Nasotec Swing Headshell - SME universal fitting

It don't mean a thing, if it ain't got that swing

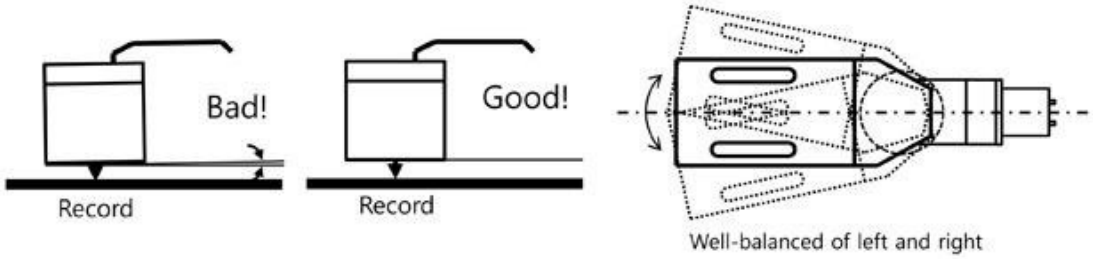
https://www.tnt-audio.com/accessories/nasotec_swing_e.html

Manufacturer: *Nasotec*
Product: *Swing Headshell*
Supplier: High End City, 96, Hau 3-gil, Paju-si, Gyeonggi-do, 10909 Korea
Arm type: SME 3009; 3012 and similar with straight headshell
Reviewer: Mark Wheeler - TNT UK and 78rpm tests by David Hoehl - TNT USA
Reviewed: *2015-2018*

Back to the future

The **Nasotec** *Swing Headshell* is a novel attempt at simultaneous efforts to correct for headshell offset angle and for bias compensation force adjustment. It comprises a well made headshell assembly that may pivot by a limited amount with low enough friction for the angle to change during LP play. For this self-adjustment to operate at rotational velocities as diverse as a 33rpm LP and a nominally 78rpm shellac disc might seem impossible. The unequal drag on the two sides of a deep lateral mono groove pressed into shellac, hurtling across the stylus tip surface at 80cmS^{-1}, presents a different set of problems from the spacious spiral groove of the dirty recycled vinyl of a 45rpm stereo 30cm dance single, different again from 35cmS^{-1} microgroove LP (all at 10cm from spindle). Hence, the groove wall friction on which this idea depends, will vary from disc to disc, Furthermore, stylus profile, tip polish and playing downforce (aka tracking weight) will affect drag too. The pendulum behaviour of the mass of the pick-up cartridge in relation to the pivot will vary from caruncular to cartridge. As if this weren't enough to confound the designer, any self-damping in the headshell pivot assembly

will operate differently in each of the above cases. DIY pivoting headshells have been tried since the advent of modern pick-ups but this is the first well engineered commercial sample to cross our paths, so Mark and david both set to explore the possibilities.



Technical Background

The four biggest challenges facing pick-up arm designers all arise from the same problem: how to maintain the pick-up cartridge's alignment to the audio groove on the LP surface, at all audio frequencies and at those subsonic and ultrasonic frequencies that might usefully intermodulate with audio frequencies. Mono grooves wiggle the stylus from side to side, so any inaccuracies in lateral position results in distortions in the musical signal. Because music is a temporal medium, inaccuracy in the longitudinal relationship of the cartridge to the groove (or to the tangent to the groove for the pedants in the Plebs Chorus) will result in changes to pitch and timing. Because stereo creates the illusion of space by carving each channel into 45° out-of-phase groove sides, effectively net lateral wiggles are a summed mono musical signal and the net vertical wiggles are spatial information. Therefore, inaccuracies in the cartridge vertical position affect spatial information. Neither a servo corrected parallel tracking arm, nor a pivoted pick-up arm can ever achieve 100% positional accuracy while tracking the full playing surface of an LP side.

