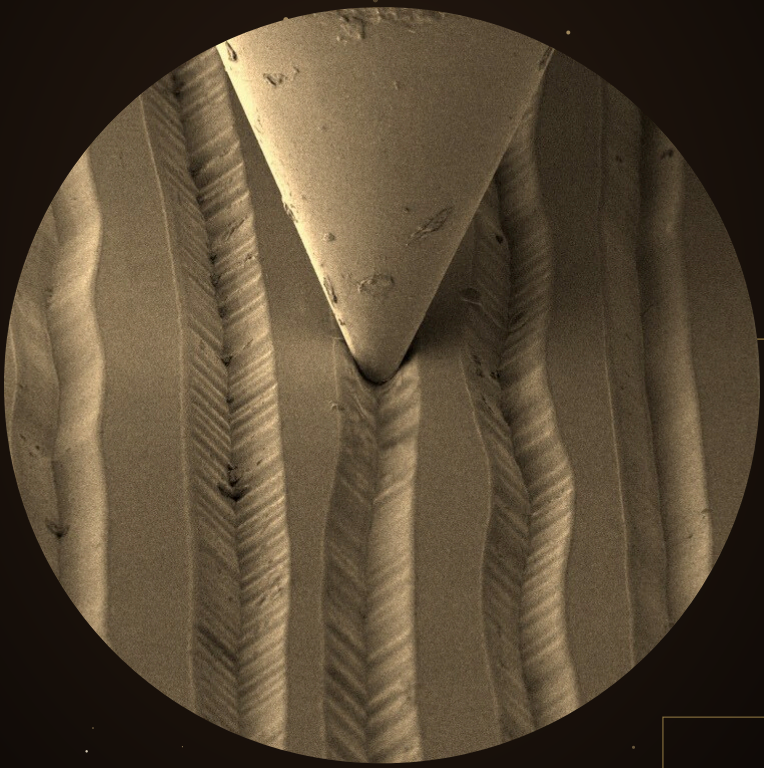
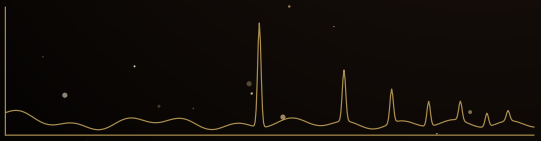
StylusScope®



Test Record Manual



FFT spectra

PAUL GRAND AUDIO UK

Made for this instrument

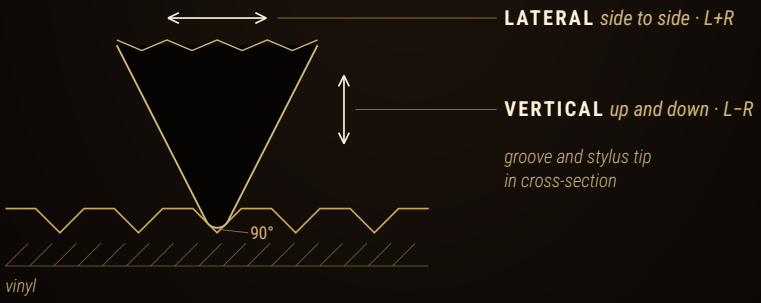
The Test Record was made for StylusScope. I specified the tracks; the master was cut at Artone Studio and the record pressed by Record Industry in Haarlem, the Netherlands. The plant was founded in 1958 under the Artone name, became Sony's main vinyl production facility for Europe, and in the 1980s pressed more than 35 million copies of Michael Jackson's *Thriller*.

ONE RECORD, ONE REFERENCE

Shipping one record with every instrument matters more than it first appears. Test records do not share a common reference level: "0 dB" on one record can be a different groove velocity from "0 dB" on another, sometimes quoted as a peak value and sometimes as RMS. A distortion figure measured on one record cannot be compared with one from another.

Every StylusScope reading comes from the same pressing of the same master, so every reading in the collective data can be compared with every other.

