THE MAGIC OF DSP
SOUND SHAPING
BY THE NUMBERS

THE EQUIPMENT AUTHORITY
DECEMBER 1996

TESTED

DVD-READY THX RECEIVER FROM TECHNICS
LEXICON POWERS UP FOR HOME THEATER

ALSO TESTED

ATLANTIC TECHNOLOGY and AR SPEAKERS, MESA AMP, and MORE

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Inside Definitive's Revolutionary BP2000

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Definitive's New BP2000 Brings You the Ultimate Listening Experience!

"The first speaker I have been able to audition in my own familiar surroundings that has given me that special thrill that usually costs ten or more times its price to obtain."

- Julian Hirsch, Stereo Review

"Frankly, if circumstances allowed, I would choose these speakers for myself."
- Julian Hirsch, Stereo Review

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Now, with the BP2000, Definitive literally reinvents the loudspeaker. We have combined a six-driver dual D'Appolito bipolar array with a built-in (side-firing) 300-watt powered 15" subwoofer. (Yes, a complete powered subwoofer built into each speaker!) The result is extraordinary sonic performance beyond anything you've ever heard. Both music and movies are reproduced with unequalled purity, transparency and lifelike realism. And the astounding high resolution imaging and awesome bass impact totally envelop you in sonic ecstasy. They are an amazing achievement!

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In addition to being an audiophile's dream, the BP2000s are also the main speakers in Definitive's AC-3 ready Ultimate Home Theater System. This astonishing system is absolutely the finest sounding available. It recreates a "you are there" spatial reality that actually puts you into the soundspace of the original cinematic action.

The complete system combines the BP2000s ($1,499 ea.) with a C/L/R 2000 center ($650 ea.) and BPX bipolar surrounds (from $399 ea.). Of course, dual 15" powered subwoofers are already built into the sleek BP2000 towers. Truly the ultimate listening experience! Visit your Definitive dealer today.

Definitive Technology

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See our dealer list on page 126
You Need More Than Just Cable.

Any cable can transmit electrical signals from one component to another, or from an amplifier to the speakers. But, transmitting music takes more than just cable. The shapes of musical waveforms are incredibly complex and critical signal timings are measured in microseconds. Ordinary interconnecting cables or speaker cables cannot faithfully preserve these complex musical relationships across the full musical spectrum.

That's why MIT's founder literally invented high-performance interconnects and speaker cables. MIT holds seven basic patents in high-performance cable and interface design. These fundamental technology patents mean that only MIT can bring you interconnects and speaker cables scientifically designed to eliminate the non-linearities and distortions caused by other cables, no matter whether the others cost tens of dollars or thousands.

If you choose your system components with care, listening for the subtleties of music that distinguish great components, then you need MITermator™ interconnects and speaker cables. The hard science behind MITermators reveals the full musical potential of your high fidelity stereo system. Until you use MITermators, you'll never know how good your system can sound.

Patented MIT Terminator Network

MITermator™ interconnects and speaker cables are the heart of MIT's sonic superiority. These unique networks enable MITermator™ interconnects and speaker cables to deliver better bass, clearer midrange and smoother treble, and to enhance the image, focus and soundstaging of every recording you listen to.

MITermator™ interconnects and speaker cables can transmit all of the sound quality that your program sources and system components are able to deliver.

New RCA connector

MITermator™ interconnects now have new high-performance RCA-type connectors. These machined-gold-plated connectors feature bifurcated center-contact pins and multi-contact shield connections for unbreakable signal integrity. They properly press the cable for highly efficient energy transfer and outstanding sound quality.

With MITermator Interfaces: starting at just $39.95 interconnect and $79.95 speaker (MITermator 5, not shown), MIT performance is truly affordable for any system.

More Than Just Cable!™
Why MITTermimators sound better

Superior Final Energy Component

MIT quantifies how well cables maintain correct phase relationships between audio signals' voltages and currents as Efficiency. When cables maintain correct phase relationships, all of the signals' energy travels to the next component or to the speaker with 100% efficiency. Ordinary cables' non-linearities make them much less efficient at low frequencies than at high frequencies, as the plot shows for "zip cord" and for an ordinary high-end speaker cable. The sonic results are noise, distortion, loss of image quality, and excessive "bright" treble sound.

As you can see from the plot, MIT's patented Terminator Networks give MIT Terminator cables a huge advantage over ordinary cables, raising low-frequency efficiency and "flattening" the overall curve. This means that MIT Terminator cables deliver far more accurate tonality and imaging, with lower noise than ordinary cables can. Although the plot shows speaker cables, the results also apply to interconnects.

Superior Imaging

Three-dimensional graphics of a typical listening room represent the sonic image quality produced by three different speaker cables. The blue, red and yellow areas indicate the image size, while the musical notes represent the quality of image focus.

The blue area produced by ordinary 12-gauge cable is tiny, indicating a small overall image, and the blurry note indicates that the image is unfocused and poorly defined. The result is a constricted, unconvincing lifelike soundstage. The blurry note indicates poor image focus within the larger image area. The result is a larger image that only makes the lack of focus and definition more obvious and disappointing.

The yellow area produced by the MIT Terminator 2 is convincingly large, with its breadth and depth to create a life-like soundstage. The sharp, clear note indicates solid image definition and focus throughout the audio spectrum. The superior Final Energy Component and Efficiency provided by MIT's Terminator technology deliver a natural, tightly focused and solid image that preserves the integrity of the musical performance. Only MIT's patented Terminator technology can achieve this level of performance in your system.

Experience the sonic improvements of MITTermimators in your system!

Most MIT dealers offer a no-risk home trial program. Call 916-883-0394 or Fax 916-888-0783 for the location of your nearest authorized MIT Terminator dealer.

Our components make your components sound their best.
DECEMBER 1996  VOL. 80, NO. 12

THE EQUIPMENT AUTHORITY

Technics A/V Receiver and Lexicon Amplifier

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Cover Photograph: Bill Kouirinis Studio
Cover Equipment: Technics SA-TX50 Home THX A/V receiver and Lexicon 412 four-channel power amp

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Go slow.
It's easy to blow right past this.

Take it easy.

SOUTHERN COMFORT

As you will see in "Letters" this issue, we've received a few responses to Corey Greenberg's, ahem, colorful "Shut the Hell Up, Geeks!" column ("Front Row," September). Ordinarily, there wouldn't be much more to say about the matter, but the recent weirdness between elements of the computer industry and the Federal Communications Commission with respect to HDTV brings me scurrying to Corey's defense.

The specific impetus is John Dvorak's column in the October 22nd issue of PC Magazine, in which he trashes the proposed advanced television standard (that is, HDTV) now before the FCC. You probably didn't realize that the Grand Alliance HDTV system is a technological camel cobbled together in Japan and now foisted on an unsuspecting American public. Why didn't you know that? Because it's complete bunk!

Almost everything Dvorak says about the standard is either flat-out wrong or painfully misleading, starting with the made-in-Japan notion. The big players are Thomson (RCA, ProScan, GE), Zenith, and Philips (Magnavox)—which are the top three TV manufacturers in U.S. market share—and NBC, General Instruments, AT&T, and MIT. Japan effectively dropped out of the race several years ago, when the FCC mandated a digital system. Even the companies in the alliance with overseas parents—Thomson (France), Philips (Holland), and Zenith (recently acquired by LG Electronics of Korea)—have deep American roots and do their development work for this market here. The primary R&D centers for the Grand Alliance advanced television system are the big Philips lab in upstate New York, the David Sarnoff Research Center in New Jersey, and Thomson's research laboratory at its headquarters in Indianapolis.

There isn't space here to get into all of Dvorak's technical misconceptions, but I want to mention briefly two prominent issues he brings up: interlaced versus noninterlaced scanning and aspect ratio. Like some computer companies, Dvorak seems incensed that the standard includes any provision for interlaced scanning and particularly that the highest resolution available is interlace only. But of course, for any given transmission bandwidth, interlacing will always enable higher resolution than progressive scan. That's the whole point of interlacing and the reason it was originally developed for the TV systems in use today—economical use of limited broadcast spectrum. Moreover, it is desirable to have some interlaced formats in the system for compatibility with existing video archives and to facilitate development of practical HDTV cameras with adequate sensitivity. Dvorak has such intense computer-display tunnel vision that he seems to forget that the primary application of the new television system will be broadcast of live-action entertainment programs picked up by cameras, not display of computer-generated text and graphics. And for such applications, the standard does incorporate progressive-scan formats; most of the supported formats are noninterlaced, in fact.

Dvorak also attacks the standard for going with 4:3 and 16:9 aspect ratios, on the grounds that they don't match anything that Hollywood is doing. But 4:3 is the current television aspect ratio and was the ratio used for movies until the advent of widescreen cinematography in the 1950s. The 16:9 size is a very convenient way of moving from 4:3 to a wider aspect ratio, because it is an even-multiple expansion. Also, 16:9 works out to about 1.78:1, which is actually very close to the 1.85:1 aspect ratio most commonly used for modern films. He notes that the American Society of Cinematographers objects to 16:9, but what it has proposed, very late in the game, is 2:1, which at present nobody uses for anything! (The other main film aspect ratio is 2.35:1.) And I would urge you to imagine what a screen twice as wide as it is high would look like in your home, assuming you could get it through the door.

PC is generally a well-edited magazine, and I usually enjoy Dvorak. The problem is that their expertise is in computers, not audio or video. So they wind up getting suckered by a handful of computer hacks with axes to grind. The advanced television system proposed by the Grand Alliance is a very good one, well thought out and flexible enough to accept extension and modification as technology moves forward. If the FCC succumbs to the clamor of the special interests fighting the proposal, the best we can expect is a long delay. More likely, the effort will founder altogether, surrendering the market to the inferior European and Japanese systems already available. That would be a great disservice not only to the American public, but to the world and, even, the computer industry.
Every little bit counts.

Introducing Adcom's GCD-700 CD player.

In our never ending quest for reproducing the fine quality of a live performance, we took our award winning and critically acclaimed GCD-600 and made it a bit, actually four bits, better.

We added the latest Burr Brown 20-bit ladder-type D/A converter – the same one used in our GDA-700 separate Digital-to-Analog converter. The result is a level of sonic performance usually reserved for stand alone D/A converters and C/D transports.

But that's not all we did. To achieve the lowest levels of noise and distortion, our GCD-700's analog section features the same Class A amplifiers we use in our top-of-the-line GFP-565 preamplifier.