Because the inside wall of the groove (nearer the label) is a slightly smaller radius than the outside wall of the groove, at any given angular velocity (33 1/3RPM for example) the inner part of the groove is always moving at a lower surface speed than the outer part of the groove with a simple mono signal.
"What if the left channel happens to have an exceedingly heavily modulated bass signal while the right channel is silent?" asks one of the brighter plebs, stage left"

This example proves that no universal situations exist and that arm designers have to compromise for the most likely scenarios. *Heideström* (1981) noted that audiophiles were discovering that much more critical arm set-up proceedings was essential than any manufacturers' leaflets implied at the time. This was 20 years after the discovery of the benefits of bias compensation for offset (aka cranked) headshell pivoted arms, still the most popular type today, nearly 35 years later. The results of Peter Heideström's investigation was that the best theoretical alignment distortion figure possible for a 231mm arm (typical approximation for 9 inch arms) is 0.06%. He calculated that one of the most popular arms of the day, if perfectly set up, could manage, at best 0.64% at the inner groove radius. However, lateral tracking distortion is mostly second harmonic so this should be inaudible, in theory, at this level.

The key phrase is *'perfectly set up'*, because errors of less than 1mm at arm base and much less than 1mm at the headshell (a good reason for alignment adjustments at arm base not headshell) could result in alignment error distortion exceeding 1%. A headshell angular error of less than 0.1° results in distortion deteriorating by 1/8 of whatever figure is calculated by the geometry of the arm. This level of accuracy is beyond what is possible in manufacturing and installation tolerances, let alone measurement by eye and protractor. Heideström (and *Keywood*, 1980, before him) discovered that with the greatest of care, using commercially available arms and alignment protractors, it was rarely possible to achieve better than 1.5% distortion.

Furthermore, some arms do not have the correct headshell offset angle to achieve the ideal linear offset (shown as length PD in Heideström's diagram cited in the references list).

$$\mathbf{PD=(R_i + R_o) + R_1/R_o + R_o/R_1 +6}$$

Where R_i is the inner groove radius and R_o is the outer groove radius.

The offset is present solely to reduce tracking error from that of a straight arm mounted perpendicular to the centre of the playing arc. The majority of work on tracking error (*Baerwald*, 1938; *Stevenson* 1966a; *Stevenson*, 1966b, *Wilson*, 1966) was done when spherical styli were common and therefore of less value now that styli are shallower. With spherical (conical) styli (like some classic broadcast models still popular in some circles) the tracing distortion error is much greater, especially with smaller groove radii, than with hyper-elliptical or line contact styli now more in fashion. The conical stylus of a Denon DL103 (16.5µm spherical diamond) in a Rega (222mm) arm struggling to trace the inner grooves of a 34 minutes side (the legendary Decca SXL6233 Beethoven 9, for example) faces different challenges from the line-contact stylus of a high compliance cartridge like the *Cartridge Man Music Maker* or a *Shure V15 V-MR* carried upon a *SME3009 III* or even a Garrott tipped *Decca London* hanging from a in a *SME3012 Series II*. Furthermore the fact that it is an inevitable consequence of vinyl LP mass production, that most of your record collections are 'swingers' to some degree.

"The Old Scribe's gone bonkers" assert plebs, stage left, *"Vinyl LP's, even those made in the '70s, do not go to parties where they mix their car keys in a bowl in search of random sexual encounters"*

In this context, 'swingers' means records whose centre hole is not perfectly centred with the spiral of the groove. Modern audiophile pressings tend to be better, but in the 1970's, when pressing quality was at its nadir, non-classical records were often off-centre to some degree. When taken to task over the situation, the majority of production staff in one record plant were unaware that there was any standard with which the hole position should comply (*Heideström*, 1981, p25). Whether the **Nasotec** *Swing Headshell* will help, or whether it will make matters worse in these situations must be tested to know whether it is a success, a mixed blessing or unfit for purpose.

