

Budget EMI Filter

By Rick MacDonald

Build this quality AC line filter for less than \$100 with surplus parts and recycled filters from old server switching power supplies. It will improve the sound of many systems and is easy to put together.

Now that you have finished that new amplifier, done all that hard work, and spent way too much, you fire it up only to be disappointed because the sound is not what you had hoped. Or, after upgrading everything, your system just doesn't perform at the level expected. Well, you may be the victim of AC pollution, and not realize that it can degrade audio/video performance.

Our power grid is a huge electromagnetic network spewing out noise and interference across the spectrum. A good filter can control and reduce this interference, improving the sound (and picture) of your entire system. Of course, isolation transformers, line conditioners, and regulators are the best solutions for EMI problems and waveform regeneration, but at higher currents (15+A) they can be quite expensive. So if you need a way to clean up your AC, try this approach.

I constructed this mains filter (*Photo 1*) using an SAE two-stage EMI filter (bought surplus) and a line filter (*Photo 2*) pulled from a discarded server switching power supply. It has two analog outputs rated at 20A, and two digital outputs at 8A. A large ferrite core (#43) was looped through twice at the AC entry point, and came from the sample kit (*Photo 2*), also purchased from a local surplus.

If you have trouble finding these items surplus, Mouser and Digi-Key carry most of them. If you choose to build one, the circuit is simply a multi-stage pi filter (*Fig. 1*), and you can find

others on the net, but it's easier to buy them already potted in a metal case (*Photo 2*).

A computer recycler is a good place to start, as many servers use high current switch mode power supplies and rely on filters to keep switching noise from being imparted back to the AC line. That also makes them perfect for isolating

PHOTO 1: Top view, front view (inset).

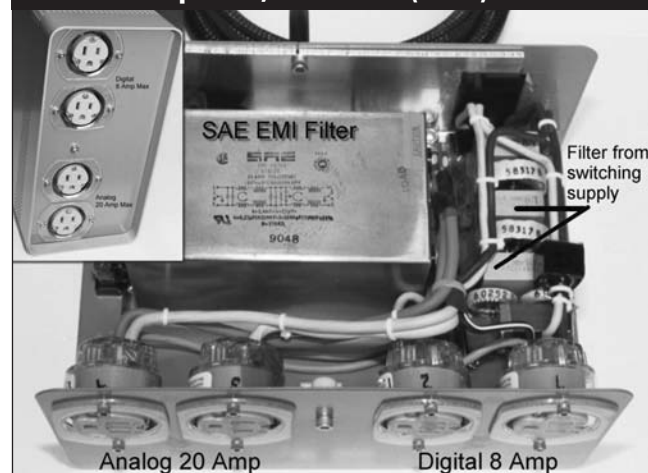


PHOTO 2: Ferrite cores and filters for EMI.

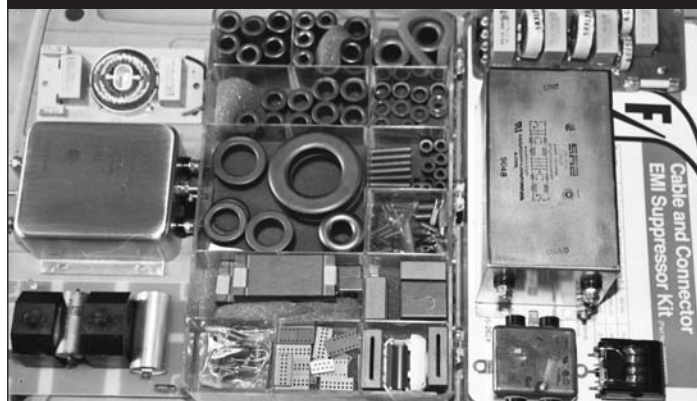
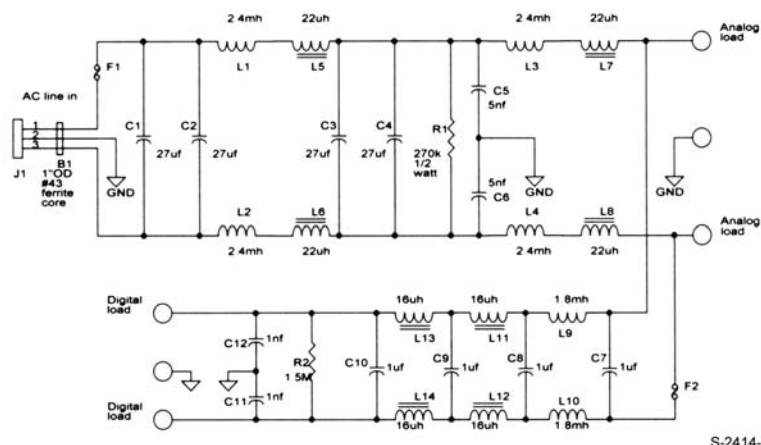