— Pal Nagy, Paul Grand Audio



LOOKING AFTER THE RECORD

- Hold it by the edge and the label only, and keep it in its inner sleeve.
- Clean it as you clean other records. The usual ticks and pops with the special test signal can be more pronounced than with music. However, the averaging function eliminates the impact on the measurement.
- Use it for measurements only. Every play wears the groove a little, as it does on any record.

StylusScope®

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StylusScope® by Paul Grand Audio UK, Life-Changer Ltd
Cover photo: Eric Muzipov, microscopy specialist

Side A

Stylus wear, distortion and resonance

A1

–12 dB

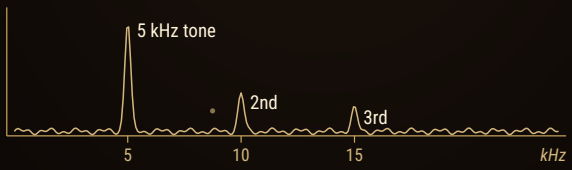
STYLUS WEAR

5 kHz, then 8 kHz and 3 kHz · 1 min each

5 kHz The standard wear measurement. Store your baseline from it in **F2**, and use it for every wear check: it is the band the wear log and the collective data are built on.

8 kHz More sensitive to the shape of the tip, and a useful second opinion. Note its readings yourself, at the same loading every time: a change of cartridge loading alone can move its distortion by 10 to 20 %. At 8 kHz the screen shows **3RD/2ND: --**, because the 3rd harmonic lies beyond the measuring range.

3 kHz Changes very little as a stylus wears, which makes it your system check: if 3 kHz readings move, something other than the stylus has changed.



A2

–12 dB

CCIF INTERMODULATION, LATERAL

1 + 1.4 · 4 + 4.4 · 8 + 8.4 · 13 + 14 kHz · 1 min each

Use these with **F4 IMD MEASUREMENT**. Average while both tones of a pair are playing, then run **F4**. The 13 + 14 kHz pair is the hardest test of the contact between tip and groove, and the most useful for comparing styli or following wear alongside **F2**. The lower pairs show how the distortion builds up with frequency. **F4** measures the left channel, and its results are not logged, so write them down.

A3

−12 dB

VERTICAL CUT, INVERTED PHASE

4 kHz · 8 kHz · 4 + 4.4 kHz · 13 + 14 kHz · 1 min each

These tones move the stylus up and down instead of side to side, so the two channels carry the same signal in opposite polarity. Measure the single tones on the measuring screen and the pairs with **F4**, exactly as on the lateral tracks.

In **F6**, the signal appears in full with input **L-R VERT** and almost disappears with **L+R MONO**; the better your two channels match, the deeper it cancels. In my long-term test the 8 kHz vertical tone showed the largest change of all as the stylus wore, so it is worth following alongside the 5 kHz wear check.

A4

0 dB

SILENT GROOVE, THEN 5 KHZ LATERAL

Silent groove 2 min · 5 kHz 1 min · not for wear checks

The silent groove is for **F6**: with input **L-R VERT**, **Hi-Res 1 kHz**, the 100 dB window and 12 averages, the low-frequency peak is your tonearm and cartridge resonance; **L+R MONO** shows the lateral resonance. The same view reveals rumble, motor noise and mains hum.

The 5 kHz tone that follows is recorded 12 dB louder than the wear track. It tests how comfortably the stylus tracks a high level, so compare its distortion with A1 at different tracking forces within the maker's range. Never use it for a baseline or a wear check.

Side B

Level, response and azimuth

B1

0 dB

REFERENCE TONE

1 kHz, 5 cm/s, both channels in phase · 2 min

Use it first, to check your level: if either channel reads above 500 mV, switch in the −10 dB attenuator. The two channel levels should be close; a large difference points to the cartridge, its wiring or the phono stage.

