Magnetic Interference Validation Report

Ebbe Design Modular Magnetic Pedalboard System

BY THOMAS BESSE

RHPF ELECTRONICS, BASEL, SWITZERLAND

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About this Report

This document was produced because the question of magnetic interference came up in conversation, and the engineering side of us wanted to know the answer.

The methodology, equipment, raw measurements, and conclusions are reproduced in full below. Anyone with comparable measurement equipment can run the same test.

Initial Concern

When we first came across the modular magnetic pedalboard system developed by Eric Werro and Benjamin Opderbecke at Ebbe Design, the very first question that came to mind was simple.

“Do the magnets interfere with the signal?”

Like many musicians and electronics enthusiasts, we grew up with the idea that magnets and electronics are a dangerous combination. Popular culture taught us that large magnets could shut down power grids, erase data, distort televisions, wipe bank cards, or interfere with delicate electronics.

Even in daily life, we were constantly told:

- do not place magnets near cards,
- do not place speakers near televisions,
- do not place keys near transport tickets,
- keep magnets away from electronics.

Naturally, the idea of mounting guitar pedals directly above magnets initially felt counterintuitive.

At the same time, the engineering side of our brains kept asking a different question.

“Does this actually make sense electrically?”

Static magnetic fields do not automatically imply signal interference, especially in low voltage analog audio circuits. The more we thought about it, the more we realized that much of our fear of magnets probably comes from older technologies, misconceptions, and dramatic movie scenes rather than actual experience with modern guitar electronics.

Exploratory Testing

As soon as we came home after our first discussions with Ebbe Design, we started doing deliberately exaggerated experiments.

Large permanent Celestion speaker magnets were placed directly against:

- guitar pedals,
- amplifiers,
- power supplies,
- signal paths.

The expectation was simple: chaos, noise, oscillation, instability, hum, something.

Nothing happened. No audible instability, no obvious noise increase, no measurable madness.

At that point, Eric and Benjamin came over and we started doing more structured blind listening tests using the Ebbe Design magnetic mounting system itself. Pedals were repeatedly mounted on and removed from the magnetic board while comparing noise, feel, response, harmonic content, and general behavior.

None of us could reliably hear any difference between pedals mounted conventionally and pedals mounted magnetically.

Still, subjective listening tests alone were not enough. We wanted to determine whether measurable electrical differences could still exist below the threshold of perception. That led to a more formal validation process.

Validation Objective

The objective of this validation was not to claim that magnets can never affect electronics. That would be incorrect.

The objective was to determine whether the Ebbe Design magnetic pedalboard system produces measurable or audible interference under realistic guitar pedal operating conditions, in the pedal categories most likely to expose any such interference if it exists.

Validation Methodology

Testing focused specifically on pedal categories commonly perceived as sensitive to interference, including inductive Wah circuits, vintage-style analog designs, BBD-based delay circuits, and high gain analog signal paths.

Both subjective and instrumental analyses were performed. Measurements included:

- noise floor analysis,
- harmonic analysis,
- spectral comparison,
- sine wave integrity verification,
- interference peak observation,
- loudness consistency,
- output stability.

Testing was intentionally performed using worst case style analog pedal combinations with reputations for sensitivity and instability.

Why These Pedals

The test set was chosen specifically to expose any plausible failure mode rather than to favor a clean result.

Vox V847A Wah pedal (original inductor, factory configuration). The inductor in a Wah pedal is, in principle, the component most likely to interact with an external static magnetic field. A sufficiently strong field could in theory shift the inductor's core characteristics, which would change the resonant peak frequency, the Q, or both. Any such effect would be immediately audible as a change in Wah character.

DOD Rubberneck analog delay. As a bucket brigade device (BBD) based delay, the Rubberneck relies on a clock signal driving the analog delay line. Any external noise source coupling into the clock, the analog path, or the regenerative feedback loop would show up as a change in delay character, modulation behavior, or noise structure.

Cleaner circuits with no inductors and no high impedance analog clocks would be less sensitive to the conditions tested here. A null result on these two pedals is therefore expected to generalize to the rest of a typical pedalboard.

Test Equipment

The following equipment was used during validation:

- Vox V847A Wah pedal, original factory inductor.
- DOD Rubberneck analog delay (BBD).
- T-Rex Fuel Tank Classic linear isolated power supply.
- FNIRSI DST-210 handheld oscilloscope and signal generator (used for both functions).
- Solid State Logic SSL2 USB audio interface.
- iZotope Insight 2 spectrum and loudness analyzer.
- Waves PAZ Analyzer.

Test Configuration

The signal chain used during testing was:

FNIRSI DST-210 signal generator → Vox V847A → DOD Rubberneck → SSL2 → PAZ Analyzer and Insight 2.

