platinum DAC or the upsampler board to the fast roll off filter reduces the sound quality and this corresponds to the 60kHz images falling below the noise floor of my HP analyzer. What's good about this experiment is that it can be reproduced by anyone with the Platinum DAC plus a DVD or CD player with an MSB upsampler installed. My paper is on my web site for anyone to read. I am not in the DAC business myself so my goal was to use the web to get the word out and stimulate further thought, possibly other papers and perhaps better DAC designs. ...Using no oversampling or anti-imaging filter of any kind and doing all of the filtering in the analog domain is feasible. However, it would not provide any ultrasonic dither energy to the DAC where it is needed. You need to increase the sampling rate from 44.1kHz to some multiple in order to add any ultrasonic energy that would linearize the DAC."

And now for a description of the upsampling implementation in the Ah! 4000 CD player by Marcel Croese, who heads the analog design team for Ah! in the Netherlands. "The Njoe Tjoeb is Red Book 44.1kHz/16bit, and the stock DAC chip is already capable of handling sample frequencies over 192kHz, though it is not used with the upsampling board installed. The Upsampler takes its input signal directly from the data stream that comes from the transport. The stock Ah! D/A circuitry and I/V stages (the famous Op Amps) are bypassed.

This signal is taken apart in the Sample Rate Converter chip, and then it is mathematically recalculated and reconstructed into 24bit, at a sampling speed of 192kHz. The mathematical process takes approximations of the added samples that are carried out according to algorithms that mimic the behavior of musical tones, and are then extrapolated and interpolated into new samples according to how the music would behave. This means that information is added, and this musically coherent information replaces the abrupt and unnatural truncations that are audible in 16-bit/44.1kHz converters. Secondly, the high sample frequency of 192kHz shifts any high-frequency problems (noise and aliasing) to above 96kHz as opposed to the 22.05kHz in 44.1kHz systems (the Nyquist frequency, half the sample frequency); so HF-filtering can be carried out a lot smoother and at almost 4-times higher corner frequency, resulting in high frequency tones in the music benefiting from vastly improved phase and pulse response. Signal integrity is preserved, resulting in better focus, more space, and extension, thus music gets more air to breathe. As a result of the total reconstruction of the audio signal, there is no relation to the original timing errors introduced by the clock variations in the transport, as timing is being redone by a highly accurate dedicated clock on the upsampler, resulting in greatly improved jitter figures.

Once in 192/24, the digital signal goes to a high quality double balanced D/A converter chip, which is surrounded by an extremely low noise power supply for maximum resolution and sound quality. Its balanced output signal is converted to single-ended by a proprietary purpose designed audio transformer, that proved to be superior to all solid-state solutions that we examined during extended listening tests. This transformer incorporates various design features, like a special iron core that has never been used before in audio, but proved to be very suitable. Also we used careful impedance matching and balanced windings to obtain optimum bandwidth extension, flattest frequency response, and lowest distortion figures. The result is a more life-like musical picture, more coherent and revealing."

Whichever explanation you believe, the sonic benefit of the upsampler is undeniable.

## Preliminaries

My sample was shipped with two pairs of 6922s, a Russian equivalent type (6H23Pi w/rocket logo) and Philips JAN New Old Stock (NOS). Having assumed that the Russian type was the stock tube, I initially installed and began my listening tests with these tubes. It was immediately obvious, right out of the box, that the player had a lot of heart, but a bright and coarse treble range bothered me. Even after a very extended break-in period the glare did not diminish significantly. Out came the Russian tubes and in went the Phillips NOS. The treble range smoothed out as if by magic. Treble transients were also much easier to resolve from initial attack to complete decay. I also experimented with the Richardson re-branded Bugle Boys. This particular pair was originally manufactured in the USA, and this time out it sounded slightly cleaner but remarkably similar to the Philips NOS. Kevin Deal, the US Distributor, informed me that the Philips 6922s are in fact the stock tubes, so that's good news indeed. He also mentioned that one can use the 7DJ8, and even variable mu tubes like the 6ES8 for cheap thrills, since the tubes do not constitute a gain stage, but rather the player's output buffer stage. Kudos are also due Ah! for their De Mat disc stabilizer (\$25). Not only does it dampen vibrations, but it also blackens the top and edge of a CD during playback. De Mat features a lip that covers the edge of the CD in much the same way as the application of a green felt tip pen aka "CD Stoplight." Unlike the green ink treatment, De Mat does not permanently alter the CD, and there's almost no effort involved in using it. Simply place the mat over the CD and go! The sonic effect is to focus image outlines in manner synergistic with the benefit of the upsampler board. Once heard, you will not want to be without it. And the best news of all is that it may be used in any CD player. The Ah! Njoe Tjoeb 4000 has a digital volume control. It's certainly a useful feature in case you're without a line stage or if your preamp lacks a remote control. As I had the Audio Consulting Silver Rock and two excellent tube line stages on hand, digital volume control wasn't a priority. I decided to defeat it, which may be done by holding down the edit button for two seconds on the front panel. My ears tell me that the sound is a bit smoother, less digital, with the digital control defeated, and that's the way Ah! Ah! I like it.

