

PHONO FIX

I want to thank Gary Galo for his article, "A Belt-Drive Turntable Upgrade," (July '08 *aX*, p. 20). I found his instructions extremely helpful. It just so happened that I was fixing up an old Thorens TD125 MKII turntable with a Rabco linear tracking tonearm (**Photo 1**). This LP rig had been sitting idle for some time and was in need of repair.

Like Gary's turntable, the TD125 MKII is also a belt-drive turntable with a suspended sub-base. And, hooking up a cable of any size to the phono outputs on the Rabco tonearm caused the tonearm to hit the edge of the turntable base.

So, I took Gary's advice and attached a small metal plate to the base with new RCA jacks (**Photo 2**). I also routed some Cardas shielded tonearm wire and a separate ground wire through two small holes I drilled in the bottom of the turn-

table. The Dayton Isolation Cones he suggested provide a solid foundation and worked wonderfully for leveling my turntable.

An additional problem I ran into was bearing noise. I heard a grinding sound coming from the bearing and platter spindle when I spun the platter. I removed the old bearing oil, cleaned the bearing, and added some 30 weight synthetic motor oil. This didn't get rid of the noise, however.

I decided it needed a higher viscosity oil. So, I used Mobil One 75W - 140 weight synthetic gear oil. For extra insurance, I also added 25% of Prolong oil treatment to the oil. That fixed it good! I heard no audible bearing noise and it spun forever.

I found a perfect replacement for my worn turntable belt at Microphonics (<http://stores.ebay.co.uk/microphonics>).

The turntable sounds great. I'm now enjoying my LPs again and buying more. Thanks.

John Loudenback

johnloudb@earthlink.net

SPEAKER ADVICE

As I scanned the price list in the Loudspeaker Buyer's Guide (*aX* August '08), I was taken aback by the high prices. However, the high prices go hand-in-hand with the high quality the speakers offer. These are not cheap speakers that you'll find in chain electronic stores. If you give them a listen, it will become clear that a lot of thought and care went into their design and construction. You must also remember that it costs big bucks to build just about anything in the US these days, due to high labor costs and other issues.

While you can understand the high costs of the new speakers, in these difficult times, they also put the dream of owning a great pair of speakers on hold for many of us. Until you win a hefty jackpot in your nearest casino, inherit money from a rich relative, or maybe dig up the loot that got away from D.B. Cooper in 1971, you have other options.

Many folks, including myself, are buying the Radio Shack 40-215 15" PA speaker. I paid \$100 each, but now they sell for \$80, at least in the San Francisco

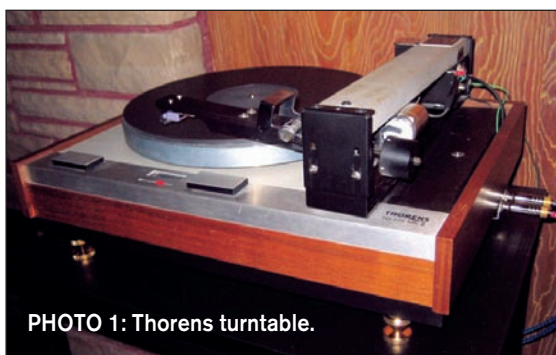


PHOTO 1: Thorens turntable.



PHOTO 2: Phono fix.

"One great sounding amplifier"

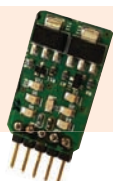
Hypex UcD™ HG-series

What do you look for in a power amplifier? Bet it's the sound. Hypex UcD™ amplifier modules are designed from the ground up for true fidelity. The fully discrete circuit affords total control over every detail of operation. Add to this custom-built parts to make it all happen and a team of committed audiophiles to insure the amplifier delivers on its sonic promises: absolute neutrality and transparency while retaining the full emotional impact of the music. The amplifier operates in Class D, needs virtually no cooling and has the lowest EMI in the industry.

Listen to one of the many great audiophile and professional products already using Hypex UcD™ modules.