Many arms since the 1960s have tried to overcome the problem of tracking error. 305mm (12 inch) arms reduce it by sheer length, which is a similar argument to the old adage that there's no substitute for cubic inches in engine design. Just like engine design, better volumetric efficiency might achieve the same ends without such a weight penalty, and parallel tracking pickup arms have followed their own path to being perpendicular to the groove. Twin tube arms occasionally appear, using a second arm to orient a pivoted headshell to remain aligned

with the groove across the LP tracking arc, the most commercially successful being the Garrard Zero 100SB of the late 1960s. On TNT-audio.com we have previously described the restoration of a Garrard Zero 100SB integrated turntable withy a variable offset headshell pickup arm that maintains its relative position to the groove by a parallelogram arrangement pulling changing the headshell offset as the cartridge tracks across the LP surface. Eschewing such complexity, the Nasotec Swing Headshell attempts to use a self correcting friction based feedback mechanism to 'pull' the cartridge into alignment.

The **Nasotec Corporation** is a South Korean company and was established by *DC Son* in 1999. Their main business items are DIY audio parts and kits including amplifiers, connectors and cables made by **Nasotec**. **Nasotec** have tried to build up overseas market since 2013 and the *Swing Headshell* is the second initiative after the *Namoo Binding Post*. **Nasotec** got the idea of our “Swing Headshell” when repairing a *Clearaudio Master referance TQ1* linear tracking arm. The cartridge carrying part gave them a hint.

Nasotec emphasize that the most important points for a good installation are to obtain effective swing balance, which is the most important parameter. They suggest that azimuth has a great effect on the swing and test by hitting the both sides of the headshell with something like a thin stick and to check the two movements are nearly the same. **Nasotec** note that the swing movement of the joint will be more flexible within a few days of use.

David notes that, as seems to be something of a tradition with failing companies, at the end of its celebrated corporate life, the English turntable manufacturer **Garrard** launched what was intended as a game-changing product. The **Garrard** *Zero 100* turntable featured an innovative, albeit not entirely original, articulated arm designed to adjust the angle of the cartridge automatically as it traveled across a record surface, eliminating tracking error. As so often is the case in such last-ditch efforts, concept outran technology, as to be practical the arm needed much higher quality bearings than could be had at the price Garrard could afford to pay for a mass production unit. Still, the Zero-100 was a brave attempt to address the age-old problem of angular error inherent in arms swinging from a fixed pivot. David has often regretted that the company never issued a Zero with 78 RPM speed.

Fast forward to 2015. A Korean company called **Nasotec**, previously unknown to TNT-audio, brought forth another innovative product aimed at the old bugaboo of tracking error, the *201A1 Swing Headshell*. In contrast to **Garrard**'s heavy, intricate, multi-pivoted articulated arm, **Nasotec**'s approach couldn't be more simple: a single low-resistance pivot, this time with a bearing that benefits from 21st century technology, connecting the cartridge mount to a plug for mounting to a standard SME style arm, relying on the cartridge signal leads to bias the two towards a straight alignment when not under external force. When playing a record, the natural skating force--in theory, at least--causes the cartridge mount to swing into perfect alignment with the record groove.

Up front, David adds that since we received our review samples, **Nasotec** has revised its design, adding insulation to the cartridge leads and springs under adjustable tension to align the components. Both our reviews are of the earlier design without the springs.

When our fearless editorial leader, Lucio, offered up the Nasotec swing headshell for review, David's first thought was, *"That contraption may be all very well for LPs, but I wonder how it would handle the demands of 78s?"* And so David is restricted himself to that question; its performance with LPs left in Mark's capable hands.

Before testing the headshell, of course, the first step was to mount a cartridge. David chose the **Shure** *M97xE*, in large part because, like the *V15Vx-MR* cartridges that are his usual choice for 78s and LPs alike, it accepts his collection of stylus assemblies fitted with custom tips for 78s and because he had one that he already needed to remount from a bum conventional headshell. To paraphrase *Homer and Jethro*, David would like to say that mounting this cartridge to the Nasotec swing headshell was a piece of cake, he'd like to, but he just can't be that untruthful! As noted, **Nasotec'**s design depends on tension supplied by tiny, uninsulated copper cartridge leads, each looking to be about the thickness of a human hair. The mounting instructions stress that the leads must not touch each other at any point. The headshell's lead mounting pins are arranged in a square, and perhaps that would work well with a cartridge whose pins are similarly configured. The **Shure** *M97*'s pins, however, are arranged in a zig-zag pattern that guaranteed leads were going to cross each other. Avoiding contact in these circumstances was a most interesting exercise in geometry! Then David noted the problem of the clips at either end of the leads. David wondered if he got something wrong, but the pins were stubbornly determined to be too small for some pins but too large for others. This raises a real challenge to slide them onto the appropriate pins at one end without damaging those delicate leads and to get them to stay on the pins at the other. Not, then, the most enjoyable way David could imagine to pass the time.