The GCD-700 also boasts a superior power supply with two transformers. One for the analog section and one for the digital section, each housed on separate circuit board assemblies to eliminate EMI and RF interference.

By now you're probably asking yourself, "How good does it really sound?" Let your ears be the judge. Visit your Adcom dealer for a demonstration of this remarkable new player. You'll discover that the new GCD-700 sounds exceptional and is sensibly priced. What else would you expect from a component that is every bit pure Adcom?
Proud To Be a Geek
Dear Editor:

I am writing in response to Corey Greenberg's "Front Row" in your September issue, "Shut the Hell Up, Geeks!" I am a computer engineer and work as a programmer. I love computers and high-end audio. I subscribe to three computer magazines and three stereo magazines. I agree that a PC has no business being hooked up to a home theater system, but that's where the agreement ends.

First of all, Greenberg lashes out against the PC market as having "CD-ROMs that won't run, operating systems that won't load properly and then take down important files when they crash, and peripherals that just flat don't work, right out of the box." You mean to tell me that every piece of audio equipment Greenberg has ever encountered worked every time, right out of the box? Well, I recently auditioned two CD changers, the Adcom GCD-700 and the California Audio Labs CL-10. The Adcom worked fine, but the CAL didn't work, right out of the box. Not to mention that CAL originally offered the CL-10 at a list price of $1,495 and a few months later raised the price to $1,795. When I called to ask why the price was raised, CAL said, "We couldn't keep them on the shelves. It was in response to demand." To me, that is like saying, "Gosh, this is such a great product, why don't we raise the price while adding no functionality whatsoever. Those hi-fi geeks won't know the difference anyway—hell, they pay this much for interconnects!"

Second, Greenberg states that the computer industry is decades behind the consumer electronics industry. At least the computer industry challenges itself to make technological advances. The last technological leap the hi-fi industry made was the CD; when was that, around 1985? If the computer industry had 10+ years between technological advances it too might find the time to live up to Greenberg's "much higher level of relative quality across the board." Today's home PC would be the Commodore 64, but dammit, it would have high quality. Instead, as a service to both science and the average consumer, the computer industry acknowledges that technology must advance. Amazingly, the hi-fi industry will not advance technologically. The best music playback sources the hi-fi industry has to offer are CDs and vinyl records. And instead of attempting to overcome the shortcomings of both, you argue about which is better. This would be analogous to dividing the computer industry into two factions: those that prefer "high-quality" Commodore 64s and those that prefer "high-quality" Radio Shack TRS-80s. It is absolutely ludicrous to imagine. While my hi-fi system begs for a decent playback mechanism, you guys have just sat on your asses for years, bickering about jitter and noise floors. Both sides should admit that vinyl and CDs suck and get to building something that doesn't.

Next time, Greenberg should try writing an article with some content, rather than writing a combination of totally unfounded statements and stereotypical slander. I'm disappointed that Audio published such a piece of prejudicial waste. Get off your damn high horse, buddy, cause I'm your worst nightmare: a total and complete overantiques by the time we got the issue out.

But the power specs you cite are neither discrepancies nor impossibilities. When an 8-ohm load is bridged across two channels, each channel sees, effectively, a 4-ohm load. So the bridged power into 8 ohms is most likely to be twice the 4-ohm stereo power—which, for the Accuphase P700, is 500 watts. Also, because the bridged channels are handling the same signal but in opposite polarity, there's often less stress on the power supply; this can increase the bridged power figure slightly, too.

Edward George French
Dallas, Tex.

Interminably Bad Ads
Dear Editor:

Advertising has never been known for its honesty, ads for audio products included. But ads for passive components, such as cables and crossovers, have reached a new low of insulting ludicrousness!

I'm referring to Audio's September issue on page 59. This ad shows an "efficiency" graph, with zip cord (blue curve) exhibiting an efficiency of about 2% at 60 Hz—really, now! Since zip cord is used mainly to conduct 60-Hz AC power, this so-called graph means all of my house wiring wastes 98% of my electricity! So, it logically follows that by rewiring my house with MIT speaker cable ("60% efficient at 60 Hz"), I can reduce my electric bill by a factor of 30 to 1!

For the nonmathematical, the above argument is called *reductio ad absurdum*, with emphasis on the absurd.

In the interest of truth, how about scientific double-blind tests of cables, etc.?

Dennis P. Collin
Gilmanton, N.H.

P.S. Thank you for providing a scientific test of something other than audio gear.
The NAD 218 THX stereo power amplifier is one of the most sophisticated hi-fi components we have ever produced. Yet for all its brilliant features and astonishing levels of performance, it remains true to the NAD "no nonsense" design philosophy.

The very first feature you’ll notice is the weight of the 218 THX, due partly to the heavy construction of the chassis and front panel, designed for rack mounting. Its advanced specification makes the 218 THX ideal for professional studio use. But the increase in weight is largely due to the massive Holmgren toroidal mains transformer.

**Why So Large and Why Holmgren?**
Apart from being the ideal design for large amounts of power, it is easy to handle, the Holmgren offers other advantages:
- A conventional transformer can be affected by AC mains supply because several smaller capacitors have a faster recovery time and have less equivalent series inductance and resistance than a single pair.
- The 218 THX incorporates full balanced XLR inputs, allowing the use of long runs of cable between pre and power stages, without the risk of interference. This thoughtful yet simple feature offers the opportunity to set your system up more flexibly and of course it’s a benefit if you are bridging two 218 THX’s for mono and locating them nearer to your speakers.
- The circuitry includes left and right channel PCB’s, offering lots of benefits. They include less complicated PCB’s meaning extra reliability, more separation of circuits, so like the Holmgren transformer, less interference going out or coming in. All this, plus lower build cost, means more savings again towards the specification of better components.
- Any amp which is overdriven (unlike the 218 THX because it is so powerful) can produce distortion or clipping. The NAD Soft Clipping circuit gently transforms the waveform, rounding off the peaks, preventing “dynamic overload” and heading off damage to your ears and your speakers, without using the sense of musical drama.

**Hard Clipping**

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So what do you get for your not substantial investment at the end of the day?
A thoughtfully designed, utterly reliable, acoustically stunning 2 x 225 watts, bridgeable to a more than you’ll ever need 783 watts mono, with enough headroom to frighten your window frames, which could even change the way you perceive music.

But with all this capability none of it is a fashion statement. The 218 THX is designed, not designed. Every feature of the 218 THX enhances performance and reliability.

That’s why our slogan “pure and simple” is as relevant today for equipment as advanced as the 218 THX as it was when NAD was created more than 20 years ago.
Bryston Integrated Amp
The B-60’s amp and preamp sections can be used separately, thanks to pre-out and main-in jacks. The preamp section has four high-level inputs, one tape loop, and a headphone jack; a motor-driven volume pot and remote volume/muting control are optional.

The preamp section has four high-level inputs, one tape loop, and a headphone jack; a motor-driven volume pot and remote volume/muting control are optional. The amp is rated at 60 watts per channel into 8 ohms (100 watts per channel into 4 ohms) with less than 0.02% THD from 20 Hz to 20 kHz; power bandwidth is 0.5 Hz to 100 kHz, and the damping factor into 8-ohm loads is more than 500 at 20 Hz. All signal circuitry is discrete, and incoming signals are buffered. Each channel has its own power supply with toroidal transformer.

Price: with motorized volume control and remote, $1,795; without, $1,495.
For literature, circle No. 100

VTL Mono Amp
In tetrode mode, the Wotan MB-1250 Signature is rated to deliver 1,250 watts; in triode mode, its rated power is 600 watts. Either way, that takes two dozen 6550 tubes. The power supply is on a separate chassis, designed for stacking with the amp; the two chassis, with stacking frame, weigh 150 pounds. The output transformer is VTL’s new Signature design, with multiple tight layers and coupling for extended frequency response. Rated small-signal frequency response is 7 Hz to 100 kHz, ±0.5 dB; full-power response is rated at 20 Hz to 25 kHz, with less than 1.5% THD. Price: $25,000 per pair.
For literature, circle No. 101

Lamm Industries MonoAmp
Because its output stage uses two high-current, low-impedance 6C33C triode tubes, the mono ML1 can also use an output transformer with a very low turns ratio that reduces leakage inductance. Meters on the chassis make it easier to set and balance response is down 3 dB at 4 Hz and 82 kHz. The power supply can be set to operate on 100, 120, 220, or 240 volts, and the toroidal power transformer is suspended to absorb vibration.

Price: $18,690 per pair.
For literature, circle No. 102

Reflection Audio Preamp
Class-A biasing, a minimal signal path, direct-coupled circuitry, and four power supplies underlie the OM-1’s performance. The manufacturer’s specifications include a 2,500-volt/microsecond slew rate, phase accuracy of ±0.5°, frequency response of ±0.02 dB from 10 Hz to 500 kHz, and a 114-dB S/N ratio. The external power supply provided can also be used as a charger for the optional battery supply. Prices: with MM/MC phono stage, $4,495; without phono, $3,995; battery power supply, $1,495.
For literature, circle No. 104

Audio/December 1996
10
NEW BACARDI SPICE

AS GOOD AS IT GETS.

Nova USA Speaker

The Applause is a two-way speaker with a ported enclosure for the two 7-inch, composite-cone woofers; dual rear chambers lower the resonant frequency of the 1-inch, soft-dome tweeter. The drivers are in a D'Appolito array, to control imaging and room effects, and are fed from a fourth-order Linkwitz-Riley crossover. Rated frequency response is 30 Hz to 25 kHz, ±3 dB, and rated sensitivity is 89 dB; nominal impedance is 4 ohms, and minimum impedance is 3.2 ohms. A black oak veneer is standard, with exotic finishes optional. Each speaker weighs 80 pounds and measures 48 x 9 x 14½ inches. Price: $5,990 per pair.

For literature, circle No.105

Total Media Systems Speaker

Phase integrity was a major goal in the design of the Adiabat 8.5, which uses a "phase-locked" crossover and a carefully sloped front baffle to keep the drivers in correct phase alignment. Its enclosure is said to operate without loss or gain of heat (i.e., adiabatically), eliminating the efficiency penalty of conventional cabinet damping. Rated sensitivity is 91 dB SPL at 1 meter. Price: $3,950 per pair.

For literature, circle No.107

Platinum Audio Speaker

The Studio-2 is a vented 2½-way speaker using a 1-inch, alloy-dome tweeter and two 5-inch woofers with polypropylene cones. Rated frequency range is 35 Hz to 20 kHz, rated sensitivity is 89 dB, and power handling is up to 250 watts. The cabinets are finished in textured black and measure 39½ x 9½ x 13 inches. Price: $1,695 per pair.