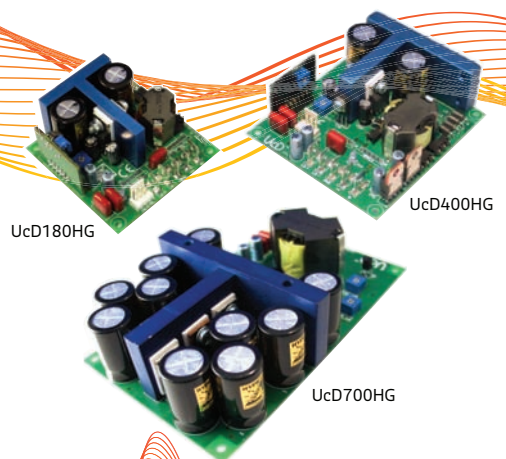
Highlights

- Flat, fully load-independent response
- Low output impedance
- Very low, frequency-independent THD
- Very low noise
- Fully passive loop control
- Consistent top performer in listening trials



Plus! Update any audio circuit with HxR™ modules: ultraquiet, ultrafast discrete voltage regulators!

OEM products available



hypex electronics
www.hypex.nl

Kattegat 8
9723 JP Groningen
The Netherlands
+31 50 526 49 93
sales@hypex.nl

Bay Area. Though many might shy away from their black-carpeted cabinet, these guys really pack a wallop. I find the mids and highs very impressive as well. Classical music and jazz listeners might find problems, but rockers and rappers will love 'em. Those interested would do well to act quickly, because some stores have taken them off display—which could mean they could soon, if not already, be discontinued.

If you miss out on the Radio Shacks, you can check out your local used hi-fi retailer(s), which you can find in the Yellow Pages. The 2008 *World Tube Directory* (available from *aX*) lists a number of such stores.

Thrift stores occasionally have nice speakers, though you might need to make repeated trips. The better known chain thrift stores receive their merchandise from an area distributor. Because of this, you will find very few electronic items, if any. Independent thrift stores, however, might have a lot of used audio gear—and many speakers. A good pair might cost from \$20 to \$100. Before you buy them, remove the grille and check for punctures and rotted or missing foam surround.

I will simply replace damaged or blown speakers or grilles, and repair damaged cabinets. If you replace a speaker in one enclosure, you would do well to also replace the same speaker in the other enclosure, for consistency in frequency response, even if the other speaker is good. Put the good speaker in a plastic bag (to protect it from mice and insects) and store it in a cardboard box for future use. Past issues of *aX* have some great articles on speaker upgrades and repairs that might prove helpful. Old issues of *Speaker Builder* will also prove helpful as well.

Good buys on speakers show up in your local newspaper's classified ads, but be careful, because many stolen items appear. If you think you're paying too little, then you might be buying "hot" speakers. Never buy speakers with missing serial numbers, especially from a stranger. It's better to buy from a store, which is what I do. Happy hunting!

Neal A. Haight
Castro Valley, Calif.

HEAR, THERE AND EVERYWHERE

I received an e-mail from Ed Dell right after I'd written to him about the English DIY company debacle. It seems that a British "watchdog" group lambasted them for saying that cables could sound different from each other. The funny part of this is that the group didn't lambaste the big cable companies, they picked on a small DIY cable company that advertised how to copy (fill in the blank brand) expensive cables. It seemed odd that the group wouldn't attack the real cable companies, only a small DIY company, and that an *audioXpress* reader, who should have known better, being a DIYer himself, was agreeing with the watchdog group (see July and Nov. issues).

So, Ed Dell asked if he could print my letter, and not really wanting to get involved in this heated debate, I basically said no. But after receiving the latest issue of *audioXpress*, I found another nasty letter to the editor from another DIYer who can't hear any difference in anything. That's like singling out the Triumph Motorcycle Company for not

putting "you should wear a helmet" in their advertising, and not even mentioning that the giant motorcycle manufacturers (Kawasaki, Suzuki, Yamaha, and Honda—the big four) also failed to mention wearing a helmet in their ads, but were not chastised. Then folks starting to write nasty letters to the "motorcycle modifier" magazines, complaining about the terrible sin that Triumph committed.