Once the cartridge was mounted, David set the **Nasotec** into a **SME** *3009 series II improved* arm and started test playing a somewhat warped 78. David was surprised to see the **Nasotec** gracefully negotiating its demands, but then one of the leads fell off, putting an end to further experimentation for the day. The real test came some time later, when David subjected the cartridge and headshell to a true phonographic torture test. Obstacles presented, all hitting the stylus at around once every three quarters of a second, included the following: a modest but relatively sharp warp; an eccentric, but not smoothly eccentric, groove; and at least some dishing. Taken together, they entirely defeated David's usual **Shure** *V15Vx-MR*s and a backup, a **Shure** *V15-III* with stock **Shure** *elliptical 78 RPM stylus*, in each case tossing the stylus from the groove, even when David increased tracking force such that the cartridge body was riding on the record surface. All were mounted in conventional headshells.

Much to David's surprise, things went better when David tried the record with the **Nasotec/M97** combination. With a bit of extra nurse maiding (leaving the cuing lever engaged until 1/3 of the way in) David was able to play this horrific record without skipping or bottoming the cartridge. Mind, the process was not entirely without evidence of desperation on the cartridge's part, but the bottom line was that David got a useable transfer to his computer for future play, something he had been unable to accomplish with a wide array of tracking force settings applied to two different cartridges in fixed headshells. David notes, however, that when the stylus reached the record's pronounced eccentric leadout groove - a common feature of *Victor* records from the period in question, intended to trip a mechanical auto-stop mechanism fitted to the *Victrolas* of the day - the **Nasotec** really went crazy, and after a few revolutions the stylus jumped the groove entirely. In such situations, the user had better be standing by to intercede as soon as the music is over.

Wandering around High-End City's website, it is noticeable that familiar products are competitively priced. Your Mileage May Vary, depending on your currency's relationship to the US Dollar and your local import duties. From this it might be reasonable to infer that the **Nasotec** products are equally competitive, but exotic wooden headshells available in SME 3000 fitting, are priced from about $35USD upwards. They look similar to fancy Japanese items and not to be confused with even cheaper flea-bay offerings.

Review procedure

Limited to SME headshell universal mount arms, the **Nasotec Swing Headshell** was tried in 3 SME arms of varying vintage and condition:

- **SME 3012 Series I**, unrestored and original except for the lead out wire and missing screening can, mounted on a sand filled plywood plinth driven by **Garrard 401**
- **SME 3012 Series II**, completely original and unrestored driven by the **Garrard 401**
- **SME 3009 SII**, equally original and unrestored but floating on a **Thorens TD160** subchassis

Pickup cartridges included the *MusicMaker II*, a reasonable *ADC VLM II*. a *Stanton 681EEE*, various *AT95* and *AT110*, the Dynavector XX-2 MkII, but the retipped Decca London was deemed too fragile for this test. All the cartridges were feeding the Canor TP306VR+ phono-stage, which has versatile loading adjustment facilities. The remainder of Mark's system comprised either the Canor TP106VR+ integrated amplifier, or an *Audio Research Corporation Reference 3* pre-amplifier feeding the modified *Assemblage SET300B* (kit version of *Sonic Frontiers*), and the modified *Hammer Dynamics* loudspeakers in 18mm birch ply transmission lines, with custom outboard crossovers with hyperlitz inductors and couture caps. In order to establish precisely what contribution the **Nasotec** *Swing Headshell* makes to the overall sound, it was necessary to try such diverse equipment combinations.