Because 5 cm/s is the reference at which cartridge makers quote output, the level divided by your phono stage's gain gives the cartridge's real output. The frequency read-out tells you your platter speed: 1003 Hz means 0.3 % fast. Do not use B1 as the 1 kHz reference for **F5**: it is 20 dB louder than B2.

B2

−20 dB

FREQUENCY RESPONSE

1 kHz, then 100 Hz to 20 kHz · 30 s each

Use it with **F5 FREQ. RESPONSE**. Average the opening 1 kHz step and store it, then average each following step and run **F5**: the screen shows that frequency relative to 1 kHz, for each channel. Thirty seconds is enough for one averaged reading per step; lift the stylus and replay if you miss one.

The low steps show your phono stage's equalisation, the high steps the cartridge and its loading. Repeat the whole track after changing the loading, and compare the two sets of figures.

B3

0 / −12

CHANNEL SEPARATION AND AZIMUTH

1 kHz left, right (0 dB) · 10 kHz left, right (−12 dB) · 1 min each

Use it with **F3 AZIMUTH ADJ.**: average the left-only tone and store it, then average the right-only tone and run **F3**. It is also a quick wiring check: the left-only tone must appear on the white (left) channel of the screen.

Adjust azimuth on the 1 kHz pair, then repeat with the 10 kHz pair to see how separation behaves at high frequencies; it is usually much lower there, which is a property of the cartridge. Set tracking force and anti-skating before you start: azimuth comes last.

B4

−16 dB

SWEEP AND WHITE NOISE

Sweep 1–20 kHz 1 min · white noise 1 min

Watch the sweep in **F6** running freely: the moving peak traces the response of your cartridge and phono stage, and any resonance stands out as it passes.

For a measured picture, use the white noise: in **F6** choose **L+R MONO**, **Full 20 kHz**, the 20 dB window and 36 averages, and start averaging as soon as the noise begins. Store the result as the reference, change one thing, such as the loading, and measure again: the coloured band between the traces is exactly the difference. Photograph the screen to compare a worn stylus with its new self months later.

Track list

SIDE A		*17 min 40 s*
A1	**Stylus wear test: 5 kHz**, then 8 kHz and 3 kHz, 1 min each. The 5 kHz tone is the standard wear measurement.	**−12 dB**
A2	CCIF intermodulation, lateral: 1 & 1.4, 4 & 4.4, 8 & 8.4, 13 & 14 kHz, 1 min each	**−12 dB**
A3	Vertical cut, inverted phase: 4 kHz, 8 kHz, 4 & 4.4 kHz, 13 & 14 kHz, 1 min each	**−12 dB**
A4	Silent groove (2 min), then 5 kHz lateral (1 min). Not for wear checks.	**0 dB**

SIDE B		*17 min 24 s*
B1	Reference tone, 1 kHz, 5 cm/s, both channels in phase (mono), 2 min	**0 dB**
B2	Frequency response: 1 kHz, then 100 Hz, 500 Hz, 2, 5, 10, 12, 15, 18, 20 kHz, 30 s each	**−20 dB**
B3	Channel separation and azimuth: 1 kHz left only, right only; 10 kHz left only, right only, 1 min each	**0 / −12 dB**
B4	Sweep 1–20 kHz (1 min), then white noise (1 min)	**−16 dB**

Some tracks, including the vertical cuts on A3 and the 10 kHz single-channel tones on B3, are there for functions and wear bands that future firmware may use. They need no new record.

Using the Test Record

A voice announcement names each test signal before it plays. Each signal lasts a minute (two minutes on B1, 30 seconds per step on B2), with 5 seconds of silence before and after.

1. Turn the volume down before you play any track.
2. Clean the stylus and the record first.
3. Wait until the announcement has passed and the frequency on the screen is steady.
4. Press **BTN1** for an averaged reading.

> **Never compare readings taken with different loading, phono gain or attenuator settings.**