FIGURE 1: AC EMI filter.



S-2414-1

your analog from your digital power; otherwise, you just recontaminate your nice clean AC when you plug in your DVD, DAC, or, worse, your PC sound editing system. When installing these filters, make sure the metal case is in good electrical contact with the enclosure. A large ground strap from the filter's GND post to a location where the paint has been removed should ensure this. **aX**

NOISE SUPPRESSION GUIDELINES

Low frequency fields can be difficult to control, particularly if they are from the AC power transformer. Stray magnetic fields (low frequency) from transformers can cause hum and other annoying noise. Short of a 1" thick lead shield, there are some other effective ways to quell these fields:

- place the transformers in a separate metal enclosure
- use silicon steel shields or shading rings around the transformer
- run cables as close to enclosure sides as possible, and place sensitive circuitry away from power transformers

High-frequency fields can enter a metal enclosure through openings as small as 20mm. This means that all connectors should be metal and holes larger than 20mm be covered in mesh. External cables should be shielded, and internal shielded cables need to be grounded on one end. Enclosure panel thickness should be at least 2mm or more, and heat-sinks should be grounded, if possible, at several points. Use ferrite beads and cores for cables carrying 10kHz or higher (except analog audio signal lines).

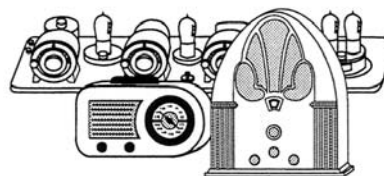
Clean AC cannot be taken for granted, and requires some effort to attain. It has been shown that noise introduced into the power supply can find its way into, and adversely affect, audio signals and ultimately system performance. ■

FREE SAMPLE

IF YOU BUY,
SELL, OR COLLECT

OLD RADIOS, YOU NEED...

ANTIQUE RADIO CLASSIFIED



Antique Radio's Largest Monthly Magazine
100 Page Issues!

Classifieds - Ads for Parts & Services - Articles
Auction Prices - Meet & Flea Market Info. Also: Early TV, Art Deco,
Audio, Ham Equip., Books, Telegraph, 40's & 50's Radios & More...
Free 20-word ad each month for subscribers.

Subscriptions: \$19.95 for 6-month trial.
\$39.49 for 1 year (\$57.95 for 1st Class Mail).
Call or write for foreign rates.

Collector's Price Guide books by Bunis:

Antique Radios, 4th Ed. 8500 prices, 400 color photos\$18.95

Transistor Radios, 2nd Ed. 2900 prices, 375 color photos\$16.95

Payment required with order. Add \$3.00 per book order for shipping. In Mass. add 5% tax.



A.R.C., P.O. Box 802-A16, Carlisle, MA 01741

Phone: (978) 371-0512 — Fax: (978) 371-7129



Web: www.antiqueradio.com — E-mail: ARC@antiqueradio.com

AUDIYO.com

Exclusive Canadian distributors of

FURUTECH
PURE TRANSMISSION

MUNDORF
www.mundorf.com

High-end audio
parts supplier

Quality audio
component parts at
competitive prices

All prices in
Canadian Dollars

Welcome to the
world of
**do-it-yourself
audio**



Audiyo Inc., 96 Leyburn Ave., Richmond Hill, ON L4C 0J6, Canada*

General inquiries: info@audiyo.com

OEM & Order Inquiries: sales@audiyo.com

* Note: No pick-ups at this location