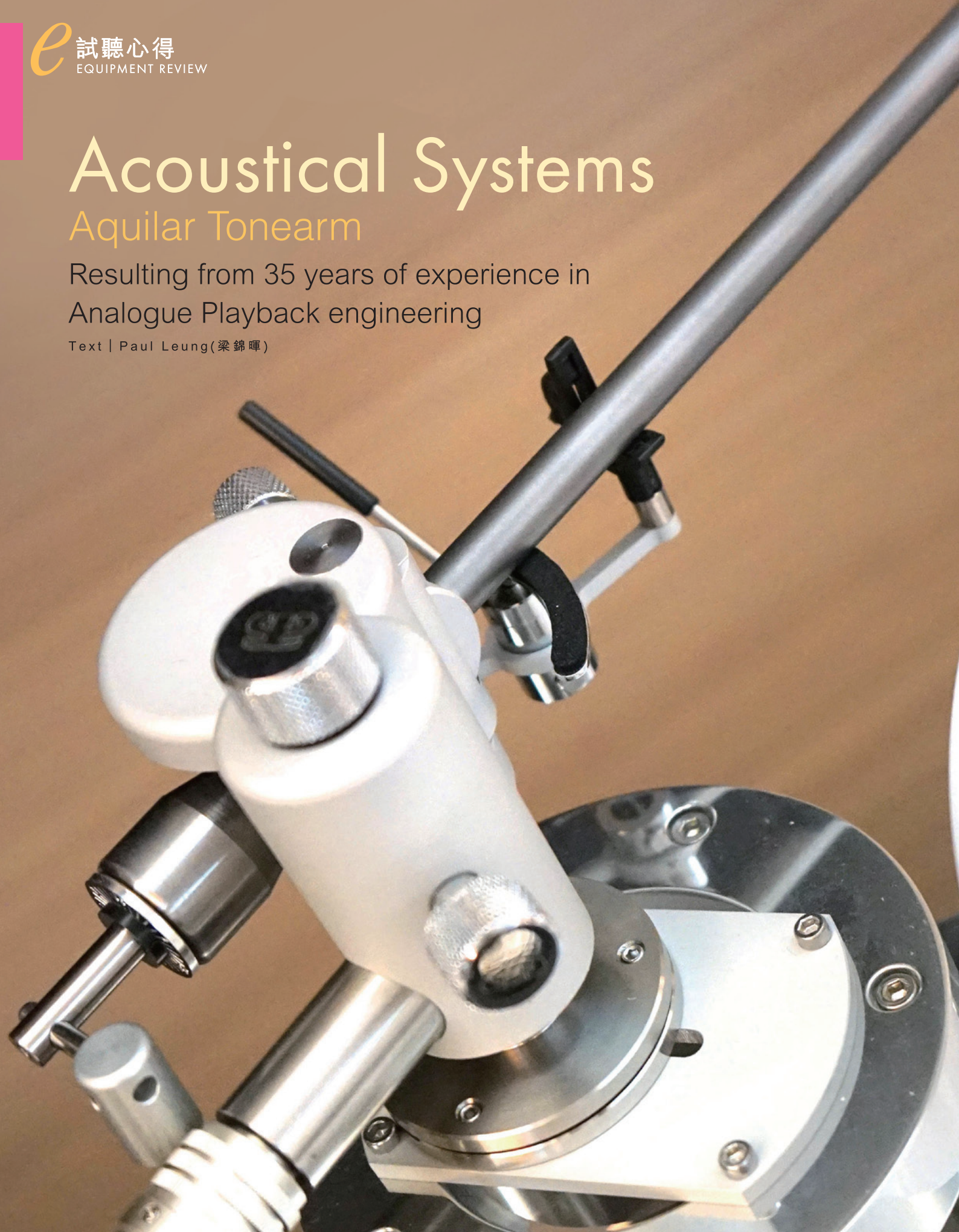
Acoustical Systems

Aquilar Tonearm

Resulting from 35 years of experience in Analogue Playback engineering

Text | Paul Leung(梁錦暉)



My first encounter with Dietrich D. Brakemeier, the founder of Acoustical Systems, was April 2014. He brought his reference tonearm, Axiom, from Germany to Hong Kong and met his distributor (Avantgarde Hong Kong). I was coincidently there with my other colleagues in Audiotechnique. It was a great meeting. He shared with us in detail Axiom's design philosophy and his long experience in analogue system engineering. All of us were somewhat impressed by his deep domain knowledge and the design of his tonearm.