Sound Quality

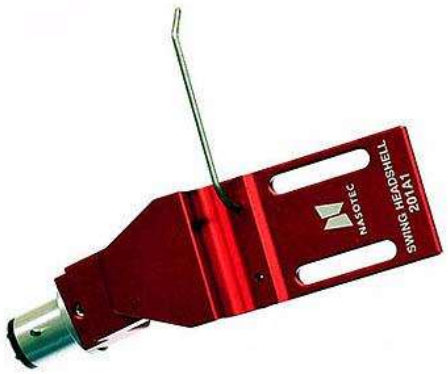
From the outset the non-78 results were mixed. The sound, despite the well crafted engineering of the **Nasotec Swing headshell**, often seemed insubstantial. The frequency response does not sound tilted but bass definition seems lacking and the soundstage seems to vary in size. The flatness and centering of records affects these effects in proportion. Warped or off-centre records are most affected, audiophile pressings are least affected. The

engineering quality of the product is not in doubt.
"At this price for a headshell, the engineering should be peerless" assert plebs, stage left.

The primary characteristic seems to be a papery colouration. The nearest comparison that springs to mind is that of analogue tape flutter, not as bad as typical stereo compact cassette decks, even those with so called hi-fi pretensions, but domestic quality reel-to-reel decks of the 1970s. To identify the causes of the papery colouration, Mark employed various test discs. TNT-audio.com writers are unpaid volunteers, so we do not like wasting time faffing about with test discs when we could be enjoying music. Tracking ability seemed to be compromised on some test discs compared with a solid magnesium headshell, but curiously not on all. Pickup arm fundamental resonance only changed by the amount predicted by the different mass of the **Nasotec swing headshell** close to the cartridge. Bias tests do indicate that bias adjustments are completely different with this headshell. Indeed, this headshell becomes the perfect device for identifying the optimum bias setting.

This headshell became a useful vehicle for optimising the bias setting for any particular pickup cartridge using test discs. David finds it useful to rescue old collectible non-standard discs. Owners of multiple cartridges mounted in SME mount headshells will find the **Nasotec** Swing Headshell a useful tool to add to their set up toolkit. The swing headshell may be used as an aid to establish the optimum bias for each cartridge, which than then be recorded and the cartridge mounted in a headshell of the optimum mass and material for that model.

In a spirit of scientific endeavour, various ideas were tried to identify the source of the papery colouration. A tiny blob of *Blutack* (always a popular audiophile tuning material) applied at the pivot of the **Nasotec** *Swing Headshell* (with tracking force corrected to suit) reduced the papery colouration and beefed up the bass. Curiously it also improved the scale of the soundstage. However, it also defeats the whole *raison d'être* for this headshell.



Conclusion

Tough. Drawing a conclusion is what has delayed this review for 3 years and your Old Scribe is no closer now. The **Nasotec** *Swing Headshell* is a clever thing. The **Nasotec** *Swing Headshell* is very well made. The **Nasotec** *Swing Headshell* may or may not achieve what it sets out to achieve. The **Nasotec** *Swing Headshell* could solve problems where pick-up arm alignment is less than optimum. The **Nasotec** *Swing Headshell* could be a valuable tool in the set up toolbox of the analogue audiophile.

David finds that on the basis of this admittedly narrow test, he would say the Nasotec swing headshell has potential to be a useful tool in playing and restoring 78s that do not track with conventional headshells. That said, at better than $300 it is an expensive tool, and in most cases the more practical, or at least economical, approach would be to buy a better copy of the record. The headshell's most compelling application, then, is likely to be in addressing challenging rarities (as it happens, David's test disk may well fall into that category) or, perhaps, as an aid to a collector who has a large number of difficult records. Otherwise, David doubts the end would justify the cost.

The inevitable structural compromise and mass penalty of a pivot in the middle of a turntable headshell does create its own issues. Mark speculates that the audible papery coloration must arise from this additional joint because preventing it moving does improve the sound quality. The comprehensive list of partnering equipment Mark offered demonstrate the efforts made to identify the effect of this component on sound quality. There were actually many more discs tried and every possible permutation and combination with the arms available. Thos is a very interesting product, and very well made, but the **Nasotec** *Swing Headshell*, at the price, cannot be recommended on sound quality grounds.