To make a long story even longer, here is what I have noticed about the sound of different audio components. First, let's take money totally out of the equation. That seems to be what makes people the angriest. Have you ever heard the old saying, "God must not care about money, after all, look at the people he gives it to."

I have an ancient Heathkit preamplifier. I've had it so long and I've stripped it down so much that I can't even recall the model number. It was burnt orange with chrome accessories, much like a 1950s car dashboard. I have never modernized the design of this in any way.

I've stripped down the preamp by re-

1nV Low Noise Dual JFET

Low Noise <1nV
Monolithic Dual
Tighter Idss Matching
Narrow Idss Grades
Low Capacitance: 20pf
Functional Replacement for 2SK389

www.linearsystems.com 800-359-4023

LSK 389 Series

LINEAR SYSTEMS

Noise - E_n (nv/Hz)

Frequency

10Hz 100Hz 1kHz 10kHz 100kHz

1mA 2mA 3mA

Time-Saving easy-to-use Solutions!

LCD Scope Bargains



2-ch 60/100MHz 1GS/s
1Msample memory high-end
DSOs set a totally new
price/performance level.

USB, 2K wfm/sec, One-touch auto setup.

DS1000B Series \$595 / \$795

NEW!

Bargain LCD Scopes



Owon - Low-cost 25 or 60MHz
color LCD 2-channel benchtop
scopes **OR** 20MHz handheld
scope/meter. USB interface for printing
waveforms. Includes scope probes!
Battery versions available!

PDS5022S/PDS6062T \$325 / \$599

HDS1022MN/HDS2062 \$593 / \$699



DSP Filters



Easy-use real-time DSP-
based filter for audio
bandwidth signals.
Design complex filters in
seconds without any DSP knowledge!

Signal Wizard

\$699

Mixed-Signal Scopes



100 MHz Scope, Spectrum/Logic
Analyzer sweepgen. 4MSample
storage! Easy A-B, math & filters!
2 ch x 10/12/14 bit; 8 logic inputs.

CS328A-4 (4MS Buffer)

\$1259

CS328A-8 (8MS Buffer)

\$1474

CS700A (signal generator)

\$299

RF - Tight Testing



RF Testing - Economical benchtop
RF test enclosure for troubleshooting,
tuning, testing electronic devices in
an RF-free environment. 8"H x
17"W x 10 1/2"D inside. Built-in illumination
(RF-filtered supply).

STE3000B

from \$1295

EMC Spectrum Analyzer + PC



Handheld PalmPC - based 2.7GHz
Spectrum Analyzer. Continuous/
single/peak-hold/avg sweeps -
unlimited storage for wfms, set-ups,
etc. Built-in Wi-Fi/Bluetooth/IR. Email, notes, etc.

PSA2701T

\$1990

EMC Spectrum Analyzer



EMC RF & EMF Spectrum -
Analyzer 1Hz to 7GHz for
measuring transmissions from
radar, radio/tv towers, WLAN, Wi-Fi,
WiMAX, Bluetooth, microwave ovens, etc.

from \$299 / \$1599

Saelig
unique electronics
888-75SAELIG info@saelig.com

moving the tone control circuits and tubes; I've removed the big rat's nest of selector and installed a two-position selector from my junk drawer (i.e., phono/aux). I've gotten rid of the stereo/mono reverse rat's nest. So, right now, it's a tube rectified tube chassis with a line stage and quite good MM phono stage and the original volume control. The tubes are Mullards, from the 50s. They've never gone bad—I've never needed to change them.

I also have a late model, solid-state preamplifier that cost quite a bit, despite the fact that I got a good deal on it. If you remove the top, it's laced with expensive capacitors, diodes, resistors, and so on, and a very expensive volume control. Without mentioning names or prices, this preamp has received warm reviews from most all the audio magazines.

