

DS Audio

Eccentricity Detection Stabilizer

ES 001



Why record eccentricity is important?

The overall wow and flutter of the entire system cannot be significantly reduced unless the eccentricity of the record is corrected

● The overall wow and flutter of the entire system



● Wow and flutter produced by record eccentricity



● Wow and flutter produced by the turntable



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Since the influence of the wah generated from the eccentricity of the record is large, The overall wow and flutter of the entire system cannot be significantly reduced unless the eccentricity of the record is corrected

DS Audio constantly strives to find solutions to otherwise overlooked fundamental problems that can negatively affect the accuracy and therefore the quality of vinyl playback systems. This can be seen in the range of DS Audio optical cartridge systems that are completely unaffected by magnetic fields as well as ionizers that prevent static electricity from being generated on vinyl records. We have now turned our attention to the issue of "record eccentricity".

What is record eccentricity? If we take into consideration the industry standard, a record center hole has a diameter of 7.24 (+0.09mm, -0mm) whereas the diameter of a turntable spindle measures between 7.05 – 7.15mm. This can result in a gap of up to 0.28mm and therefore an eccentric width of up to 0.14mm. The industry standard dictates that the eccentricity of the center hole of the record itself should be 0.2mm or less. Taking all of these points into account it is possible that the eccentric width could be as high as 0.34mm in the worst case.

With an eccentricity width value of 0.34mm, even if there is no inherent wow and flutter (speed error) produced by the turntable in use, it reaches around 0.15% (WTD RMS) on the innermost grooves of the records playing surface. In reality, the average speed error value of even the highest quality turntables is around 0.008%. These factors combined can result in an overall wow and flutter value 20 times worse than that of the turntable in isolation.

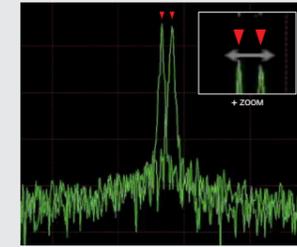
Put simply, when using even the finest quality turntables available, the overall wow and flutter of the entire system cannot be significantly reduced unless the eccentricity of the record is corrected. In order to faithfully reproduce the source material it is imperative to reduce the record eccentricity as much as possible.

What problems can record eccentricity cause?

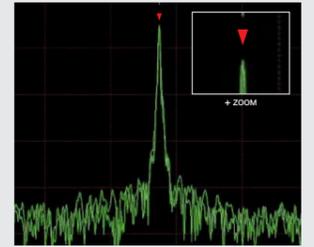
- ① Fluctuations in pitch across the frequency range
- ② Cartridge and tonearm will be forced to sway from side to side

Excessive wow and flutter presents two problems. The first is that the unstable rotation causes fluctuations in pitch across the frequency range. The second is that if the record eccentricity is not corrected, the cartridge and tonearm will be forced to sway from side to side as they follow the groove. This impairs the stylus ability to accurately track the groove and results in a muddy sound and an unstable sonic image. As a result, the full potential of even the highest quality systems will not be realised by the listener. Correcting this eccentricity as much as possible allows you to unlock far more of the potential performance of your equipment.

① Frequency



There is eccentricity: Frequency changes



No eccentricity: Frequency does not change

② Cartridge sway



There is eccentricity: Cartridge is forced to sway



No eccentricity: Cartridge is stable

Technical explanation

The ES-001 is equipped with two sets of infrared LED's and PSD (position detection elements) arranged at an angle that intersect at 90°. Each of these sets of sensors detects the position change of the end groove at the innermost circumference of the record. The eccentricity of the record is then calculated by using the information provided by these sensors in order to establish the difference between the current rotation center and the absolute center position (the turntable spindle center.)

This information is then displayed to the user on the ES-001's screen. Adjustments can then be made manually by repositioning the record to bring the center of rotation of the record closer to the absolute center.

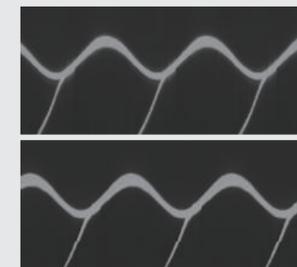


Detects end group position changes using two infrared LEDs and two linear image sensors.

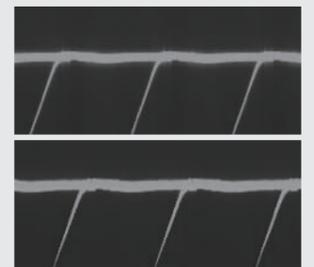


Eccentricity adjustment screen

Example of linear image sensor output



Before adjustment



After adjustment

Differences from the Nakamichi DRAGON-CT

The Nakamichi DRAGON-CT and the ES-001 share a common ground in that they both detect the position variance of the end groove in order to detect the eccentricity of the record. The DRAGON-CT however uses a mechanical centre search rod to detect this position variance and then automatically makes the adjustment whereas the ES-001 uses infrared LED to detect the variance, providing the user with the information required to then make manual adjustments to correct the eccentricity. The ES-001 allows users to make these improvements on most turntables, therefore making it infinitely more versatile than the Nakamichi design.

Product name	Detection area	Detection method	compatibility
Nakamichi DRAGON-CT	End groove	Contact type with sensor arm	Incompatible
DS Audio ES-001		Non-contact type with infrared LED	compatible



Nakamichi DRAGON-CT

How to use

Step1

Measurement

When the record player is rotated, the upper part of the stabilizer is held to stop the rotation of the stabilizer, and the stabilizer detects the rotation and shifts to the measurement mode.

When switch to the measurement mode, the display on the outer circumference of the stabilizer starts to rotate and the [Tap to start measure] button is displayed.

Next, when you press the [Tap to start measure] button, the display changes to the [Measuring] button and the measurement is completed in about 2 seconds.

* Be sure to rotate the record player (33 rotations or 45 rotations) when measuring. If the record player is not spinning, the stabilizer will not be in measurement mode.



Step2

Adjustment

Stop the record player when the measurement is complete. Next, while looking at the stabilizer screen, press the record board to bring the cross mark (center of rotation) as close as possible to the absolute center position.

The degree of eccentricity of the record is indicated by the color of the screen (outer circumference, cross mark & display bar at the bottom).



Press the record board so that the cross mark (center of rotation) is in the absolute center position.



● Screen example



Red: There is a lot of eccentricity



Yellow: There is some eccentricity



Green: The eccentricity has been considerably eliminated.

Step3

Restart

When the center of rotation is aligned with the absolute center position, rotate the record player again to check that the eccentricity of the record is gone(or reduced) and then play the record.



When the eccentricity is adjusted below the adjustment limit, the display switches to "The center is ok".



● Spec

Size: ϕ 80mm x H 70mm

Weight: 620g (including batteries)

Material: Aluminum & Tungsten

Power supply: Two AA batteries

User Interface: Touch panel

Touch panel size: 2.4 inch

Notes

- Measurement may not be performed correctly depending on the condition of the record.
- If the record is severely warped, the stabilizer may be shaken and accurate measurement may not be possible.
- There is a limit to the adjustment due to the manual adjustment of the record position.