For literature, circle No.106

Probe Audio Labs Speaker

The two-way Monad mini-monitor has three drivers: a 6½-inch shielded woofer and a 1-inch silk-dome tweeter in front, plus a ¾-inch dome tweeter in back, to enhance the soundstage. Rated anechoic frequency response is 65 Hz to 20 kHz, ±3 dB; typical room response is 50 Hz to 20 kHz. The 8-ohm speaker's rated sensitivity is 88 dB. Price: $1,945 per pair.

For literature, circle No.108

Yamaha Powered Subwoofer

The two 8-inch drivers in Yamaha's YST-SW150 subwoofer are servo-controlled by circuits in the system's built-in amplifier. The drivers, which have spruce-fiber cones, operate in a vented enclosure. The 120-watt amp turns on automatically when a signal is present and turns off after five minutes of inactivity. Response is claimed down to 20 Hz; the upper limit is 40 to 160 Hz, depending on the setting of a built-in high-cut filter. Price: $399 each.

For literature, circle No.109
From The Wall To Your Ears, We Connect It All.

"...the TIFF-5 was an excellent digital link... The TIFF-5 is a great buy...."
"If you are looking for interconnects in this price range and appearance is important, these cables (H-4) require an audition..."
"Great value, cables and very good dynamic range with... excellent imaging and timing..."
Bryan B.
The A & E News
The Audio Adventure
February 1996

You Paid Good Money For Your System. Why Screw It Up With Lousy Cables?
Get The Best.

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POLICE INCIDENT REPORT: Officers responded to call from concerned citizen regarding shocking sounds and deep bass vibrations emanating from house next door. Further investigation revealed source of sound to be occupant's state-of-the-art Pioneer Advanced HomeTheater System. After questioning, officers learned that Dolby Digital (AC-3) technology provides stunning sound reproduction with 6 independent digital channels. Supercharged audio and video performance.
was traced to Pioneer LaserDisc player. Cinema Wide System projection monitor identified as source of razor-sharp visuals. Officers concluded Pioneer Advanced HomeTheater System equal to or better than movie theater experience. Officers decided to confiscate the system as evidence and place it in precinct break room until further notice. END OF REPORT.
Call 1-800-PIONEER for a dealer near you. Pioneer Advanced HomeTheater. You're surrounded.
Mystery Skip in CD Changer

Q Sometimes, my CD changer works beautifully—but sometimes it does not play at all, or plays only discs 5 and 6, or plays every disc but with lots of static and skipping. This has happened since day one and still happens with a replacement (of the same model) I was given. I have had both units in for service numerous times and been told that nothing was wrong. My only clue is that the changer seems to work fine if I unplug it from my receiver (which is of the same brand), but if I plug the changer back in, the discs start to skip and act up again. I’ve read that radio signals can sometimes interfere with the operation of a sound system, and I am close to a strong station. Is this my problem? And is my problem in the CD changer, my receiver, or both?—Tony Giammatteo, Poughkeepsie, N.Y.

A The fact that the player works fine when not plugged into the receiver tells me that there is some interaction between the two components. Such interaction usually involves ground loops and hum. If hum gets into the changer’s microprocessor, it could confuse its operation and cause erratic performance.

The first thing I’d suggest you try is removing any extra ground connections there may be between the chassis of the player and receiver. Next, if either of these units uses a three-prong (U-ground) line cord, lift its ground connection by plugging it into a three-hole, two-prong adaptor, which should not be grounded to your wall outlet. If both devices have three-wire power cords, try this first with just the player. If that fixes the problem, great! If it does not, then lift both grounds. If the player does not have that kind of wall plug but the receiver does, lift the receiver’s ground.

If, on the other hand, there are no extra ground paths, either direct or via the power line’s ground circuit, try the following: Connect the chassis of the player directly to the chassis of the receiver, using the shortest possible lead. Braid, such as the shielding from a scrap piece of coaxial cable, works best. See if the system works properly. Next, wire the receiver to the best ground you can find. An earth ground is best, but if all you have is a water pipe or radiator, try it and see if this helps matters.

Interference from that local broadcast station could be the problem, too. The interference could enter the player via the cable between the player and the receiver, so try cable with better shielding and use the shortest practical cable run. The interference could also enter the player via its power cord. Try coiling up this cord and tuck the cable close to the chassis of the player. If need be, try power-line filters. Let me know what, if anything, works.

Postscript: Mr. Giammatteo wrote back to tell me that nothing helped. He gave the player to his parents, and it works fine in their home. He bought a different make and model player, and it works fine in his home. Hmmm!

Harshness in Classic System

Q In 1962 I bought a sound system that, even today, sounds very good except for a slight harshness in the treble. (The only thing I’ve changed is the preamp, in order to accommodate CDs; I replaced it with a solid-state preamp.) It’s been suggested that the harshness comes from my horn tweeters and that I might cure it by applying a damping material, such as modeling clay, to the interior of each horn, near its driver. Will this kill any resonances that are causing the harshness?—Name withheld

A I wonder whether the harshness really is taking place within the tweeter. But you could try the clay; it’s easy to remove if it harms the tweeter’s response, output level, or coverage. You might also find the treble less objectionable if you reduced each tweeter’s output by putting an L-pad in series with the tweeter.

Unfortunately, there was probably no need to replace your preamp. Just because it had no input labeled “CD” doesn’t mean you couldn’t have gotten very satisfactory performance by plugging a CD player into some other high-level input. Although CD players have fairly high output voltages, many tube preamps had their volume controls right at the input, where they’d prevent overload of the early stages. (Those preamps whose volume controls were placed after the input circuits would sometimes overload on really high signal voltages, just as solid-state preamps do if they’re built that way. But if you did have that problem, you could have gotten a CD player with an output level control.)

Even if your original preamp simply lacked enough inputs, you could have kept using it. All you’d have needed was a switcher that would let your CD player share an input with another high-level source.

Tonearm Grounding Problem

Q When listening to records a few weeks ago, I noticed a hum that I hadn’t heard before. After a few tests, I thought the cartridge was at fault, so I replaced it; this reduced the hum but did not eliminate it. Someone suggested that I ground the tonearm to my preamp. I ran a wire from the tonearm’s vertical height-adjustment screw to the preamp’s ground, and the hum disappeared. My tonearm has worked fine for years. What could have happened to it to cause this need for grounding?—Carl S. Lau, via e-mail

A It is not unreasonable for your tonearm to have developed the hum problem, given its age. The tonearm is grounded to its base (which is grounded to the preamp through the turntable base and phono cable shield) via the electrical contact within the bearings. Over time, non-conductive oxides build up in the bearings, effectively lifting the ground between the tonearm proper and the preamp.

You could try squiriting some WD40 into the bearings, but I’m not certain this will correct the problem. I once solved it by running a fine, flexible wire between the tonearm and its mounting base. I made certain there was sufficient slack to permit the arm to move freely over its arc of travel. I didn’t

If you have a problem or question about audio, write to Mr. Joseph Giovanelli at AUDIO Magazine, 1633 Broadway, New York, N.Y. 10019, or via e-mail at JOEGIO@delphi.com. All letters are answered. In the event that your letter is chosen by Mr. Giovanelli to appear in Audioclinic, please indicate if your name or address should be withheld. Please enclose a stamped, self-addressed envelope.

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have to run the ground directly to the preamp because the turntable base was already grounded there.

**Power Amplifiers and Cable Runs**

**Q** My loudspeakers are connected to power amplifiers by 30-foot runs of 16-gauge cable. Should I be using heavier cable? If I locate the power amplifiers closer to the loudspeakers, what benefits will I get? And what problems will occur if I therefore lengthen the line-level interconnects feeding my preamp?—Robert Mallory, Sedalia, Mo.

**A** If the impedance of the loudspeakers is 8 ohms or more, you probably can use your present cable without sonic degradation. Nevertheless, I'd suggest trying heavier cable, at least AWG #14; you might get a slight audible improvement in response. For 4-ohm speakers, I'd try 12-gauge wire.

Long cable runs tend to be less trouble-prone at speaker level than at line level. If you do move the amps closer to the speakers and farther from your preamp, beware of treble losses caused by interconnect-cable capacitance and of noise and hum pick-up. I've used line-level cables more than 40 feet long successfully but only because my preamp's output impedance is a very low 100 ohms. If your preamp's output impedance isn't reasonably low or you do lose highs or pick up noise, try using interconnect cables whose capacitance per foot is lower than that of your present cables.

**Dead Backup Battery**

**Q** My surround processor uses a lithium backup battery to preserve its programmable memory settings when it is not in use. Recently, the processor's display started flashing a signal that this battery is dying. I rarely use the memory function and can reprogram in seconds if I need to change factory settings. Will it do any harm to ignore these warnings?—David R. Brown, New Cumberland, Pa.

**A** I'd replace the battery as soon as possible. Sometimes these batteries actually preserve more than just the programmed memories, in which case your processor might stop working properly if the battery goes dead. Also, dead batteries can leak if they are left in place too long, and the chemicals that leak out of them might damage your processor.
CHANGING CHASSIS

One of our editors says circuitry is "in" a chassis. I say "on" a chassis. It's a generation gap, of sorts. "On" the chassis is a tube-era term. Early gear had tube sockets mounted on the chassis' top surface. But most other components were wired directly to solder lugs on the sockets' bottoms, so some components were in the chassis, even then. The first audio gear I ever bought (some of it already antiquated) was built that way. But the first equipment I bought new had its components and tube sockets mounted to printed circuit boards. Those boards were originally set into the chassis surface but soon were mounted underneath, with the tubes poking through chassis holes.

As solid-state took hold, engineers started rethinking chassis design. Some have even eliminated the chassis. In Rotel's RMB 100 amp, for example, the circuitry is mostly sandwiched between two metal plates that sit an inch or two from the heat sink at one end and the rear panel at the other. Instead of a chassis, this amp has a frame—four corner rails—to hold the pieces in position.

In the Air Kluge radios built a few years back by Philadelphia artist Jason Homer, the chassis disappeared entirely. The components of his deconstructed radios seemed to float in space, joined only by their wiring. With no circuit boards, Homer's radios harked back, in a way, to the earliest electronic gear I played with—except that weight, heat, and higher voltages would seem to rule out building tube gear this way.