## The Sound

The star attraction, without a doubt, was the midrange. The effect of the upsampling upgrade was to shine a bright light onto the soundstage, reducing veiling and increasing the intimacy of the musical performance. You might wonder why I'm obsessed with the midrange as the cornerstone of musicality. It's really a function of the physics of musical instruments. The average spectrum of the orchestra peaks around 400Hz to 500Hz, and then decreases with increasing frequency. The mean spectral level at 2.5kHz to 3kHz is already about 20dB below the peak. And, of course, the lower midrange is rich in fundamentals and their first overtones. In particular, the range of 262Hz to 330Hz (C4 to E4) is common to all voices. In my book, if a component can't get it right in the midrange, frequency extension, imaging, etc., matter very little. The midrange, to my mind, is literally the heart of the matter.

The Super Tjoeb did get it right in the midrange. It was adept in re-creating the dramatic flair of the original performance. Artistic passion catapulted off the soundstage like a photon torpedo. Microdynamic nuances shimmered and glistened with extreme clarity. Ladies and gentlemen, get your handkerchiefs out - this CD player is a tearjerker! The harmonic envelope ebbed and flowed convincingly at all volume levels. This has been a traditional weakness of CD players from day one. Try cranking the volume level of a typical mass-market or even mid-fi player and listen to the character of the harmonic tapestry. What you will find is that digital artifacts become more obtrusive with increasing volume, and as a result, the character of the sound becomes coarser, more electronic; in essence more digital and less analog in nature. The fact that the Super Tjoeb passed this test so well speaks volumes for the upsampling upgrade.

Image focus and spatial resolution were also improved relative to the stock player. This was evident during playback of choral music, individual voices being precisely located within the confines of the soundstage. Solo voices were portrayed with excellent dimensionality and appeared firmly anchored in space.

Treble transients unfolded with realistic speed. Nuances such as brushed cymbals were readily resolvable, at least with the Philips and the Richardson Bugle Boys in the chain. Artificial reverb, so prevalent on most pop recordings, was resolvable down to what appeared to be an exceedingly low noise floor. Concert hall ambiance was given almost full scope of expression, with only minor restriction in the width and depth of the soundstage.

There are only two significant reservations to report, the first having to do with the tonal balance. Even with a romantic sounding preamplifier such as the Blue Velvet, the subjective impression was of a lean, lightweight, lower midrange and upper bass range. For example, double bass lacked a bit of guts and punch. It should be made clear that tonal balance impressions are very much impacted by system context. With speakers (my Lowther BassZilla) whose performance in the lower midrange and upper octaves is full bodied, the Super Tjoeb sounded like it was on a diet relative to the sound of my BAT VK-D5SE CD player. In this system, the Tjoeb had nowhere to hide. On the other hand, with mini-monitor type speakers, the effect may hardly be

noticeable.

Finally, in a direct comparison with the likes of the BAT player, it became clear that the Super Tjoeb lacked the BAT's level of analog smoothness and top-to-bottom coherency. By that I mean that I was more aware of the Super Tjoeb "changing gears" as it moved from the bass range to the treble. Its presentation did not gel into a coherent whole as well as that of the BAT, which was more successful in approaching the Gestalt of live music. But when it came to the midrange, I actually found the Super Tjoeb to be the more engaging player. I guess it's time to send my BAT player back to the factory for an update.

### Conclusion

The Super Tjoeb represents a quantum leap in performance relative to the stock Njoe Tjoeb player and a Godsend for music lovers on a budget. It makes clear the sonic advantage of a properly implemented upsampling digital filter in linearizing the performance of even a good DAC. A super linear DAC translates into less digital artifacts and a smoother, more analog-like sound quality. In a world of high-end Goliaths, this David slays every player I've heard to date in the under \$3K price range. At its sub \$1K asking price, its price/performance ratio is simply out of this world. The Super Tjoeb gets my vote for digital product of the year.

Tonality	86
Sub-bass (10 Hz - 60 Hz)	84
Mid-bass (80 Hz - 200 Hz)	86
Midrange (200 Hz - 3,000 Hz)	94
High-frequencies (3,000 Hz on up)	90
Attack	94
Decay	94
Inner Resolution	92
Soundscape width front	90
Soundscape width rear	90
Soundscape depth behind loudspeakers	90
Soundscape extension into the room	90
Imaging	90
Fit and Finish	85
Self Noise	90
Value for the Money	100

### Specifications

Basic CD-4000:

Frequency range: 20Hz to 20kHz ( $\pm 0.5$ dB)

Dynamic range: 95dB

Signal/noise: 98dB

Channel separation: 85dB

Total harmonic distortion: 0.000063%

Transport mechanism: VAM1201+DSD

Decoder: SAA7378

D/A conversion: CC DAC

Maximum dimensions in mm: 440 x 87 x 280 (WxHxD in mm)

Weight: 2.9 kgs.

Price: £529.95 includes the Njoe Tjoeb (£429.95), De Mat disc stabilizer mat (£13.95), tube dampers (£4.95), and the AC Direkt power cord (£52.95) and Tjoebshoes isolation feet (£54.95) upgrades. Add the Tjouplesampler upsampling board - a stand alone option (£249.95)

Warranty: 1 year

Company Information (in UK)

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