A few months later, Lincoln Cheng, the chief executive editor, and Patrick Lee, a lead reviewer, in Audiotechnique, selected Axiom as their primary tonearm for their analogue systems. This gave me very good opportunity to listen how Axiom performed in their systems. After several round of auditions, I was impressed and replaced my primary tonearm with it. People who listened to this tonearm in my system were impressed too. But they complained that the tonearm was not so affordable.

Dietrich seemed to know what his potential customers have been asking for. Dietrich has eventually come up with Aquilar, a new 10" tonearm based on the design of the 12" Axiom. When comparing with Axiom, the new tonearm adopts same materials and bearing architecture. It also offers similar flexibility in calibration. But the price is only half of the reference tonearm!

When I first learned about Aquilar from Dietrich last August (2015), I was indeed astonished by its price. The first question that came up in my mind was "how does the tonearm sound when compared with Axiom?"

"Aquilar sounds extremely close to Axiom!", Dietrich responded with confidence. I was very skeptical. It sounded too good to be true. Hence I requested Dietrich to send me a sample for review.

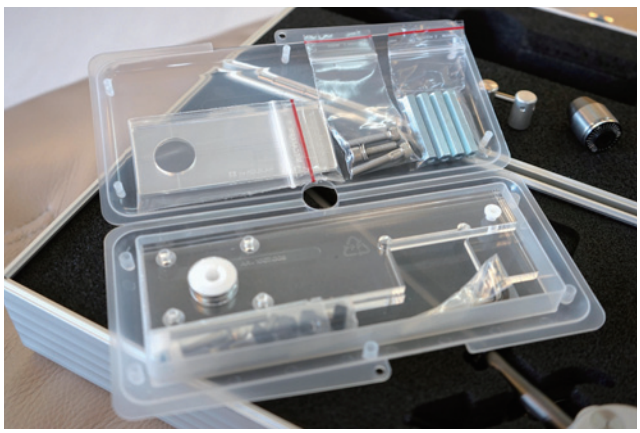
Inheritance from Axiom

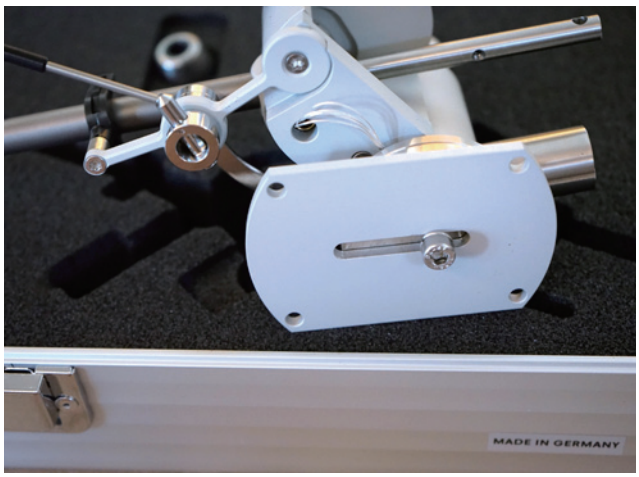
I waited for a couple of months before receiving a silver Aquilar from Acoustical Systems. The package also included an optional SME slide base for the tonearm. A black version is also available but silver suits my JR Transrotor Tourbillon turntable and the existing Axiom tonearm more since both of them are silver.

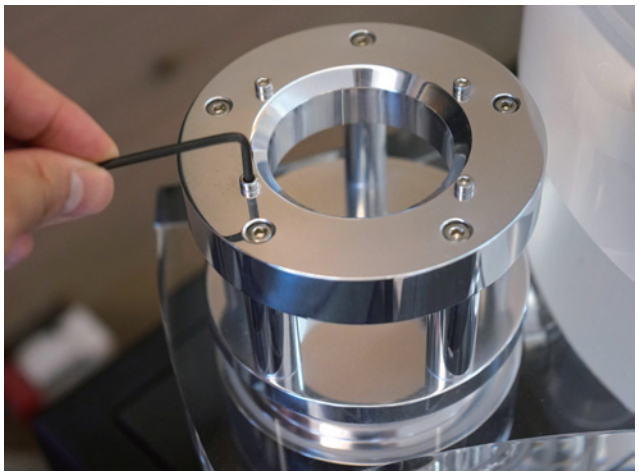
Although Aquilar is so inexpensive, the materials, the build quality and the tools included are not compromising at all. Aquilar comes with an aluminium case, basically in par with Axiom, albeit the size is smaller. When I opened the case, a finely finished 10" tonearm and a plastic toolbox rest comfortably on shock absorbing materials.