BULLETINS

Tandberg and Thorens, two famed European audio companies, have returned to the U.S. market after an absence of several years. Tandberg, originally known mostly for its tape decks, is also sending electronics and CD players here; the importer is Jason Scott Distributing, at 800/359-9154. Thorens, which progressed from making music boxes in the 19th century to being a power in 20th-century turntables, is bringing in turntables and electronics; you can reach the company at 718/847-4289.

The 100th laserdisc with Dolby Digital (AC-3) sound has been released: Twister, from Warner Home Video.
Discover the incredible sound of patent #4,076,098.

Announcing the new B&W 600 Series.

B&W was the first company to pioneer the use of Kevlar® cones in loudspeakers.

And we've applied our patented technology to some of the world's most respected monitors—the legendary B&W Matrix 801, the celebrated Silver Signature, and our highly acclaimed THX Home Cinema System.

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The difference is easy to see. And even easier to hear.
FILE AND FORGET?

My record-filing system goes back to the days when all I had were LPs. Because the majority of my stuff is classical, I file by composer most of the time. If there’s more than one composer on a disc, I file by instrument, country of origin, or genre (e.g., “Chamber”). Jazz and pop, I file by group or lead artist.

That still leaves room for ambiguity. Should a disc featuring Prokofiev and Shostakovich string quartets go under “Chamber” or “Russian”? (And if I vastly prefer one work to the other, I may file the album under that work’s composer.) At worst, it narrows down my search for a given work to three or four places. If I’m searching for a particular artist, however, it’s harder: I have several discs by Ivan Moravec, for example, under “Piano” but others under “Beethoven,” “Chopin,” and “French.”

I’d love to have an inventory on my computer, so I could find short works instantly, avoid buying duplicates of stuff I’ve forgotten I have, and find what works I have by any given artist. The daunting task is entering all that stuff—a problem I ran into when I got my first computer, back when all I had were LPs and cassettes.

For LPs (of which I still have many), only manual entry will do. But I think some of my cassettes have bar codes, and I know some of my CDs do. What’s more, a signature code is recorded as data on every CD, so there ought to be a way to automate that part of a filing system. I can envision a gadget with an optical bar-code reader plus a slot that accepts a CD, reads its code, and spits it out again. That’s the easy part.

The hard part would be making sense of the numbers that the system retrieved. I’d also need software to compare these codes to a database and convert them to disc titles and listings of artists, works, and composers. It would have to be a hefty database, too: I have CDs that have been out of print for more than a decade.

Such a database would be huge and would probably have to be updated daily, as new CDs come out. So it would make more sense to have it accessible via the Internet than to have it all on my machine. I could just scan a batch of CDs, transmit their numbers, download the information, and then stuff it into my own, smaller, database.

It would be great if a tiny fraction of a DVD’s huge capacity carried complete information on the disc’s title and contents. (That would include cast and major credits on movie discs, while music discs would have composers, works, and artists.) Most DVD buyers will, I suspect, already have computers, so a connector and software to transfer that data should be easy to make—or not needed, if those computers had DVD-ROM players built in. I don’t know if the folks developing DVD have thought of this—and it’s probably too late, if they have not. But wouldn’t it be nice? (See pop/rock/jazz shelf, under “Beach Boys”.)

YES, WE HAVE NO BANANAS

The IEC65 directive on safety requirements for electronic gear sold in Europe and some Asian countries (“Mondo Audio,” January) is already affecting American audio equipment, even though the directive is not binding here. I’ve just seen an example: the touch-proof binding posts now being used by Amplifier Technologies, Inc. (ATI) on its amplifiers. These terminals look like the familiar five-way binding posts, but they’re actually just three-way. No metal shaft is exposed when you unscrew the terminal lugs, so you cannot use spade lugs or wrap the wire around the post. Instead, unscrewing each lug opens a hole in a plastic shroud into which you insert the wire and then clamp it in place by screwing the lug down again. The hole will accept wire up to about AWG #10 or pin plugs up to 4 millimeters in diameter.

There are still holes in the top of each post for banana plugs, but the banana-jack contacts are recessed about ¾ inch below the top of the plastic lug—and that’s just...
became available; more than 80% said than 20% of the listeners surveyed said they would be willing to pay a premium of $25 or more for one, and nearly 43% said they'd be willing to pay an extra $50 or more.

For 1997, the tops of the CD's favor. More than a million home decks with Dolby S decoding; with the advent of a 7-volt Dolby S chip (due soon), such players should become available. More than 80 million prerecorded cassettes, made from about 3,200 album titles. Dolby S noise reduction has now been sold, as have more than 80 million prerecorded Dolby S cassettes, made from about 3,200 album titles.

S-CITING NEWS FROM DOLBY

How does the sound of a cassette tape with Dolby S noise reduction compare with that of a CD? Last summer, 1,100 people found out for themselves at a demonstration held by Dolby Labs.

In the first part of the demonstration, comparing the output of a home CD player and a home cassette deck, slightly more people (27.9%) preferred the S-encoded tape than preferred the sound of the CD (24%). By far the largest group, however, was the 48.1% who said they could hear little or no difference between the two.

When a car stereo cassette player was substituted for the home tape deck, the picture changed drastically. Only 32.7% of the listeners heard little or no difference, and the tide turned heavily—42% to 20.7%—in the CD's favor.

The cassettes used for these demonstrations were taken from the same masters as the CDs but were made on Type I tape (the least expensive formulation) and mass-duplicated at 80 times normal speed. The car stereo deck was modified by replacing its Dolby C noise-reduction circuitry with Dolby S noise reduction but was otherwise unchanged. Listeners were informed by lighted signs as to which source, tape or CD, they were hearing. "In a blind test," said Larry Poor, Dolby's director of technology marketing, "I suspect there would have been more 'little or no difference' answers."

A modified car stereo deck was used because there currently are no production models with Dolby S decoding; with the advent of a 7-volt Dolby S chip (due soon), such players should become available. More than 20% of the listeners surveyed said they would buy a car stereo with Dolby S when it became available; more than 80% said they'd be willing to pay a premium of $25 or more for one, and nearly 43% said they'd be willing to pay an extra $50 or more. More than a million home decks with Dolby S noise reduction have now been sold, as have more than 80 million prerecorded Dolby S cassettes, made from about 3,200 album titles.

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Call toll free or return the coupon for a free information kit, or to find out how to hear the Wave radio in your home, satisfaction guaranteed.
NEW OLDIES, HOT ON THE CHARTS

Probably the most heartwarming artifact of the tube revival is the booming interest in vintage hi-fi equipment. And not just elderly tube gear—any audio equipment older than Chelsea Clinton qualifies: horn loudspeakers, funky idler-drive turntables, and cartridges that once were deemed too massive for anything other than ploughing fields. Hey, I even know a guy who collects the kind of pre-Walkman-era heavy clamping headphones that could pin back the ears of an alert German shepherd. And to think so much of this stuff was dumped in garage sales...

Although manufacturers of new equipment would rather we bought new stuff instead of pestering them for spares for the old stuff, the more industrious brands over a certain age have embraced the hobby—dubbed "anachrophilia" by John Atkinson more than a decade ago, when he was editor of Hi-Fi News in England. What started out 30 years ago as a casual audio pursuit in Japan has gone global, and the major brands know it.

I'm sure I'll be corrected by a reader more astute or perhaps older than I, but the first proper reissue (or replica, or near facsimile, or whatever you want to call "revived" hi-fi) to appear outside of Japan was a limited run of Radford STA-25 tube amps in England in 1984-85. Prior to that, you could buy replicas of Marantz Model 7s in kit form in Japan, but that was about it. With the tube revival becoming newsworthy by the early '80s, all it took was a lot of nagging to get the then-semi-retired Arthur Radford to permit his former employee, John Widgery of Woodside Electronics, to oversee a run of 100 Radford STA-25s. These amps were designated Mk IVs and painted gloss black with gold trim, to distinguish them from the battleship gray originals; each came with a certificate signed by Radford himself. After his death a couple of years back, 100 lucky owners saw their treasures appreciate in collector circles.

Since then, there's been a constant flow of such limited-edition reincarnations, and I'm all for it, especially when originals are disappearing at an alarming rate. As was pointed out to me by a McIntosh spokesperson, the $4,000 paid for the reissued MC275 is less than mint samples command in certain markets, and the buyer knows that the MC275 commemorative edition is brand-new. Unforeseen but unsurprising is the inflation that attaches to a limited edition after its allotted production run has been met; I was told that the market value for a mint, boxed MC275 reissue is now upward of $7,000.

Those with an investor streak might be kicking themselves for passing on the last decade's replicas, but I'd hate to think that people bought them to hide away in some closet until they'd appreciated like Shaded Dogs instead of using them to make music. Apologies to those I may be omitting, but the run of now-collectible reissues includes mid-1980s Ortofon SPU-Gold moving-coil cartridges, the (still available, but only just) Sennheiser 50th anniversary reissue of the HD414 headphone, the revived Dynaco products that qualify as near-replicas of the David Hafler-era gems, Quad's recently announced run of 600 pairs of Diamond Jubilee Quad II tube amps, and Marantz's revived Models 7, 8,
Home Theater: New Horizons, Old Concerns

Transitions are often difficult. Making any move — say, for instance, to a home theater system — is something of a balancing act. After all, what's the point of three or four more channels if they don't sound as good as the two you already enjoy? That's why music lovers think of Rotel's award-winning sonic heritage when facing the here-and-now reality of home theater.

Consider Rotel's new RTC-970 Surround Sound Tuner/Preamplifier, an impressive centerpiece for a home entertainment system. The RTC-970 decodes Dolby® Pro Logic sources with precise all-analog circuitry to avoid the harshness common to most digital designs. A special Cinema Mode compensates for excessive high frequency energy in many movie soundtracks. And the RTC-970's Music Modes add progressive spaciousness to music while providing accurate and convincing reproduction.

An informative on-screen display makes initial set-up and calibration easy and also helps you get the most out of your system every day. You can choose any of up to four audio-only and four audio/video sources for your main system while selecting a different one for enjoyment elsewhere in your home!

Regardless of the source you choose, your ears will applaud Rotel's remarkable audio circuitry. Careful power supply design, meticulous parts selection, and painstaking board layout lie at the heart of the RTC-970's outstanding performance.

The RTC-970 also puts discrete multi-channel digital audio squarely in your future. There's a connector specifically designed for outboard Dolby Digital/AC-3 processors like our soon-to-appear RDA-980. That makes your upgrade path simple and totally free of pre-planned obsolescence.