In my listening room, I have both preamps set up so that I can easily switch between the two by changing the patchcord. Everyone who has ever entered my listening room has taken the following listening test. At the exact same volume, set by a sound pressure gauge, I switch between the preamps, playing various kinds of music. The results are simple, non-mathematical, and resounding: every single person who has ever taken this test has picked the Heath preamp. I am talking about at least 30 people over the years. They all said basically the same thing. The audiophiles used phrases such as "soundstage was better," "warmth," and "bloom." The non-audiophiles also picked the Heathkit—they said it just sounded "way better."

When my family and I listen to solid-state, after an hour or two, we usually stop to do something else. But when I hook up the stereo with the tube-regulated power supply Heath preamp into two tube-regulated power amps, we'll start listening to music on Saturday morning during breakfast and will be hard-pressed Saturday night at 2am to turn off the stereo and go to bed. I don't think you can measure that! If you can measure it, and there's something wrong with the tube measurements, I'll take it anyway. Like the song says, "if loving you is wrong, I don't want to be right."

Clayton Mitchum

BUFFER USE

I have a question for Darcy Staggs about his article, "Inductive RIAA Compensation," Feb. 2003, p. 40. Why do you need a buffer after the OPA627? My experience is that the 627 can drive a fairly difficult load. If you do need the buffer what would you recommend?

Kit Fung

fung1580@rogers.com

Darcy Staggs responds:

Thank you for your interest in inductive RIAA compensation¹. My version is taken from the preamp article by Michael Danbury, who also assisted in its adaptation to my phono stages.

At the time I performed the changeover from capacitors to inductors, I was using a highly modified Hafler DH-110. It had an added op amp phono stage using the Texas Instruments TL-070, which sounded better with a simple buffer (designed by Mike). I used the same buffers on the dual op amps in my Magnavox CD-472, which improved the sound. The phono stage buffers remained in place when the OPA-627 was swapped in, so I showed a buffer in the article, partly for generality.

Now I am listening to Preamp X² with another op amp in the phono stage, still using the inductive RIAA solution, but without any buffer. Newer op amps have been tested in Preamp X and all seem to drive the volume and balance control, and so on, with no buffer needed, but then again every preamp will be different and some may in fact benefit from a buffered phono stage.

1. *Audio Amateur*, 3/96, p. 8.

2. *audioXpress*, 4/07, p. 46.

HOW CDS WORK

I am writing this prompted partly by Edward T Dell Jr.'s "review" of Mystery Cream in the Sept. 2008 issue, and partly by my own annoyance at the misinformation that persists in this area—and the way it never seems to get corrected.

Audio CDs contain numbers (44,100—16 bit numbers per channel per second). Depending on which type of CD, these numbers are recorded in a series of dots burned into the surface of a layer of dye using a laser (CD-R), or as bumps or pits—depending on which way you look at it—on the surface of a

layer of metallized plastic (pressed commercial CDs). In both cases, they are read by a laser, which is bounced off the data surface and, with the aid of some neat optics, reads the pits or dots as bright and dark spots in the reflected beam. The surface which the laser is reading is inside the disk, and is covered by a layer of clear plastic to protect it—the laser is focused through that clear cover onto the data layer.

(I'm skipping a lot of stuff about how the beam follows the tracks...)

The way virtually all players work is that the data is held in a buffer, which is a queue where the numbers are stored. The amount of data in this buffer is controlled by a servo mechanism such that the buffer is never allowed to run empty. When the amount of data in the buffer becomes too low, the mechanism reads more data off the disk. Numbers are read *out* of the buffer and fed to the digital-to-analog conversion circuitry (D-to-A converter) under the control of a crystal controlled clock.

Unlike a turntable, the speed at which the disk spins is *completely unimportant* as long as the buffer isn't allowed to run empty. In fact, most mechanisms read the data in short bursts, pausing in between, and do so at different speeds on different portions of the disk. It doesn't matter whether the disk vibrates, bounces, or even stops, as long as the player mechanism can manage to follow the track and deliver enough numbers to keep the buffer supplied. Many portable players are able to find the proper track again, even after being bounced out of it entirely, before the buffer runs empty—and continue to play uninterrupted.