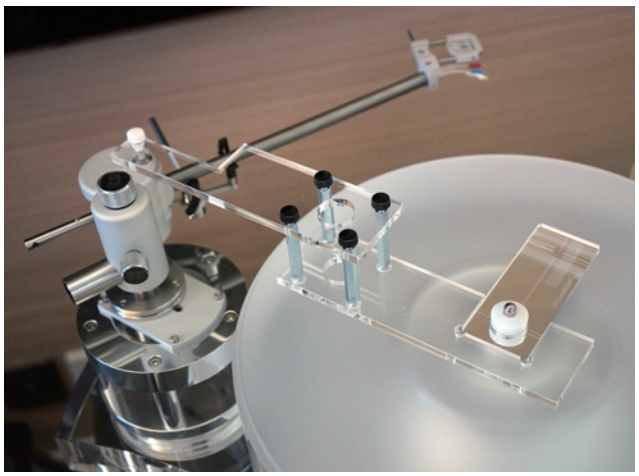
Just like what Dietrich told me, both tonearms share the same materials and finishing. Then an interesting question arose: how did the maker bring down production cost without compromising sonic performance?

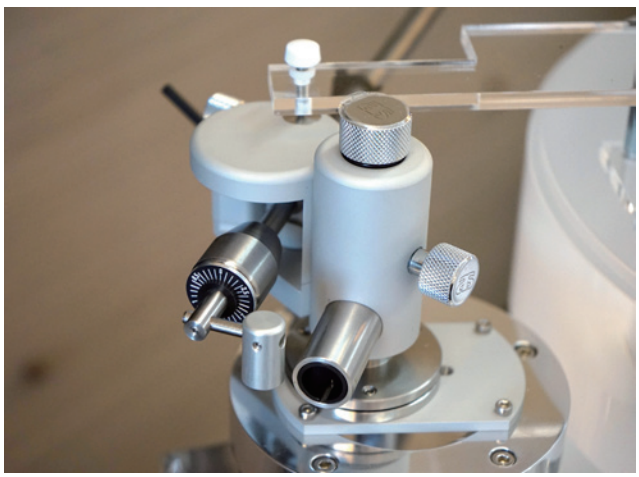
Similar to Axiom, Aquilar is designed to be mounted on the arm board with an M5 screw. Whatever turntable it











is, a single 5mm hole in the arm board is all we need for mounting the arm. The manufacturer has also made an SME slide base available as an option. This option is suitable for SME IV, SME V, SME 309, Graham Supreme, Graham Elite, Tri-Planar, DaVinci and Jelco. The slide base can easily be mounted on top of the arm board.

There is a free SME arm base available in my turntable. I just needed to install the SME slide base by removing the 4 screws on top of it. As the M5 screw is designed to screw from the bottom of the slide base, I mounted the arm onto the slide base before mounting the slide base onto the turntable. While it makes the mounting process a bit tricky, I appreciate the fact that the designer is trying to simplify the tonearm. With an amazingly small number of parts, Aquilar can be firmly mounted on the turntable. Similar to Axiom, Aquilar can be levelled via 3 screws around the M5 screw. This way I can level the horizontal plane of the tonearm independent of the arm base if the arm base is not aligned to the same horizontal plane as the turntable.

After I mounted Aquilar on Tourbillon, the side by side comparison became very straightforward. The first notable difference was the bearing structure. Aquilar looked simpler and lighter because it does not have VTF-on-the-fly, a feature that allows the user to adjust VTF during playback. Dietrich told me it's a feature expensive to implement. Does the usefulness of this feature justify the cost? First thing we need to bear in mind: it does not really have any direct impact to the sonic performance. All it does is to make fine VTF adjustment easier.

The gimbal bearings used in Axiom is of the highest grade available. The manufacturing process is conducted in a specialised laboratory with pre-heated material condition to ensure perfect placement. The outcome is very promising but the implementation cost is very high. Aquilar adopted gimbal bearings of the same size and origin (i.e., Germany) but the implementation is carried out in-house, which substantially reduces the production cost yet yielding extremely low friction in the final product. This strikes a good balance between performance and price.