RSP-985 THX Surround-Sound Processor

Do you already own a high quality music system? Do you loathe the thought of relegating it to a dark closet? Then consider the new Rotel RSP-980 Surround-Sound Processor for adding all the performance and flexibility you'll ever need to your existing music system.

Full THX® circuitry augmented by precision A/D and D/A conversion means you'll hear a movie's soundtrack exactly as the director intended you to. Wide-bandwidth video switching for both composite and S-video sources and special "Zone 2" outputs increase your current system's flexibility. Audio circuitry featuring high precision metal film resistors, low ESR capacitors, and high current operational amplifiers means you won't lose anything either. Of course, a DB25 connector means you'll be able to add Dolby Digital/AC-3 (or DTS . . . or whatever) at any time, now or in the future.

The THX approved RB-985 delivers the powerful sonic boom of a movie explosion with 5 x 100-watts of power.

RB-985 5-channel amplifier

Whether building your home theater from scratch or adding to an existing system, this amplifier is the answer. With 5 channels each delivering 100 high current watts, the RB-985 puts plenty of power in a highly efficient and convenient package.

The RB-985 exemplifies Rotel's commitment to quality: A massive 1500VA toroid transformer combines with oversized, high capacity filter capacitors and precision regulators to provide extraordinary smooth operating voltages. Each of the RB-985's 20 output devices is rated for 130 watts and 15 amperes of current. This high reserve design assures uncompressed and dynamic reproduction of today's music and video sources.

Placing the RB-985 in your system is easy. A multi-pin connector, allowing single-cable hook-up, complements an array of gold-plated RCA jacks. Rugged, heavy duty binding posts accept a variety of audiophile-grade speaker cables.

Our point is simple: Rotel gives you several approaches to home theater. Each product is different because your needs are different. But each one shares a common family heritage of extraordinary sound quality, backed by a five year warranty on amps, preamps, and processors. That's the Rotel tradition.

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CIRCLE NO. 34 ON READER SERVICE CARD
and 9 amps (shipping to stores as you read this). But undoubtedly, it was the reappearance of McIntosh's MC275 power amp and C22 preamp that gave the whole sub-genre its credibility.

Admittedly, replicas of high-end tube amps are just as costly to make and buy as brand-spanking-new amps. In some cases you can still buy secondhand mint originals for insignificant sums relative to the price of a reissue. But the reissues tap another vein: a further subset of collectors who don't just want to own the old stuff but also like to acquire limited editions, whether they're reissues like the 100-only numbered Radfords or products intended from the outset never to exceed a certain quantity. The latter includes the first Goldmund Reference turntable (limited to a production run of 300), KEF's Raymond Cooke Commemorative LS3/5A loudspeaker system and a recent piano-black version, one of Gryphon's preamplifiers, the gilded Nakamichi ZX1000 Signature cassette deck, Technics' piano-black SL1200 turntable, and the like.

"remarkable"... "flawless"... "astonishing"... "a landmark"... "the best"

CS.5
"...one of the best speakers available at any price—Thiel's full size CS.5." —Tim Smart, Business Week, December 11, '95

CS1.5
"The CS.5 is a landmark speaker of the 1990s... an astonishing speaker." —Sam Tellig, Stereophile, Vol. 17, No. 8, August '94

CS2 2
"I think they are one of the best, if not the best, performers I have come across." —Andy Benham, Hi Fi Choice/U.K., Winter '92-'93

CS3.6
"...the CS.6 outperform every other speaker I've heard in their price class... a remarkable loudspeaker." —Robert Harley, Stereophile, Vol. 17, No. 5, May '94

CS7
"Thiel's CS7 loudspeaker is one of the finest sounding loudspeakers that I have heard." —Anthony Cortesman, Audio, August '95

CS5i
"A completely flawless design." —Nagashima, Stereo Sound/Japan, Winter '93

Anachrophilia has created its own supporting industries, quite independent of the companies that emerged to service the tube community. Of course, there is overlap, and companies supplying replacement tubes to the public don’t know if the 6550s they’re selling you are going into a refurbished MC275 or into an amp that was introduced in 1995. But a new breed of restorer has emerged (a lineal descendant of what the British lovingly referred to as "vintage-radio restorers") who can source a transformer to replace the lump of steel leaking all over the back of your Dyna Stereo 70 or locate some decent "magic eye" tubes for your elderly FM tuner.

How deep is this fascination with vintage equipment? Let's put it this way: The internet's a'buzz with requests for sources of Tannoy Red and Gold drivers, you can't find RCA tube manuals for love or money, and the old (British) Hi-Fi Yearbooks that used to sell for 25¢ in thrift shops now command $20 to $30 a copy. McIntosh sold out its MC275s in months, as did Quad with its 11s, and Marantz (which, I hasten to add, plans to keep the 7, 8, and 9 in production as long as there's demand) couldn't believe the response even before the first models came off the assembly line.

Just how seriously this should be taken as a proper subdivision of audio fetishism rather than a flavor-of-the-month craze is also indicated by the success that vintage hi-fi displays have enjoyed over the past decade at European hi-fi shows. Credit goes to the French for their vast display of old tube amps at the "Permanence du Tube" exhibition eight years ago, while the Italians followed suit three years back with their own display. At this year's Hi-Fi Show at the...
London's Heathrow Airport, visitors crowded around a "Hi-Fi Heritage" display, which Hi-Fi News organized to celebrate its 40th anniversary. It featured 25 yards of counter space and such treasures as the world's only known surviving Decca MK V cartridge, the prototype of the SME 12-inch tonearm, a mint original Mac MC275, one of the ultra-rare Audio Research D150 power amps, Rogers tube electronics, Grace's wooden tonearm, Garrard 301 and 401 turntables, and a Revox G36 open-reel deck. More than one visitor walked away tearfully after learning that the stuff wasn't for sale. And the Italian and Asian visitors — trade and public — took as many photos of vintage gear as they did of the new products on display (just in case you were wondering which territories could boast the most fanatical anachrophiles).

One of my wealth-reducing fetishes is bibliophilia, and nothing addresses that passion better than obscure titles about my hobbies. (Even better are books that combine two or more: Anyone know of any publications about tube amps owned by Grand Prix drivers or a history of wristwatches seen in films noir?) Publishers from the industry's fringes have been quick off the mark with books so perfectly suited to encourage the worst excesses of anachrophilia that they might be deemed by some as audio porn.

In the United States, Vintage Hi-Fi Productions (1095 East Duane Ave., Suite 106, Sunnyvale, Cal. 94086; 408/733-6146) has released a "bookshelf" that forms the foundation of a superb reference library for those unfortunate not to own a complete run of Audio going back to the Eisenhower years. My faves are the volumes of photos, specifications, and ad reprints in Vintage Hi-Fi Spotter's Guide 1 and Guide 2. A must have for owners of those two titles is the companion Vintage Hi-Fi Price Guide, while the more scholarly will adore the Vintage Hi-Fi Schematic and Literature List.

Undoubtedly the best book yet for pure information (as opposed to ad reproductions) is the stupendous Audio! Audio! by Jonathan Hill, author of Radio! Radio! (both published by Sunrise Press, 2-4 Brook St., Bampton, Devon EX16 9LY, England; 011 44 1398 331532). The latter consisted of nothing but photos and specs of classic tube radios. This time Hill has moved on to audio electronics from the golden age. Although far from complete (it concentrates on British brands and the few imports that were available in the U.K. during the '50s and '60s), it's the only source of information on 850 models from 150 companies available to those lacking a full set of Hi-fi Yearbooks. Indeed, it looks like a "Best of" the Yearbook, the near-holy that was published from 1956 to 1980 and featured every product on the U.K. market. This 96-page surrogate is jam-packed with data on Quad, Rogers, Leak, Radford, HMV, Armstrong, and the other greats. If you are an anachrophile of any seriousness, it's unputdownable. And Hill knows the collector mentality: The first edition was numbered.

What's needed now is a guide written from the American side of the pond. So is there anybody out there with the drive to assemble reams of information on products from Harman Kardon, McIntosh, Scott, Fisher, Marantz, Heathkit, Dyna, and the rest? And if so, put me down for two copies: one to use 'til it falls apart and one to save for later.
Twenty years ago a few lone visionaries spoke of the promise that a futuristic technology called digital signal processing might someday bring to audio, but all they could really do was guess and hope. Back then, DSP was largely confined to the engineering classroom and a few esoteric aerospace and military applications. The computer-like hardware needed to realize real-world applications was cumbersome and very expensive, and the mathematics underlying DSP were very challenging. Nevertheless, it seemed clear that one day DSP might significantly improve the way we hear recorded music in our homes.

We all know how profoundly computer technology began to evolve and how rapidly digital storage technology infiltrated audio, principally through the Compact Disc. Soon, hobbyists and the hi-fi press were all buzzing about what DSP was about to do for sound reproduction. It was going to finally conquer the demon of room acoustics. It was going to turn our homes into concert halls—at the touch of a button. It was going to eliminate stubborn imperfections in loudspeakers that had eluded capture for decades. It would enable a degree of signal-tailoring a hundred times more precise than was possible with the conventional tone controls or equalizers of the day. It would restore precious antique recordings to modern levels of fidelity. And it might even let us block out unwanted noise from our homes and cars.

About a decade ago, we saw the first DSP products reach the consumer market in force. Hopes were high, but, oddly enough, nothing really caught fire. In the best cases, the products were moderately successful. In the worst, DSP seemed to be just another feature, another button on the box. In all cases, the implementation seemed to be falling short of the revolutionary advantages that were once prophesied. Still, there was hope: The cost of computer hardware continued to plummet, and processing speed, DSP’s biggest requirement, was accelerating rapidly.

Today, 10 years later, has DSP finally arrived? Was there any substance to the hype, any reality behind the promises? Certainly, the answer is yes. It has found its way into almost every corner of audio, but not (as we might have been prudent to expect) in exactly the same ways we anticipated. In some areas, DSP has fallen noticeably short of expectations. In others, it has provided advantages not even imagined a decade ago. Its influence is growing, and its very boundaries are hard to define. So let’s start by reviewing the underlying principles.

Ken Kantor is Vice President, Technology, for NHT loudspeakers in Benicia, California. In the late ‘70s and early ‘80s, he helped develop the Teledyne Acoustic Research (AR) Adaptive Digital Signal Processor, the first DSP room correction system. In addition to his loudspeaker design work, Kantor has managed a number of DSP projects in the related fields of loudspeakers and psychoacoustics and was recently named in a patent as a co-inventor of a DSP solution to the problem of car cabin noise.
WHAT, EXACTLY, IS DSP?

