

MIT Filterpole™ Technology Explained

Q: What are MIT Filterpoles™?

A: Poles of Attenuation

(as referenced in *The Impedance Domain*)*



A properly built AC filter will not only attenuate unwanted noise on the AC power line, but it will also optimize the power factor.

The best way to attenuate unwanted noise is to create a very low impedance (a zero of impedance across the load which acts as an attenuation

pole to the noise) surrounding the frequency (or frequencies) of the undesirable noise. In the case of audio, that would be at any frequency other than the power line frequency. **This is best accomplished by placing a tuned circuit in parallel, around the load.**

MIT was awarded this patent in November 9, 1993: number 5,260,862.

Also important is the **Power Factor** which is a (dimensionless) number between 0 and 1. When power factor is equal to 0, the energy flow is entirely reactive, and stored energy in the load returns to the

source on each cycle. When the power factor is 1, all the energy supplied by the source is consumed by the load and nothing is reflected back to

the source. MIT was awarded a patent on this technology regarding audio in July 13, 1993: number 5,227,962.

Q: What problems are associated with typical series filters?

A: Unlike MIT parallel filters, series filters:

- are ineffective at removing noise
- have inductors that create distortion “products” at audible frequencies
- reflect noise back into the circuit rather than directing it to “ground” for removal
- cause resonances that actually create noise at audible frequencies

A series filter operates by blocking, or rejecting certain types of noise. Imagine a series filter working by ‘shutting a door’ in the face of noisy pollutants. What happens to the noise after the door is closed? Since noise is energy, it cannot be destroyed; it must be consumed to be removed. So, when a series filter blocks or rejects unwanted noise, it simply reflects the noise right back to the source. The noise has not been removed, only reflected. This type of filter cannot rid itself of noise, as the noise is continually reflected between the series filter and the source, again and again. This is yet another source of audible noise, inserted by the very device called upon to eliminate it!

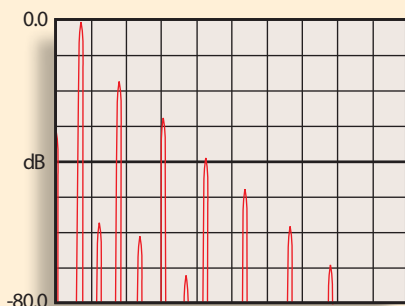
The Solution: Parallel AC filtering.

The Z Series of power products from MIT uses patented parallel “AC Filterpoles”™; a tuned LCR technology. MIT Filterpole technology eliminates reflections by efficiently absorbing all forms of AC noise from the mains, and then converting it into harmless thermal heat.

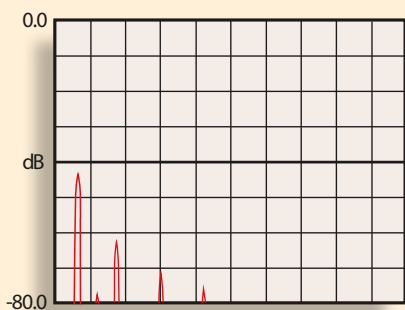
The result? Once the Z circuitry is working to clean, condition and protect your AV system, you will instantly enjoy “blackier” blacks, better color saturation, and increased shadow detail; movie sound tracks will deliver dialog, Foley sounds and background music with theater-like quality. Because your audio system now has a lowered noise floor, you will have pinpoint audio image placement within a lifelike soundstage, all with clear and authoritative bass.

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Harmonics Reduction of the Z Powerbar



Before Z Powerbar: Power spectral density of the harmonics produced by a well known isolation transformer.



After Z Powerbar: Isolation Transformer of Figure above with Z Powerbar, which provides greatly lowered harmonic levels.

*for additional in-depth information, please refer to MIT Technical Note 101: “Transportable Power in Audio Cables: Energy Storage Elements and the Power Factor”, available in PDF format on the MIT website reference library at www.mitcables.com.

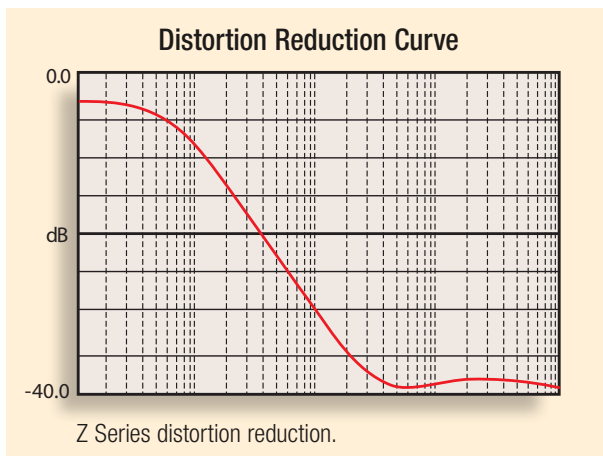
MIT Filterpole™ Technology Explained *continued*

Power Factor Correction: Stops Energy Waste

MIT's Z Stabilizer circuitry also provides "PFC" (Power Factor Correction), by controlling the phase angle of the inbound AC sine wave for maximum efficiency.

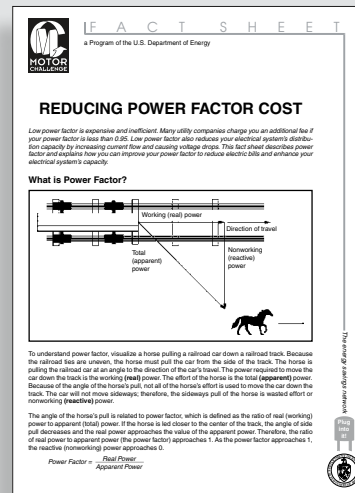
With PFC you will:

- use less energy for the same work
- prolong the life span of most electronic components
- never limit your current flow



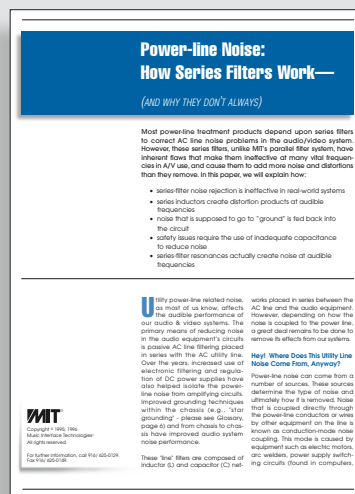
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Power-line Noise: How Series Filters Work—



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All products using Z circuitry are protected by US Patents: 5, 227,962, 5,260,862 and 5,920,468. Other patents pending.
MIT Z Series™ products are manufactured and sold by CVTL, Inc.