Another notable difference between Aquilar and Axiom is the arm lift assembly. This is something the user would use to lift the arm when the playback is stopped. Dietrich told me that the design of the arm lift adopted in Aquilar is much simpler than that of Axiom. While he could produce only 1-2 arm lifts for Axiom a day, he could produce as many as 8 for Aquilar. The arm lift of Axiom does give me a sense of precision and robustness but again, this has nothing to do with sonic performance.

Surpassing the predecessor

Apart from the bearings and arm lift, the two arms have many core features in common. Aquilar has a titanium-carbon hybrid arm wand which is very effective in lowering the resonance frequency. The head shell design allows SRA/VTA adjustment. The bearing architecture is non-symmetric and non-reflective. The anti-skating mechanism adopts the non-touch magnetic design. This anti-skating force is dynamic so it varies with the position of the wand. Anti-skating force adjustment does not require any tool in Aquilar. I just needed to turn a knob on the fly. This, I think, is a vast improvement over Axiom.

Another improvement is the counterweight. While the material used in the counterweight is similar to Axiom - Tungsten Carbide HD18, a super hard material that is resistant to resonance, I don't need to use any tool to perform adjustment. Instead I just need to rotate the counterweight and observe the scale. This is a very useful feature that saves time for those who change cartridge very often.

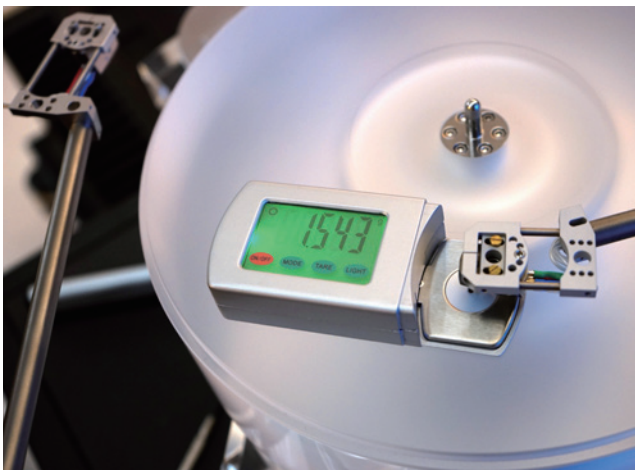
The power of UNI-DIN

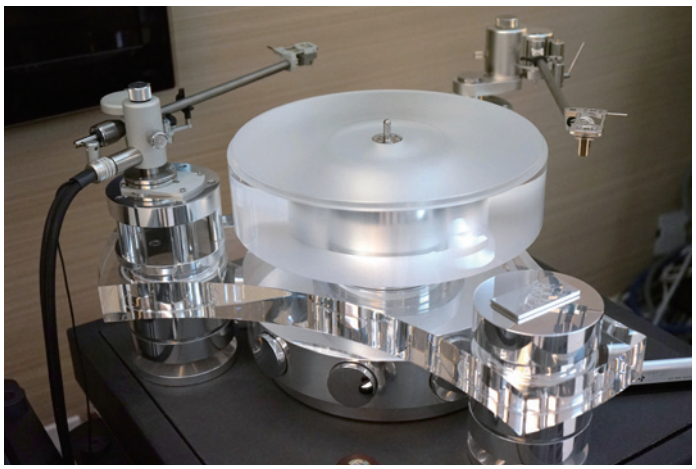
Aquilar is the world's second arm that adopts UNI-DIN geometry. The first one is Axiom.

Why is UNI-DIN important for Aquilar? Basically the tangential error of an 10" arm is greater than that of an 12" one. If you are convinced that UNI-DIN works better for you, you will find it works even better in Aquilar.

So how does UNI-DIN differ from the traditional tangential curves such as Loefgren A DIN?