The numbers coming out of the buffer, under control of the clock, are fed to the D-to-A converter. The *only* thing that determines the jitter associated with those numbers at that point is that clock. The speed of the disk's spin, or how smooth it is, means *nothing*. Neither do things such as the disk vibrating or edge reflections, or resonances, and so on. (In theory it would be possible that a clock was somehow influenced by what the rest of the circuitry was doing—in practice the jitter introduced by this clock is always determined simply by how well the clock itself is designed.)

Jitter is important because at this point

it will cause most D-to-A converters to produce distortion (many of the better separate ones have their own ways of preventing this problem). All of this assumes that the disk mechanism is indeed able to read correct numbers—but what if the numbers aren't all correct?

Audio CDs contain basically three error correction mechanisms. When the numbers are recorded, extra information is added in case they become damaged. This extra information, and the data itself, is "spread" in such a way as to minimize the chance that surface damage will cause enough data to be lost that it cannot be repaired. Before the numbers leave the final buffer to head off to the D-to-A converter, they are processed digitally to verify that they are correct and to repair any that are not.

The first two error correction mechanisms are absolute. They can and will detect and repair *any* error perfectly, ranging from a single digit to a gap 2.5mm wide in the disk. (This is assuming that the drive mechanism can follow the track—some fail to maintain tracking before this point is reached.) Any error repaired at

this stage *no longer exists*—you can't possibly hear it because the numbers have been returned to what they should be.

The final correction mechanism uses "interpolation," which is a last ditch attempt to correct any gaps that are too big to be properly corrected by the first two levels, and is accomplished by filling them in with a "good guess" of what belongs there. Errors of this level often make "ticks" and most certainly *will* affect the sound of the disk—especially if there are a lot of them—because the original numbers have been lost and cannot be replaced correctly.

To summarize so far, anything that happens up to this point is totally *meaningless* as long as the buffer remains full, and as long as no errors occur that are beyond the ability of the two digital error correction levels to repair. Unless something *fails*, the numbers coming from a \$15 Walkman and those coming from a \$25k super titanium gonzo CD deck playing a good disk will be *the same* at this point...and *being the same numbers they will sound the same*.

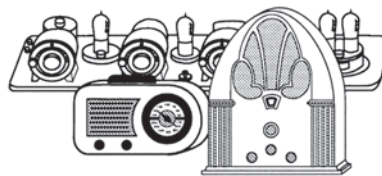
(I will add a qualification here: I have

FREE SAMPLE

IF YOU BUY,
SELL, OR COLLECT

OLD RADIOS, YOU NEED...

ANTIQUE RADIO CLASSIFIED



Antique Radio's Largest Monthly Magazine
68 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: \$24 for 6-month trial.
\$45 for 1 year (\$60 for 1st Class Mail).**

Call or write for foreign rates.

**The Collector's Guide to Antique Radios, 7th Edition by John
Slusser & Radio Daze: 10,000+ prices, 1,200 color photos – \$24.95**
Payment required with order. Free shipping! In Mass. add 5% tax.



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

Toll free: (866) 371-0512 — Fax: (978) 371-7129



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

Musical truth & beyond



Using the finest components we produce the best sounding conventional and hybrid planar speakers. We also specialized in Pro Audio speakers.

www.devineaudio.com
(905)794 8987

heard claims that some cheap Walkman-type players actually fail to buffer the full 16-bit numbers that compose the audio—and so do *not* deliver the correct numbers. I've never seen one like that but, if true, this is limited to a few *very* low-end portable players—which probably don't have digital outputs anyway.)

The quality of the clock used to send the numbers out to the D-to-A converter may matter, and the cabling, if the two units are separate, may introduce jitter at this point, which could also matter. Certain high-end D-to-A converters are immune to this jitter as well, but some are not. Separate boxes that remove jitter at this point also exist.

So, it sounds as though I'm saying that "magical mystery cream" and its brethren couldn't possibly work, right? Not exactly.