Measurements were captured under two conditions:

- Pedals positioned away from the magnetic board (off board).
- Pedals mounted directly on the Ebbe Design magnetic mounting system (on board).

For each condition, the T-Rex Fuel Tank Classic power supply was moved together with the pedals. When pedals were tested off the board, the power supply was also off the board. When pedals were tested on the magnetic board, the power supply was also on the board. This ensured the validation represented real world operating conditions rather than isolated partial testing.

A controlled 1 kHz sine wave at 0.5 V peak was used for harmonic and spectral comparison testing. Additional no input measurements were performed to evaluate potential noise floor changes.

Measured Results

Subjective Listening Results

No audible difference could be identified during blind listening comparisons between pedals mounted conventionally and pedals mounted on the magnetic board. This included noise behavior, harmonic response, delay behavior, Wah response, signal integrity, and general feel.

Noise Floor Analysis

The no input measurements were performed with the SSL2 input gain deliberately set to maximum. This was a worst-case visibility configuration: any new noise component introduced by the magnetic mounting system, however small, would be amplified by the SSL2 preamp and appear most clearly in the spectrum. The absolute levels shown below are therefore high because of the cranked gain, not because of signal content.

The no input spectrum measurements remained essentially identical between both configurations:

Frequency	Off Board	On Board
991 Hz	−32.4 dB	−32.4 dB
1981 Hz	−22.0 dB	−22.0 dB
9991 Hz	−43.1 dB	−43.1 dB

No additional hum, broadband noise, oscillation, spectral spikes, or instability was observed when pedals were mounted on the magnetic system, even with the SSL2 preamp at maximum gain.

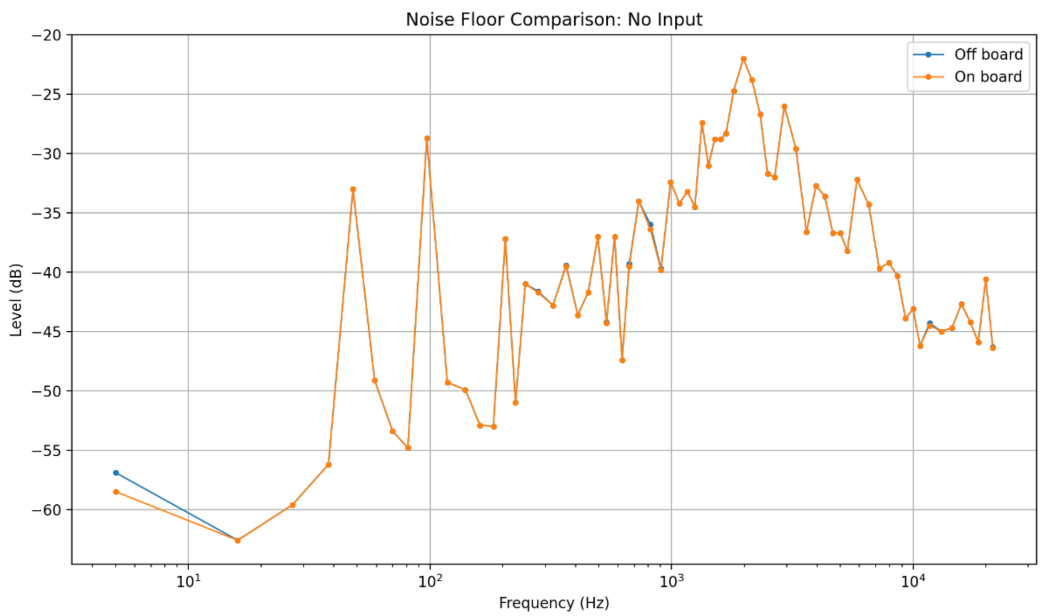

Figure 1 - No input spectrum overlay. Off board and on-board traces shown superimposed.

1 kHz Sine Wave Analysis

The controlled 1 kHz sine wave at 0.5 V peak was used as a stable reference for harmonic content and spectral integrity. Results were essentially identical between both configurations.

Fundamental

Frequency	Off Board	On Board
991 Hz	−2.0 dB	−2.1 dB

Harmonics

Harmonic	Off Board	On Board
1981 Hz	−43.2 dB	−43.4 dB
2929 Hz	−58.1 dB	−58.5 dB

No meaningful change in harmonic structure, output level, spectral distribution, or waveform integrity was observed.

