

**Question:** I'm trying to understand the difference between IIR and IIRDigital+Compensation modes -- trying to understand technically what the manual means by "the extra edge" on page 19. Are IIR and IIRDigital+Compensation modes supposed to yield different magnitude responses? I'm testing (running my DAW at 48,000Hz) on pink noise, with a bell filter at 22,000Hz, and when I turn Digital+Compensation on (set to 512) and off, I see no difference in the magnitude response shown in the Equilibrium analyzer. I also see no difference using Voxengo SPAN. Is my method of testing defective, or is the difference too small to show up on these analyzers? Or have I misunderstood the purpose of IIRDigital+Compensation mode, and it's not actually about changing the magnitude response?

Answer from Dave Gamble: No, everything is working as expected.

So, it is a fact that a digital EQ response cannot perfectly match an analogue EQ response simply because there IS a Nyquist. But you can get insanely close. The last 12 years of EQ research for me has been about getting absurdly close, and that's in Equilibrium.

Digital+ compensation is a very simple idea - measure the difference between the analogue and digital responses and design an FIR filter to fix the error. Digital+ without phase just fixes the magnitude response. Digital+Phase fixes both phase and magnitude responses.

There should, in general, be virtually no improvement between Digital+ and regular IIR. It +SHOULD+ be extremely hard to measure and negligible in its difference. That means my maths is working well.

However, if I'm going to release what I consider the finest EQ built by human hands, it damn well needs to work 100% of the time. So Digital+ is there to catch any edge cases.

Hope this helps.

Dave.

**Question:** In FIR mode, for Phase, what's the difference between "analogue" and "zero-latency analogue"? The manual says,

Since they provide the same "cumulative minimum phase response" as each other, how do they differ?

Answer: Latency. Analogue Phase is identical to EQuality Analogue Phase. ZL Analogue phase is the same thing with the latency reduced. Same magnitude and phase responses, but since some people had developed a very strong affinity for EQuality's Analogue Phase, I figured I'd keep it in Equilibrium unchanged.

Dave

**Question:** If choosing a minimum-phase option, what advantage is there to FIR-mode ("global

minimum", "analogue", or "zero-latency analogue") over IIR-mode ("Digital+Phase" off, or "Digital+Phase" on)?

Answer: Ability to design the impulse response in detail. In FIR mode, you can window, adjust phase and generally go wild. If you're just doing regular EQ work, then IIR mode all the way.

If you're doing something more demanding, FIR mode gives you more flexibility.

IIR-mode has less latency and less CPU-demand (no?) than FIR-mode, so that's an advantage to IIR-mode; but what would be any advantage to FIR-mode for minimum-phase?

For regular analogue-style cumulative minimum phase, IIR is great.

If you need the flexibility of the FIR design, it's there in FIR mode.

Dave.

**Question:** What would be the purpose in choosing the option with latency, when the zero-latency option is available? Why would you ever choose to add useless latency? Why would an equalizer-design include a mode to add useless latency?

Answer: Strictly, under certain circumstances, there could be an eccentricity in the centering of the window function in Analogue phase vs ZL analogue, depending on cumulative phase. It's not really clear to me whether this could be audible or not. Nonetheless, it's an option on a menu that allows users to definitely get a sound they've used before and love. It's hardly making the UI more cluttered; it's on a menu with a bunch of options.

Dave.

**Question:** I just tested, and it's not just a matter of processor power. "Analogue" and "zero-latency analogue" actually yield different audio. I set up two tracks, with the same source material (an impulse) on both tracks. On one track I put Equilibrium in "analog" mode, and on the other track I put Equilibrium in "zero-latency analogue" mode, and they do not null -- i.e., they yield different audio.

**Answer:** Exactly. Could you hear a difference?

I included both options because I didn't want anyone to be without, in case they COULD hear a difference.

Dave.

**Question:** That will work for the terms "linear phase" and "minimum phase", because those terms have precise meanings in engineering circles, and you can ascertain those meanings with research.

Research will not, however, enable you to learn what DMG means by the terms "IIRDigital+Compensation", "IIRDigital+Phase", "FIR Analog Mode", and "FIR Zero-Latency Analog Mode", because these are terms which were coined by DMG and have no meaning determined by engineering conventions.

Answer: Yes and no.

IIR and FIR have precise engineering meanings.  
Zero-latency has a precise engineering meaning.

Digital+, Digital+Phase and "Analogue Phase" are descriptions of various bits of tech that form part of the EQ implementation. I try to explain them in the manuals. I have a set of videos underway to explain them in greater detail though.

Dave.

**Remark:** It seems strange to me that anyone would prefer unnecessary latency.

Answer from Krzysztof Octalsky: It's not a question of preference, it's about consistency. There are thousands of EQuality users that moved to EQuilibrium, we needed to offer them analogue phase with identical latency so they could reproduce their previous setup phase perfect. Some users work in environments with no automatic latency adjustments and are calculating and adjusting shifts manually within their chain. As Dave's already stated, the ZL Analogue Phase mode was different to the original EQuality mode so we included both to ensure continuity.

If you think there's a better way of tackling this problem then we're open to suggestions, but it's imperative we support users that have supported us from the start and that's why we chose this two mode solution.