Those two levels of digital error correction can repair a *single damage* up to 2.5mm across, but most beat-up CDs have a bunch of small scratches and not one big one. Due to the way the data is spread, enough small scratches—especially if they happen to fall in the wrong spots relative to each other—can cause

damage sufficient to make the digital error correction unable to totally repair it. In that case, we are stuck with level 3 repair (interpolation), which can sometimes be heard—and can sound quite bad. Theoretically, a very badly vibrating disk, or a very badly designed mechanism, could also cause the drive to return so many bad numbers that they are beyond perfect digital correction.

If that miracle cream is able to fill in some of those scratches enough that the laser can again see through them clearly enough to read more numbers correctly, or if that disk clamp can prevent the disk from vibrating, and so allow that poorly designed mechanism to read a few more numbers accurately, it could make the difference between a perfect play and a less-than-perfect play—but only *if* those conditions exist.

Therefore, any claim that a product will somehow "enhance" the way an undamaged disk sounds when played on a good player is a complete impossibility. What is possible is that some product may enable a borderline disk to play perfectly, or enable a borderline player to play a few more disks perfectly. It may

State of the art engineering
Extreme reliability
Joyful sound

auricap
High Resolution
Made in U.S.A.

"Auricaps are precision-wound in the US, and are considered by many to be the finest capacitors available"
Stereophile - June '06 - Peter Breuninger

auraTeflon
Ultra High Resolution
Made in U.S.A.
022uF ±5% 600V
H103653-1000

"simply the highest resolution capacitor ever made"

audience
OEM & dealer inquiries invited.
Call (800) 565-4390
www.audience-av.com

CONTRIBUTORS

Bill Fitzmaurice ("The XF210 Electric Guitar Cab," p. 8) has been a professional musician since 1966 and has been constructing instruments, amplifiers, and speakers for just as long. Vice president of DeltaSounds Loudspeakers Inc., Fitzmaurice is the author of *Speaker Builder's Loudspeakers for Musicians* and over 30 magazine articles dealing with speakers and electric instruments, as well as the action-adventure novel *Operation: Sergeant York*. Bill and his wife of over 30 years reside in Laconia, N.H.

Charles King ("A Really Simple PAS Modification," p. 17) resides in Oneonta, NY.

Earl Geddes ("How Horns Work Revisited," p. 18) runs GedLee LLC with his wife Lidia Lee. He has authored several books, and was recently interviewed in *Voice Coil* (Oct. '08).

Ed Simon ("2400W of Clean AC Power, Pt. 4," p. 24) received his B.S.E.E. at Carnegie-Mellon University. He has installed over 500 sound systems at venues including Jacob's Field, Cleveland, Ohio; MCI Center, Washington D.C.; Museum of Modern Art Restaurants, New York; The Coliseum, Nashville, Tenn.; The Forum, Los Angeles; Fisher Cats Stadium, Manchester, N.H.

Gary Galo (Product Review: Tascam CD-RW900SL CD Recorder, p. 28) is Audio Engineer at The Crane School of Music, SUNY Potsdam, where he also teaches courses in music literature. A contributor to AAC since 1982, he has authored over 230 articles and reviews on audio technology, music, and recordings. He has been the Sound Recording Reviews Editor of the *ARSC Journal* (Association for Recorded Sound Collections) since 1995, was co-chair of the ARSC Technical Committee from 1996 to 2004, and has given numerous presentations at ARSC conferences (www.arsc-audio.org). Mr. Galo is also a frequent book reviewer for *Notes: Quarterly Journal of the Music Library Association*, has written for the *Newsletter of the Wilhelm Furtwängler Society of America*, and is the author of the "Loudspeaker" entry in *The Encyclopedia of Recorded Sound in the United States*, 1st edition.

Chuck Hansen (Tascam CD-RW900SL—Measurements, p.33) is an electrical engineer and holds five patents in his field of engineering. He began building vacuum-tube audio equipment in college. He plays jazz guitar and enjoys modifying guitar amplifiers and effects to reduce noise and distortion, as well as building and restoring audio test equipment. He enjoys sailing and has over 150 magazine articles to his credit.