These tangential curves were invented between 1930 and 1940 for 78 rpm shellac mono record. In other words, they were not designed for $33^{1}/_{3}$ rpm or 45 rpm records which are commonplace today. 78 rpm shellac mono records do not have microgroove as fine and small as their contemporary counterparts. Also, they do have long grooves cut very close to the paper label. Many 33 rpm or 45 rpm records exceed the "official" limits of both DIN and IEC. When the stylus is getting close to the centre of the record, the tangential error increases exponentially, thus causing significant distortion and audible disturbance. Dietrich proposed a new tangential curve that works better for the modern records. The two null points are pushed towards the centre of the record, reducing the tangential error of the inner groove while allowing the bigger error in the outer groove. As the tracking speed of the stylus relative to the record surface in the outer groove is faster than that in the inner groove, the tolerance of tangential error of the outer groove is





in fact higher than that of the inner groove. If you are a serious classical music lover, you would find UNI-DIN advantageous when playing a piece of music with simple and quiet opening and more complicated and dynamic ending. Moving null points towards the inner groove will thus improve the overall performance of the music.

The initial impression

My first impression on Aquilar: it sounded very close to Axiom. Thank to the materials common to both arms which effectively suppress resonance.

My second impression: Aquilar sounds more dynamic than Axiom. This is not a surprise though. Theoretically, a 10" tonearm has higher tangential error and thus higher distortion level than a 12" tonearm. To many listeners, this will be perceived as more dynamic.

On the other hand, cartridge played a role there: The Archon cartridge I mounted on Aquilar sounded very different from the one mounted on Axiom (i.e., Kondo IO-M). Archon is more exciting and vibrant. The bass sounds more punchy. IO-M has better resolution, clarity and separation of instruments. Also, it sounds more elegant. As such, I prefer Aquilar + Archon for playing Rock, Jazz and Pop music or music dominated by percussion instruments. If I play classical music in which detail level, clarity and sound stage are important, or solo instrumental music that stresses on realism and micro dynamics, Axiom + IO-M would be a better choice.

However, this is not the fairest comparison. If we want to compare only the sonic difference between the two arms, a serious A/B test with all other variables fixed will be necessary.

Aquilar versus Axiom

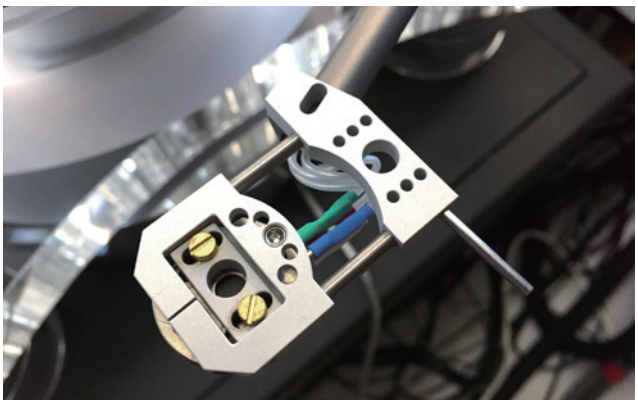
Fortunate enough, Patrick owned a Kondo IO-M cartridge. He agreed to lend it to me for an A/B test. Therefore, I had two identical cartridge mounted on these tonearms. I also connected them (by taking turn) to the same MC transformer (Kondo SFz) and phono amplifier (Kondo M-1000 Mk II Phono stage). If I have to be very critical, there is still one thing different between them: phono cable. The one in Axiom is a seamless 4N aged silver cable. The one is Aquilar has two parts - the first part (from the cartridge to the DIN port) was the same as that of Axiom; the second part is Kondo LPz phono cable. LPz is also made of 4N

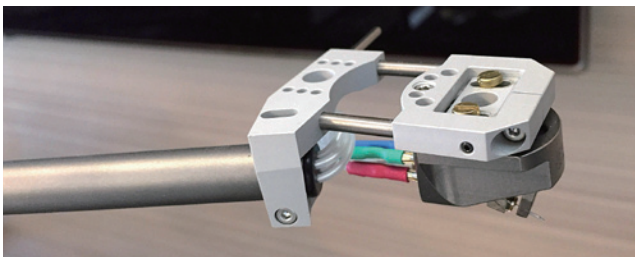
aged silver albeit the manufacturing process might be different. Unfortunately, that was the best I could do.