On its trip from the studio to the loudspeaker, the information that will ultimately shape the music you hear in your home undergoes many transformations and is subjected to many processes. Think about it: The moment it leaves the microphone or an electronic instrument, the audio signal must be amplified and equalized, attenuated and routed. It must be converted into different forms for storage on different devices, such as a studio DAT, an open-reel master, a lacquer master, or a CD. The audio information may also be subject to filtering, multichannel surround processing, noise reduction, and a dozen different types of enhancement. Even in purist or minimalist recording setups, the signal changes form many times.

Each change or transformation that occurs means we are processing the signal in some way, so an engineer refers to these as "signal processing" tasks. For each step, there is a mathematical equation (or set of equations) that defines what has been done to the data representing the music.

Traditionally, the only option available for signal processing was analog circuitry—resistors, capacitors, transistors, and that kind of stuff. Tone controls, your RIAA preamplifier, and the crossovers in your speakers were, and probably still are, analog signal processors.

And time has proven analog signal processing to be pretty darn good at many kinds of tasks, such as gentle filtering and equalization, attenuation, amplification, and the handling of high-power audio signals.

Because you can also think of every processing task as a mathematical operation applied to the signal, however, it becomes evident that a computational approach might also be applied. And if the signal is being stored in numerical (digital) form already, this kind of approach opens the door to all kinds of signal manipulation that are virtually impossible to understand in terms of analog circuitry. A resistor can make a signal smaller. A transistor can make it bigger. A capacitor can emphasize the highs or the lows. But a computer—now we are talking serious potential! Perhaps we could precompensate the signal for existing acoustical problems in the listening room. Maybe we could add in some of the musical dimension and life not captured by the microphone or filter the noise from an old recording without affecting the desired information. Indeed, a computational approach offers intriguing possibilities.

THE EARLY YEARS

Today, most audio signals are stored and handled in digital form, so it’s easy to take that for granted. But if you can remember back to 1976, you know this wasn’t always the case. In the studio and in the

TO REDUCE THE SIGNAL BY 6 DECIBELS, THE DIGITAL SIGNAL PROCESSOR DIVIDES THE ORIGINAL NUMERICAL DATA STREAM BY A FACTOR OF 2. THE RESULTING SAMPLE SERIES APPEARS AS IF A SOUND OF HALF THE ORIGINAL LEVEL WERE RECORDED, YIELDING THE -6 DECIBEL CONTINUOUS WAVEFORM.
home, audio was predominantly analog. Although it was relatively easy to comprehend the potential value of digital storage and distribution, it took a bit of vision to recognize what digital processing and manipulation might offer.

Early on, audio scientists and engineers realized that creating advanced filters was one of the really powerful advantages of DSP. Because a digital filter works by momentarily storing and combining portions of the signal in digital memory, it can control the temporal (impulse-response) characteristics of a signal as well as manipulate frequency characteristics. This double-edged capability enables the creation of extremely complicated and powerful filter transfer functions, like those required to properly address room acoustics problems (or even to simulate entirely new rooms). Among other applications for advanced digital filtering is creating the kind of surgically exact responses that can dissect the noise from the signal on an old recording.

Consequently, different types of digital filters were among the first commercial applications of DSP technology. Noise-removal systems found their biggest market in professional environments, helping to restore vintage or damaged recordings, assisting with forensic investigations, and improving the quality of location recording for film and television.

In the recording studio, digital signal processors were being explored as an alternative to the special rooms and electro-mechanical "plates" used to generate artificial reverberation. Sometimes accidentally, and sometimes purposefully, digital boxes were providing creative recording engineers and musicians with new effects and even new instruments.

Consumers did not have the ongoing need, the operational training, or the budgets to make digital noise removal a household word. In the consumer arena, ambience simulation and enhancement systems were being developed for the home and car using techniques already employed in recording studios. And, of course, it's hard to forget those cheesy digital keyboards that started appearing everywhere—the $69 specials where the "piano," "violin," and "trumpet" settings all sounded like "kazoo." You can thank the DSP revolution for those, too.

It was, however, a novel kind of digital filtering that really caught the attention of hi-fi enthusiasts: room/speaker correction systems, probably the most conceptually interesting and controversial of the early commercial DSP efforts.

Serious audio hobbyists had come to understand the limitations of conventional graphic equalizers in correcting room acoustics problems. First of all, they were restricted in their precision and flexibility. Worse, they had no way to cope with reflected and delayed energy, the very basis of room sound. If a graphic equalizer fixed the reflected sound's tonal balance, it was almost sure to mess up the direct radiation of the speaker, and vice versa.

But a DSP filter, with its ability to work in the time domain, ought to be able to apply individual corrections to each instant of the continuously developing sound field. At the same time, powerful filters might be applied to fix known errors in the loudspeaker. The result, it was hoped, would be an unprecedented degree of transparency between the recorded signal and the listener's ears. The characteristics of speaker and room—in effect, the timbral corollations contributed by each—would be digitally erased, and the recording in its pure essence would be heard. To this pure sound could be added new architectural acoustical signatures and new stereo image perspectives, appropriate or not. And since the computer that accomplished all this DSP work would have to "hear" the listening room via a microphone in order to process it, why not have it make all the necessary corrections automatically, adaptively?

It all seemed to be coming together perfectly—Compact Discs, powerful computer hardware, and great ideas. And several big semiconductor makers had active development programs to offer chips customized for advanced audio signal processing. No wonder we got so excited!

TECHNICAL BARRIERS

Inevitably, the bubble had to burst. A little bit of technical and economic reality had to encroach upon the dream. Nowhere did it intrude harder than in the area of room and speaker correction. While other fields of DSP gradually began to flourish, several seemingly promising room and speaker correction products were announced, only to evaporate just before or just after being introduced to the market. No single reason was to blame. After all, the success of a new technology depends on many interwoven theoretical and practical factors. Yet in hindsight, there were some formidable technical hurdles that room and speaker correction schemes faced—hurdles that somehow escaped our attention a couple of decades ago when we pondered the future of DSP.

A room corrector is supposed to work by seeking out deleterious room reflections and sending a cancellation signal of each to the loudspeaker. For example, if the room corrector's microphone detects a reflection at 8 milliseconds (i.e., a reflection of the original sound that issued from the speaker 8 milliseconds earlier), the speaker will be sent an opposite signal at exactly the right instant to arrive at the listener and null out the reflection. Or, if energy is missing at that moment, the corrector will try and fill it in. You can think of this as equalization in the time domain, with an effectively anechoic room—a room with no reflections—as the ultimate goal.

One of the major snags is that the listening room is a much more complex physical and mathematical system than was considered in the planning of early correction schemes. In fact, there are acoustical artifacts of the loudspeaker and room combination that simply cannot be corrected by any conceivable signal applied to the loud-
speakers. Another way to think of this is to realize that at any listening position within a given room there will be a few specific frequencies that simply do not reach the listener's ears directly from the speaker.

An engineer would call each of these troublesome intersections of location and frequency a "singularity" and tell you there is "zero energy transfer" at that point. (A really smart engineer might try to impress you by telling you the playback system is "non-minimum phase." But who needs another really smart engineer?) Response singularities are normally caused by special kinds of reflections that can occur both in the room and within the drivers of the speaker system.

The net result of a singularity is that no matter what you put into the speaker, that frequency ain't going to get to your ear. You can boost it till the speaker cooks, you can delay it till the cows come home, but it is going somewhere else in the room before it reaches your ear, period. Hey, this is a fact of life, and it isn't so bad. These singularities are few and are so impossibly narrow in bandwidth—almost infinitesimally narrow—that they don't affect the sound nearly as much as many other acoustical errors and distortions.

But singularities are hell on a digital filter. It's hard to distinguish between a bad but correctable problem and an impossible one. So it's easy for the DSP system to get stuck in the mud when it happens onto one of these acoustical black holes. Before you know it, more and more of the processing power is sucked up, and to no avail. On the contrary, by attempting to fix a singularity that happens to fall right at the sensing microphone, the computer is likely to add excessive and inappropriate boost or cut to the sound a few inches or a few feet away.

This problem really complicates the job of room correction. If the designer writes a cautious program, significant errors will be missed that could have been fixed. If his approach is too aggressive, things will get stuck in a rut. It is true that adding additional active channels to an adaptive correction scheme reduces the singularity problem, since any point in space can be addressed by more sources. But the issue still doesn't go away, and multichannel adaptive correctors stretch today's economic and technical limitations to the maximum.

Surprise, surprise, we are back to relying on human judgment as to what sounds best and how we balance different problems and benefits. So what else is new?

To a great extent, the problem of singularities goes away if the designer takes both the room and "adaptation" out of the equation.
and focuses his efforts on correcting and controlling the speaker alone. Since human hearing automatically acclimates itself to its acoustical environment to some degree, there is value in this approach. We all know that better speakers generally sound better, almost regardless of the room.

To date there have been a few superb loudspeakers designed with built-in complementary digital correction. It is certainly a more feasible approach technically than generic, adaptable correction applied to the room. When designing a DSP-assisted loudspeaker system, the engineer does have to be very careful to manage the signal delay inherent in most digital filters, which can range from less than 1 millisecond up to 10 or 20 milliseconds. This delay is not usually noticeable in a home audio-only system. But a signal delay of 10 or 20 milliseconds can create plenty of havoc in a recording studio or home theater, where synchronization and timing of the sound is critical.

A difficulty common to all DSP loudspeaker and room compensation is that detailed response corrections implemented in the time domain often trade off spatial flexibility. In other words, the better the correction at one spot, the bigger the problems become everywhere else. This goes beyond the traditional "sweet spot" that many serious listeners have learned to live with. The spatial focus of a digitally corrected system can be so great as to be intolerant of the slightest head movement or even the difference in location between your ears—a tough problem to overcome. Again, the designer can make trade-offs between detailed correction and location flexibility. Some systems even let you make the choice yourself. But here we are once again, deciding how to set our controls for the best subjective effect. Nothing wrong with that; at least we have more power and control. But it isn't the magic bullet of audio transparency anymore.

Finally, it's important to point out a very practical problem about digital room and speaker correction, one that I hope will diminish with time: What is it worth?