John Shand ("Jazz Track," p. 46) is a CD reviewer for *Australian HiFi and Home Theatre Technology*.

even enable a completely trashed disk to play and not sound too bad—which might be worth it. As such, any legitimate claims should be based on that possibility, and any tests should be based on those claims.

It is quite simple with a computer to “rip” a CD—that is, to extract the numbers exactly as they appear on the disk. There are databases available on the Internet which can be used to verify that the numbers read are correct, and disks can be easily compared.

Unfortunately for these products, if the numbers are correct to begin with, then the disk is “a perfect read” and there is nothing that can be done to improve it—by any tweak product or super super drive (in fact, any change would mean that errors were added). If, for example, you rip a disk, then treat it with “marvelous wonder cream,” and again rip it—and the numbers are the same—then the cream didn’t change the way it sounds, *period*.

(If the disk had errors, they were entirely removed by the digital error correction in both instances, and it will sound the same. It is possible that the cream could remove some errors, which might make certain drives more likely to be able to get a “better read” on a damaged disk—but it cannot help an undamaged disk. There are special pieces of test equipment which can measure the errors before they’re corrected, which could be used to perform this type of test—but most drives don’t report on corrected errors.)

If you rip a disk, and the AccurateRip database says it was perfect, and then you treat it, and it’s different when you rip it the second time, then the product changed it—which means that the product introduced errors.

Incidentally, computer disks, unlike audio disks, lack that last “interpolation” level of correction (because data that is “almost right” is still no good). The fact that Mystery Cream enabled the author’s computer disk to read after the treatment means that it *did* repair some of the surface damage (it either polished out the scratches or filled them in with something optically similar to the plastic of the CD/DVD)—at least enough to allow the drive to read the disk correctly afterwards.

This means that the product is actually useful for repairing damaged disks, but their claims are bogus—their product probably will make damaged disks sound better (or even perfect), but cannot possibly improve the sound of an undamaged or only slightly damaged one. In fact, it sounds useful for computer disks—but, in that market, they’re competing against several relatively cheap alternatives. (I suspect that their marketing department has figured out that very few people will buy something expensive to treat the occasional damaged disk, but lots of people will buy something that supposedly makes all their disks sound better.)

For anyone interested in playing around with this stuff, the “best” ripping program is *free*—it’s called EAC (ExactAudioCopy), and can be downloaded from www.exactaudiocopy.de. The EAC program is completely trustworthy and contains no adware, but you need to sort of dig the download link out of the other junk on the site lately (you’ll be wanting EAC_0.99pb4.EXE or something like that).

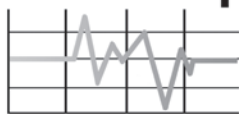
A nicer—but not free—ripping program is called dBPowerAmp (there is always a current link to their site from the AccurateRip site).

EAC and dBPowerAmp link up with AccurateRIP (you can follow the info on the EAC site to AccurateRip for the latest info and a better explanation). AccurateRip does two things. First, it allows you to “calibrate your CD drive.” This has to do with a certain timing “error” inherent in the way that CD drives read audio discs which makes the first few bytes they read invalid—AccurateRip asks you to read a known disk on your drive and calculates and verifies this correction number for your drive. Second, once your drive is calibrated, every time you rip a disk AccurateRip compares a checksum of your rip against a huge database, and informs you whether you have ripped a perfect copy—which is *very* handy.

I hope I’ve clarified things a bit.

Keith Levkoff
kLevkoff@panix.com
aX

Test Equipment Depot



800.996.3837

The source for premium electronic testing equipment

New & Pre-Owned

- Oscilloscopes
- Power Supplies
- Spectrum Analyzers
- Signal Generators
- Digital Multimeters
- Network Analyzers
- Function Generators
- Impedance Analyzers
- Frequency Counters
- Audio Analyzers



Call now to speak to one of our knowledgeable salespeople or browse our extensive online catalog

www.testequipmentdepot.com

• Sales • Repair & Calibration • Rental • Leases • Buy Surplus