Music enjoyed while writing this review	**Reference system**
on vinyl of course • **Aphex Twin:** *I Care Because You Do* Warp records excellent reissue of one of the high points of new music in the 90s, the decade that music remembered • **The Clash:** *Give 'em enough rope* • **Alan Cortot:** *Chopin Ballade No.1, G minor, Op. 23*, Victor Orthophonic, Recording of Take 4 on 27 October 1926, less common that Take 6 recorded 2 months later. • **Bruce Springsteen:** *Live/1975-* • **James Newton Howard:** *The Sheffield Track Record*, legendary direct-to-disc 2 tracks per side • **I Jah Man:** *Haile I Hymn (Chapter 1)* • **Caron Wheeler:** *Beach of the War Goddess*, cousin Caron on 45rpm • **Zappa/Mothers:** *Roxy & Elsewhere* 2013 analogue remaster	Equipment used in this review: • Pick-up arm 1: **SME 3012** ***Series I*** with original bias compensation accessory and unrestored except silver arm cable (Mark) • Pick-up arm 2: **SME 3012** ***Series II*** with *FD200* damper accessory disengaged and completely original (Mark) • Turntable support: kiln dried sand filled Wilko (Wilkinson Stores) table, without glass shelves (Mark) • Turntable shelf: ERaudio Large SpaceHarmoniser (Mark) • Tuning: **Yamamoto Sound Craft** and **BrightStar** extra large *IsoNodes* (Mark) • Turntable: **Garrard 401** in plywood plinth filled with kiln-dried sand (Mark) • Pick-up arm 3: **SME 3009** ***Series II improved*** completely original (Mark) • Pick-up arm 4: **SME 3009** ***Series II improved*** (David) • Turntable2: **Thorens** ***TD160BC*** with some 'S' parts (Mark) • Turntable 3: **Strathclyde Transcription Deevelopments (STD)** *STD305D* (David) • Initial trial cartridges: **Audio Technica** *AT95E* and *AT110* (Mark) • Cartridge 1: **ADC** ***VLM mkII*** (Mark) • Cartridge 2: **Cartridge Man** ***MusicMaker II*** • Cartridge 3:Dynavector XX2 MkII (Mark) • Cartridge 4: **Stanton** ***681EEE*** (Mark)

Music enjoyed while writing this review	Reference system
Test discs were used somewhat less enjoyably: • **Hi-Fi News:** *Analogue test LP: The Producer's Cut*, Len Gregory's essential bias setting tracks • **Image HiFi:** *Vinyl Essentials: the ultimate pickup test record###* • **Manger:** *Musik wie von einem anderen Stern*, useful for back-to-back with the equivalent CD as reference to aid audio memory • **Stan Ricker:** *Cardas Frequency Sweep and Burn-in Record* • **Shure:** *TTR110 Audio Obstacle Course*, still the standard by which all test discs are judged	• Cartridge 78rpm: **Shure M97** (David) • Phono pre-amplifier: **Canor *TP306 VR+*** phono-preamplifier ((Mark) • Phono pre-amplifier: **Graham Slee** *Jazz Club* (David) • Integrated Amplifier: **Rogue Sphynx** *first generation* (David) • Integrated amplifier: **Canor *TP106 VR+*** (Mark) • Line Pre-amplifier: **Audio Research Corporation** *Reference 3* (Mark) • Loudspeakers: **Pinnacle** *BD650* (David) • Loudspeakers (Mark): TQWP/Transmission-line hybrid passive loudspeakers (18mm & 25mm birch-plywood cabinets; long fibre natural wool stuffing; Deflex panel lined) loading the late the late John Wyckoff 's **Hammer Dynamics** bass-mid driver • Passive (yuk) crossover (with litz-wired inductors & couture capacitors) and B&C DT400N & B&C DE-35-8 tweeters. Some wire is used to join these components together. No interconnects cost more than 10% of the device at each end, much of it made by the Old Scribe from high quality components. Mark's amplifier-to-loudspeaker wire is ultra-low impedance *Black Rhodium S900*, a low-Z variation on the *Black Rhodium S600* cable that came out well in *Ben Duncan*'s objective and subjective correlation tests, selected primarily to match the OPT/driver damping factor, not for any magical qualities.

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