As a loudspeaker designer, I know that every dollar counts in the final sound of the speaker. Implementing digital correction in a speaker is costly, and that money could improve the sound in many other ways—better drivers, a more advanced crossover, effective room treatment, and so on. It's always important to determine which sonic problems take priority before running off to solve them. In my opinion, the consumer audio business at times has a tendency to invent solutions and then go looking for the problem. "Digital," in all its forms, is no exception. It can do some things undeniably well. It will do more things better and cheaper as time goes on. But that does not mean it is the most effective solution to every problem that arises now.

Arguably, the cost-versus-benefit factor is the single most important reason why more products that combine DSP with speakers have not reached the market. Customers hear them and compare them to traditional speakers at comparably high prices. Nevertheless, there have been a few great-sounding models, and that does whet the appetite for more affordable solutions.

ACOUSTICAL SIMULATION

No matter how good a microphone you use, one thing you can count on losing when you make a recording is spatial information. Unlike your ears, a single microphone has no way to understand the location and direction of the sound source. The electrical signal from the mike is an average of the sound waves impinging on it. Even a very directional microphone cannot fully differentiate, say, a loud sound behind it from a soft sound in front of it. Once a natural sound field is recorded as a two-dimensional electrical wave, its spatial characteristics are compromised. Good stereo microphone techniques help a lot. Multichannel systems help even more. But nothing available in the audio world today can fully capture the direction, space, and ambience of a live event.

Part of the job of a fine hi-fi system is to restore the proper dimensionality to the sound. In addition to getting the tonal balance right, a good speaker can take a fine recording and create the illusion of a real, tangible event—to a degree. Since we know information is lost at the microphone, the speaker must necessarily "guess" at what constitutes correct spatial information. How well this transpires depends on a complex interaction of recording, loudspeaker, and listening room—and a bit of blind faith on the part of the listener, who, after all, probably doesn't know precisely what acoustical space he should be hearing.
Restoring a believable and controllable sense of space to recordings by digital means is not a new idea. Some of the early delay-line processors from the 1970s were a sort of primitive digital signal processor, and the premise is the same today with several DSP-based models intended to improve the home listening experience. Now, however, the process is often assisted by surround decoding.

From the inexpensive DSP head units designed to give car audio listening an expanded sense of space to astonishing studio reverberators that can model the minute acoustical details of all sorts of real and totally imaginary "rooms," the idea is to convey a convincing impression of space and location by adding simulated reflections and reverberation from directions other than the main speakers' sound.

DSP is a natural for this. A real-world reflection is nothing more, at its heart, than a delay of the original sound. String enough of these delays together, and you have reverberation—and delaying sound is about the easiest task to accomplish with DSP. The recipe is simple: good A/D and D/A converters, a bunch of memory, and some basic filters to alter the levels and spectra of the reflections. Then add a few mixers to recirculate signals within the box and to send outputs to various speakers around the room—okay, so it adds up to serious processing power in the end, but at least the idea is simple. The designer must understand the reflection pattern of the room he is trying to simulate and match that reflection pattern using delays and filters within the DSP. With a multichannel processor and several speakers, the results can be startlingly good. A lot depends on the acoustics of the original space, since it is bound to imprint itself on the sound, one way or another. If the playback room is especially live, it may dominate the overall acoustics to the extent of rendering the DSP efforts futile. If the playback room is deader than usual, the listener can be transported to a place of virtual acoustic reality.

Given DSP's success with simulation, it's too bad that DSP room correctors don't work better than they do. Otherwise you could use one to remove the acoustics of the playback room and use a room simulator to insert the acoustics of a new room. Pretty neat, huh? Stay tuned. It will happen.

TECHNICAL TRIUMPHS

When we think of DSP, often what comes to mind are sound-field processors or other specialized applications. But some of DSP's greatest triumphs in the audio domain are in areas not directly apparent to the consumer. One of these is the recording studio, where almost every imaginable kind of signal handling and manipulation is now done in the digital domain. In fact, micro-
For well over 60 years, the name Tandberg has been associated with flawless, faithful sound reproduction. Whether the components were professional grade reel-to-reel tape recorders, audiophile-quality cassette decks or high-end electronics, Tandberg invariably established new standards of excellence.

The new 4000 Series continues this unbroken tradition. The unique, stackable, top-loading transport of the CD Player, the Zero Negative Feedback and Discrete Class A circuitry of the Control and Power Amplifiers, the Dual Gate MOSFET and Class A circuitry of the FM Tuner are packaged in a museum-grade, fully remote-controllable system as pleasing to use as it is to view.

Tandberg achieves the best of both worlds by integrating old world craftsmanship, world class industrial design and the latest audio technologies. In the process, Tandberg has once again created audio components that transcend traditional hi-fi to become one of your most prized possessions.

What keeps us in the foreground is our background.
EASTERN MUSIC MEETS
MODERN RECORDING TECHNOLOGY

Gently inching his stereo mike array closer to the musicians—an American slide guitarist, an Indian musician playing a modified slide guitar, and a tabla player, all seated on a rug in a spacious church—Kavi Alexander monitors the signal through headphones. He checks the musicians' balances with each other and with the room acoustics. When all is ready, he presses “Record” on a huge, all-tube two-track tape machine and captures an astonishing performance.

Alexander shuns the usual multimike, multitrack recording techniques commonly used by big-label pop and rock album producers. Instead, he simply places a stereo mike near the performers, in a church that has gorgeous acoustics, and then records using no processing. As a result, his recordings present the music in its purest form.

Alexander knows how to capture the beauty of the instruments. The sound is remarkable for its gentle, non-edgy highs. There's clarity without harshness—a very natural, non-fatiguing quality. On stringed instruments, you can frequently hear individual plucks within a strummed chord. This detail comes from the purity of the signal chain, not from a treble boost on a recording console. Cymbals have a sweet, shimmering edge. Strings and saxophone sound warm and full, not thin or tinny. Tabla goes very deep and has a visceral impact. Thanks to the purist miking techniques, the imaging is very precise and the reverb sounds airy and spacious. Powerful dynamics add to the musical excitement. It's a compelling, realistic effect.

The microphone itself is a custom tube design using Pearl bidirectional mike capsules set in a classic Blumlein array: two coincident figure-eights crossed at a 90° angle. The mike design is by Tim de Paravicini, of Esoteric Audio Research.

Founder of the audiophile label Water Lily Acoustics, Alexander uses minimalist technique to record Asian master musicians playing Indian, Iranian, Arabic, and Chinese music, as well as American blues performers. His work brings the old and the new together, uniting the traditional music of Eastern cultures with modern recording technology. Thanks to Alexander's devotion to sound quality, we can finally hear the remarkable beauty and sophistication of this music.

Of course, world folk music has been available for years from obscure sources, such as field recordings. But Alexander's work is not musty archival stuff. In fact, A Meeting by the River, with Ry Cooder and V. M. Bhatt (Water Lily Acoustics WLA-CS-29-CD), won a Grammy for Best World Music album in 1993.

by Bruce Bartlett with Jenny Bartlett

AUDIO/DECEMBER 1996 34
TIONAL ASIAN AND AMERICAN ACOUSTIC MUSIC IS IMPORTANT TO ME.
TO MY EARS, THE BLUMLEIN STEREOMIKING ARRANGEMENT

(T.U.K.), whom I interviewed for the January 1995 issue. He also designed Alexander's tube microphone preamps.

The tape recorder is a Studer transport converted to a 1-inch, two-track format. It has a custom magnetic head assembly and tube electronics designed by de Paravicini. Even though the deck is analog, recordings made with it have no audible tape hiss at normal listening levels.

Alexander monitors with VMPS Super Tower speakers and Stax Lambda Signature Pro electrostatic headphones. He uses 100-watt, monoblock EAR 508 MK II power amplifiers and Discovery Cable Teflon twin-axial cables.

Although in the past he has used several different churches in Santa Barbara, California, for his recordings, Alexander now uses the chapel of Saint Anthony's Seminary exclusively because of its "fantastic acoustics" and its geographical isolation from traffic noise.

The music itself is faultless. Performers range from America's Ry Cooder and Taj Mahal to India's Ali Akbar Khan and V. M. Bhatt. There's a strong East Indian influence, much like Ravi Shankar's sitar music.

Supplied with each recording are extensive liner notes, carefully written and researched by Alexander himself. So scholarly are the notes that reading them is like taking a short course in musical history.

Kavi Alexander was born in Tamilelam, India, and worked in Paris and Sweden before moving to the United States. I began our conversation by asking him how he started his own recording company.

What prompted you to start your own label?

I've always loved traditional music from Asia—Indian classical, Arabic, Persian, and Chinese. Unfortunately, records of this music always sounded awful. The quality of a lot of these recordings was poor because they were made by musicologists, who mostly were not technical people. Even when the recordings were made in the West in studios, they were not well done, partly because the engineers used rock 'n' roll recording techniques. An exception to this, however, are the recordings of the Connoisseur Society, which made fantastic LPs of Ali Akbar Khan [now reissued on CD].

Many tape recordings made in India were superb because they used simple miking techniques and tube electronics. But the vinyl used to make the records was horrendous. To listen to these scratchy records, I used to buy complex amplifiers that had noise and rumble filters to fight the pops and clicks and hiss. This robbed the music of all life. That's how I became an audiophile. Out of frustration, I decided I could do better.

Were you aiming to start an audiophile label?

Not at first. My goal was to become a movie director. I realized that record-producing and movie-directing are basically the same thing. Different media, but the same result. So I went with music production.

As a child, I was inclined toward the arts. I painted. My mother instilled in me a great love for poetry and music. She was a well-trained classical Indian musician who thought that art was more for mystical purposes than entertainment, that art is a legitimate means toward God.

My name, Kavichandran, my mother made up. It means "Poet of the Moon." Her name was Lily, and I named my company after her.

I'm self-taught in musical history. A lot of my early reading came from the wonderful recordings made in the '60s by UNESCO [United Nations Educational, Scientific, and Cultural Organization], which did a series of all the traditional music of the world. They had wonderful album notes that were written by ethnomusicologists.

I decided that recording was my calling in life. I worked as an independent producer/engineer for a Swedish company doing American jazz. Eventually I wanted to start my own company in order to have complete control of the artwork and so forth.

An audiophile friend of mine in Sweden was importing Tim de Paravicini's hi-fi equipment, built by Esoteric Audio Research. When I listened to it, I was quite blown away. A friendship with Tim developed from that.