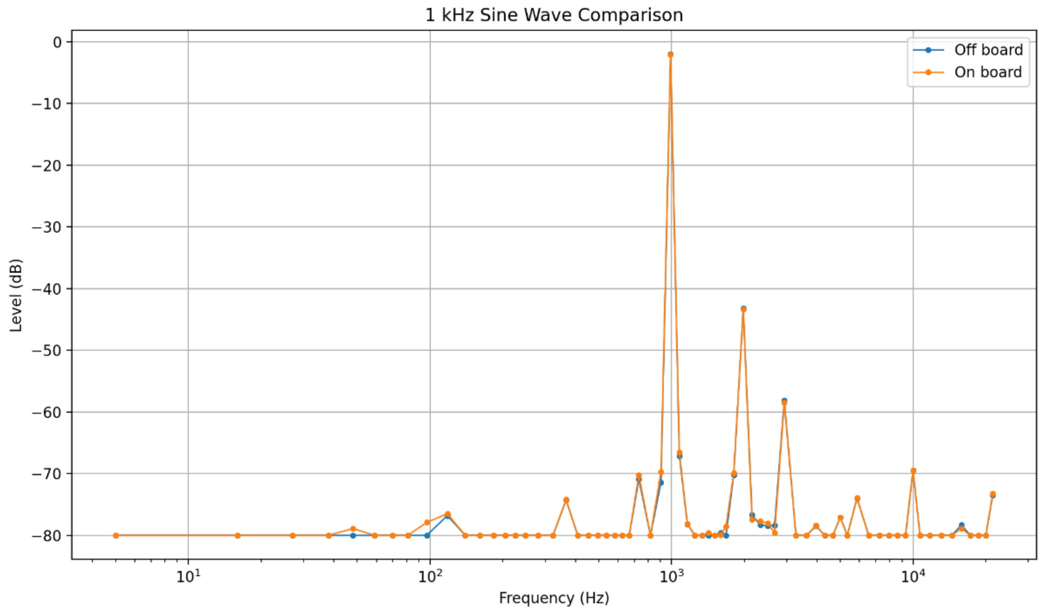

Figure 2 - 1 kHz sine wave overlay. Fundamental and harmonic structure shown for both configurations.

Analyzer Stability Observation

Small fluctuations were observed between captures, but these fluctuations were not consistently worse when the pedals were mounted on the magnetic board. In several cases, the analyzer measurements were actually slightly more favorable in the on-board condition, including slightly lower measured noise bins, slightly lower true peak values, and slightly lower harmonic readings in some captures.

This demonstrates that the observed variations were part of normal analyzer, environmental, and playback fluctuation rather than evidence of magnetic interference.

iZotope Insight 2 Observations

The iZotope Insight 2 measurements also remained effectively identical between both test conditions.

Loudness Comparison

Measurement	Off Board	On Board
Short-Term Loudness	−26.9 LUFS	−26.8 LUFS
Integrated Loudness	−5.1 LUFS	−5.1 LUFS
Momentary Max	−3.9 LUFS	−3.9 LUFS
True Peak	+0.1 dB	−0.4 dB

Note on the True Peak Reading

The Insight 2 true peak measurement shifted from +0.1 dB off board to −0.4 dB on board, a 0.5 dB swing on a single metric. Repeated captures showed similar amplitude variation in both directions, with the on-board condition sometimes reading lower and sometimes higher than the off-board condition across independent runs. This is consistent with the normal capture to capture variability of the SSL2 input stage and the analyzer's true peak detection algorithm at the signal levels used here. It does not represent a directional trend caused by the magnetic mounting system.

The spectrum displays also remained visually indistinguishable between both operating conditions.