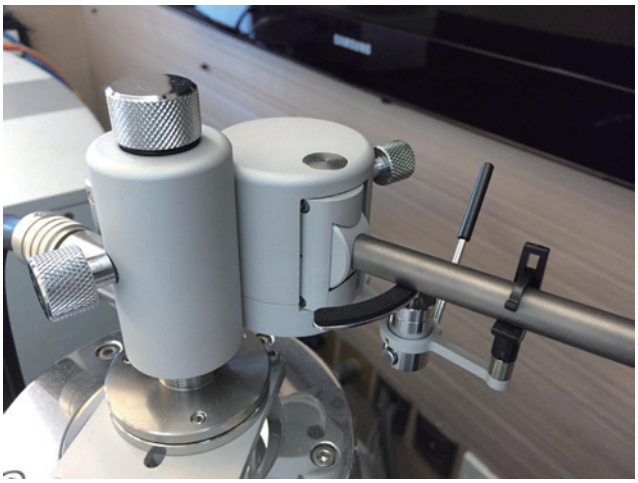
During the A/B test, I got a new perception. These tonearms sounded different. Also, they seemed to be good at different things. For example, when I played the London version of "Star Wars and Close Encounters of the Third Kind" in which the music is dominated by brass instruments, I found Axiom performed very well on dynamics and transient speed. But Aquilar's Star War was even better. The music it played was more exciting and stimulating. The bass was more punchy and deeper. I was even tempted to watch the movie again! If you asked me, which tonearm would be better for Sci-Fi music, my answer would definitely be Aquilar.

How about voice? Well, it depends.

I played a canto-pop song "10 minutes past midnight" which was also used in Patrick's review on Axiom on August 2015 (Issue 407). Aquilar delivered a vivid and superb three dimensional image with amazing clarity. If there were no A/B comparison at all, it would have been very difficult to tell the exact acoustic difference between these two tonearms. But if I picked "Kindlespiele" on side 2 of an infamous record "Esther", Aquilar delivered very musical and touching sound. Coloration appeared to be very minimal. However, I found Axiom delivered more subtle details in the guitar sound. Micro-dynamics was indeed better than Aquilar. When fingers plucked the guitar string, there were tiny variations in harmonics. These variations, if reproduced correctly, will contribute significantly to the realism of the sound. Axiom did a better job in preserving these variations than Aquilar.







If we apply the same thought process, one would think that Axiom is much more superior when playing chamber musics. But this is another surprise: when I played "The Devil's Trill", Aquilar did not lag behind too far - the violin sounded very beautiful and charming. I also heard a lot of texture in the sound of cello. The pizzicato sound from the harp was crystal clear and transparent.

The strength of Aquilar

If you asked me what I like most about this new tonearm? I would say it plays piano and percussion music extremely well. During the A/B test, I played "The Jacques Loussier Trio in Concert at the Royal Festival Hall". The music was recorded with microphones positioned very close to each of the instruments: piano, double bass and jazz drum. Amongst these instruments, piano sounded the most appealing. When hammer stroke on the strings, the harmonics produced by the sound board were very rich. Because both macro-dynamics and micro-dynamics have to be preserved for realism, piano playback is usually very challenging for an LP system. This also explains why voice and string music records are usually more popular than piano records.

Here is how Aquilar impresses me: it revealed the texture of the piano in great depth. As a amateur pianist, I found the piano sound produced by Aquilar was so real. I simply ran short of language to describe how impressive the piano sound was. My conclusion is simple here - if I want to play piano music, I would prefer Aquilar to Axiom.

How about the sound of other two instruments? I don't think I need to tell you given Aquilar performed so well on piano. The other instruments simply sounded real!

Verdict

The biggest challenge of this review is to determine if the tonearm was optimally calibrated. Although you never know if the best has been achieved, I found that the tonearm is very sensitive to the change of parameters such as VTF, VTA/SRA etc. For example, when the vertical tracking force is increased or decreased by just 0.1g, the sonic difference is already very significantly audible. Same observation applies to VTA/SRA and anti-skating force. As such, I spent a lot of efforts in trying out different settings even though there is absolutely no way for me to say that I have got the best out of it.

In terms of the overall sonic performance, Axiom is undeniably more superior than Aquilar. But interesting enough, if I just focus on certain genres or certain sonic performance aspects, Aquilar could be in par with Axiom or, in some cases, better.

When I upgraded my turntable to Transrotor Tourbillon, I planned to have two tonearm mounted on it. When I decided to have Axiom as my primary tonearm, I was hoping that the second tonearm would offer something unique, or something that the primary arm was less good at. Also, price/performance ratio is also of a key consideration.

Apparently, Aquilar fulfils all these criteria. Therefore, I have become a happy owner of this new tonearm.