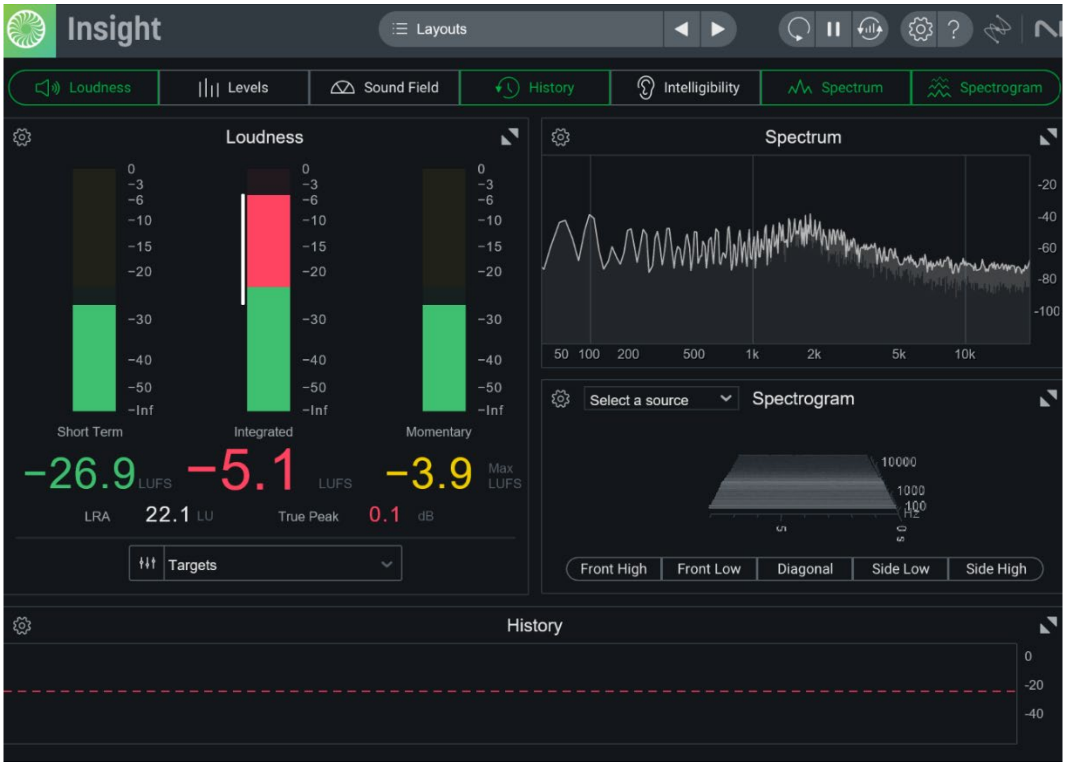

Figure 3 - iZotope Insight 2, on board condition.

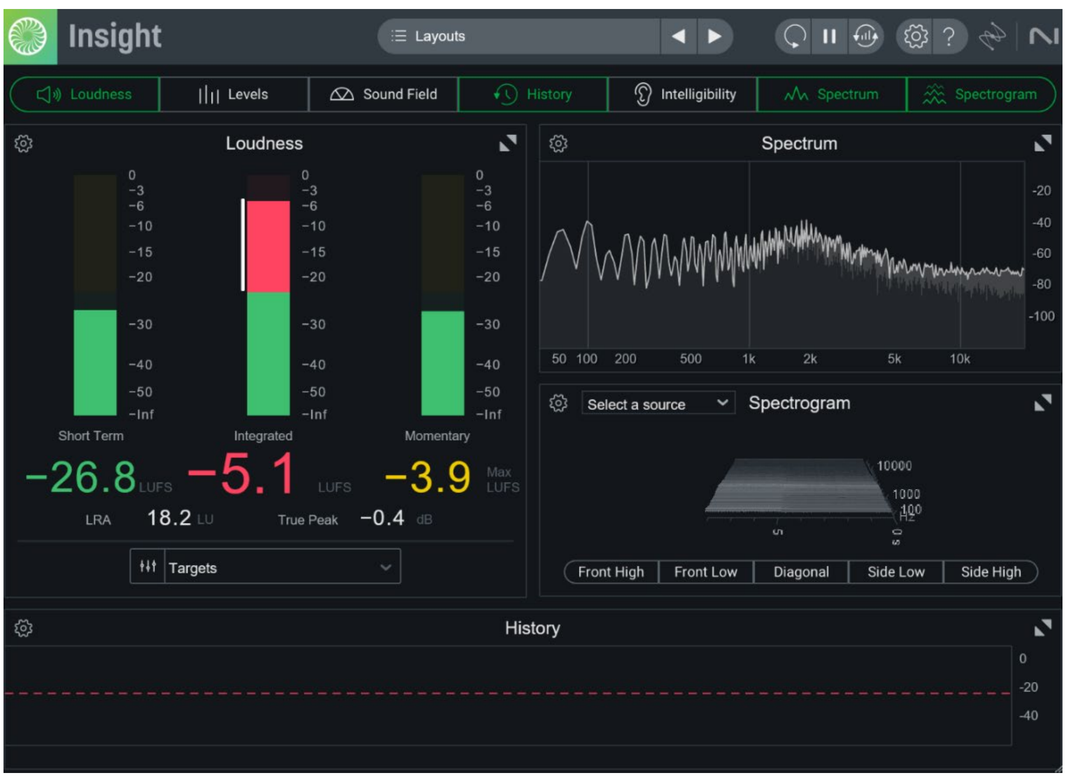

Figure 4 - iZotope Insight 2, off-board condition.

Conclusion

Under realistic guitar pedal operating conditions, the Ebbe Design magnetic pedalboard system produced no measurable or audible interference in any test performed, including in pedal categories specifically chosen for their sensitivity to electromagnetic effects.

This remained true even when testing pedal categories commonly perceived as sensitive to interference, including the inductive Vox V847A Wah, the BBD based DOD Rubberneck analog delay, and vintage inspired analog signal paths in general.

The results of blind listening tests, spectral analysis, harmonic measurements, noise floor analysis, and loudness analysis all correlated consistently.

While extremely strong or dynamically changing magnetic fields can affect certain electronic systems under specific conditions, no evidence of problematic interaction was observed with the static magnetic mounting system tested here. The concern, while understandable, appears largely rooted in assumptions associated with older technologies and cultural misconceptions surrounding magnets and electronics rather than practical behavior in modern guitar pedal applications.

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