I came to the United States in 1981 and started Water Lily Acoustics in 1984. A lot of people in the
The music business helped me get started and to get where I am now. They were very supportive and generous with their knowledge, time, and resources. For example, Tim built the entire recording chain and gave it to me free of charge.

**How did you arrive at your recording technique?**

I tried all the stereo miking techniques, and to my ears, the Blumlein arrangement of crossed figure-eights gave the best results overall.

For my jazz recordings in Sweden, I was using a Revox B77 tape recorder and Pearl stereo microphones made in Sweden. Tim liked Pearl’s rectangular mike capsules. So once I was in the United States, I got him the capsules and he made a prototype tube mike for me.

I prefer to record using analog tape equipment rather than digital. I’ve heard the best digital recorder, the Nagra 20-bit machine. But I think that Tim’s 1-inch all-tube analog recorder is still the most musical.

You’re using equipment and simple methods that were employed in the past. Some of those older recordings still sound great today.

Yes! There’s a newly remastered Muddy Waters LP recording from 1963, *Muddy Waters, Folk Singer* (Chess CH-9261), that’s absolutely formidable in its sound quality. Staggering.

A problem I find with a lot of high-end recordings is that the music has been forgotten. People are getting so much into technology, special cable, this and that. I say to my friends, “Listen to this Muddy Waters record made in 1963. What kind of wire do you think these guys used? What kind of capacitors did these guys have in their signal path? What kind of cruddy connectors?” You listen to this record with your brand-new equipment, and you go, “My god, how did they do it?” We’ve definitely lost a great amount artistically and technically.

Nowadays you listen to some so-called audiophile records, and you want to shut off the system. I wouldn’t buy any of them, but this Muddy Waters disc I would gladly own. So if the music isn’t there, who cares what copper or gold is used in the cables? It’s meaningless.

One recording engineer from the past whom I respect is Emory Cooke. He was an overlooked genius. Not only was he technically very innovative, but he was recording the Tarahumara Indians way back in the 1950s. He was an ethnomusicologist and a pioneer in recording techniques. He built his own equipment. I have an LP of an organ recording he made in the ‘50s that goes down to 15 Hz!

One recording engineer from the past whom I respect is Emory Cooke. He was an overlooked genius. Not only was he technically very innovative, but he was recording the Tarahumara Indians way back in the 1950s. He was an ethnomusicologist and a pioneer in recording techniques. He built his own equipment. I have an LP of an organ recording he made in the ‘50s that goes down to 15 Hz!

People like that, the real pros, wrote the book and set the stage for guys like me, the rank amateurs. They wanted to preserve great music and present it well, with great documentation. Their recordings are a time capsule to another world, frozen forever.

**The music in your recordings is superb. Most of it is played by master musicians who have perfected their craft. It must be a thrill for you to work with them.**

It’s the greatest gift. I’ve been blessed because I’ve had the opportunity to record some of the great virtuosos. A lot of these musicians have tapped into something really profound, very spiritual, because that kind of music leads you to it. Just to sit next to them, to drink a cup of tea with them, is an inspiring experience. They have so much love.

When these men die, a whole era is going with them—the era of the royal courts. When these musicians were court musicians, they only had to worry about the music; everything else was taken care of. Now musicians have to be agents and managers, negotiating their price for the next gig. It changes something.

One of the masters is Ali Akbar Khan. My first record on Water Lily is of him. I consider him as my dad; he’s been very loving. He tells me stories about his father, Baba Allhudid Khan, and what it was like in the old days to play in the royal courts.

Baba, a legend in India and revered as a musical genius, had a band composed of orphans. It was a chamber group trained in both Western and Eastern instruments. This, I believe, was one of the first fusion bands. He even made new types of instruments, such as a combination sitar/banjo. He was a great innovator, a guiding light.
y business relationship with these musicians is based on friendship. Many musicians whom I record do not speak any English. They can’t even read my recording contract, but they trust me because I’m their friend. It’s a big responsibility.

A lot of these virtuoso musicians are in their golden years; they feel they don’t have much time left, and they want to leave behind a record of their work. The great Indian singer Salamat Ali Khan told me that there are these modes he’s always wanted to sing, and he said, “Hurry up, record me.”

**What are your plans for the future?**

I want to become mobile. Many musicians from the old traditions don’t want to travel to the church in California where I record. They don’t want to leave their villages. So I want to record on location. The recorder I have now weighs 250 pounds! Tim de Paravicini is going to design and build an FM recorder for me, using Nuvistors in a Nagra instrumentation-recorder transport.

I just did a recording with James Newton, David Hidalgo from Los Lobos, Cadri Goopalnath (a South Indian sax player), and Martin Simpson (a fantastic English guitarist).

**You seem to have a mission.**

Yes. I want to archive the traditional music of Asia, American Delta blues, and whatever acoustic music that has a tradition worth preserving. Many of my recordings bring together wonderful musicians from the West with those of the East. So we have East meets West. I’m also recording Indian and Chinese musicians together and Indian and Iranian musicians collectively. East meets East! This has never been done before.

I’ve always believed in this type of fusion, because all music is ultimately a fusion of various cultural streams. This mix of cultures paves the way for the future. I try to preserve the old music in the purest way on the one hand while trying to create encounters that can be a stepping stone for the new music on the other.

I’m very much a believer in the oral tradition of poetry and music. I think we are losing that. In this age, most people have no regard for poetry; most don’t even sing lullabies to their babies anymore. A doctor found that babies who had lullabies sung to them were able to grasp more complex things perceptually than babies who had no lullabies sung to them.

The highest compliment to me would be, “I read your liner notes and started singing lullabies to my baby.” Then I would feel that I have contributed something, in a humble way, toward the betterment of humanity.

**PARTIAL DISCOGRAPHY**

- Ry Cooder and V. M. Bhatt, *A Meeting by the River* (Water Lily WLA-CS-29-CD). A best-seller featuring bottleneck guitar, mohan vina (a sitar-like instrument), and tabla.
- The Court Musicians, *At the Court of the Chera King* (Water Lily WLA-CS-34-CD). Vocal, dobro, violin, cello, dulcimer, sarod, tar, and dumbek.
- Dom Um Romao, *Saudades* (Water Lily WLA-CS-16-CD). Jazz-like music with drums, piano, percussion, berimbau, vocals, bass, and sax.

For a complete discography, call 805/968-8188.

Kavi Alexander told me that Water Lily Acoustics “will release a CD of classical Indian musicians and classical Chinese playing together. It’s a remarkably historic recording because this Indian/Chinese mix has never been done before. The recording features Visha Mogen Bhatt and an exceptional erhu player from China, Jie-Bing Chen. Another recording will feature Iranian master musician Jossian Alisade playing with a South Indian musician, Ravikiran, who played with Taj Mahal. We’ll also present Simon Shahim, probably the finest erhu player in the United States.”
'Audio Hall of Fame' speaker designer Arnie Nudell is famous for making speakers with ultra high-end performance—and prices to match. Now he has developed Eosone—a new speaker line featuring high-end technologies and performance but at affordable prices.

The top-of-the-line Eosone Millennium home theater speaker system features Radiant Surround Field™ dipole technology so that everyone in the room, regardless of listening position, hears the same full fidelity sound and lifelike imaging.

On-board, twin 10" powered subwoofers provide the body slams while titanium dome tweeters deliver clean, clear sound and enveloping surround sound imaging. The center and surround speakers perfectly match the front speakers and take full advantage of the latest surround technologies such as Dolby® Digital (AC-3®).

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The Eosone Millennium system consists of two RSF 1000 towers with twin, on-board powered subwoofers, two RSR 350 surround speakers and one RSC 300 center speaker.

Suggested retail price: under $3,000.
Although the new Technics Master Reference SA-TX50 looks like an upscale stereo amp, it's really a five-channel, Home THX-certified, Dolby Digital surround-ready receiver. With its twin analog power meters, central volume control, and modicum of other buttons and knobs, the SA-TX50 looks like less than it is. (Or should that be "more"? Those burnished-gold meters surely give it the high-end look of yore.)

In addition to its AM/FM-stereo tuner, the sine qua non of a receiver, the SA-TX50 handles two audio-only sources and five audio/video sources. The audio inputs are designated "CD" and "Tape." There's no phono preamp, but that's not likely to concern the buyers Technics has in mind for this product.

The video complement is nominally designated for three VCRs, a TV, and a videodisc player ("VDP"). Of the VCRs, only "VCR 1" can record, but it's equipped with S-video and composite-video connections and can make a direct S-video dub from the videodisc player—the only other input that has an S-video connector. The SA-TX50's "TV" and "VCR 2" and "VCR 3" inputs handle composite-video signals exclusively. Since composite-video and S-video signals are routed separately through the SA-TX50 (as is usual), both output types are provided for the TV, and both must be connected if both are to be used.

All connectors are on the back except for the trio of RCA jacks for "VCR 3" and the front-panel headphone jack; all are base metal. To meet requirements for Home THX certification, there's a line-level subwoofer output to feed a powered sub and decoder output jacks for the five other channels (front left and right, center, and surround left and right). These are jumpered to their respective power amp input jacks by removable links, so you can reconfigure the system if desired. (Although the receiver's owner's manual mentions connecting a graphic equalizer at this interface, I don't recommend using such a hookup for home theater unless a five-channel equalizer is used and all channels are adjusted simultaneously.)

In addition to stereo inputs for each source, the "VDP" input has four more jacks to accommodate the stereo surround, center, and low-frequency effects (LFE) signals of an external Dolby Digital (AC-3) decoder (or a DVD player with analog outputs from all channels of its internal Dolby Digital decoder). These are activated when the input selector is set to "VDP6CH," and they route the 5.1 discrete audio channels directly through the system. Thus, when "VDP6CH" is selected, all other playback modes are unavailable, so you can't use THX timbre-matching or re-equalization with Dolby Digital audio. When conventional "VDP" is selected, the stereo signal fed to the front left/right inputs is decoded by the Dolby Pro Logic circuit and Home THX modifications can be applied.

Connections are provided for a 75-ohm FM antenna, a long-wire AM antenna, and the supplied AM loop antenna. The loop plugs into a socket on back and must be attached even when you use an external wire.
antenna. The wire antenna connects to a thumbscrew terminal. Two more terminals are provided for the FM antenna hot and ground wires; I find these somewhat less convenient than an F connector.

The SA-TX50 has output terminals for two sets of main front speakers, a center speaker, and a pair of surround speakers. Although these look to be multiway binding posts that will accept banana plugs, the connectors lack internal metal sleeves and can be used only with bare wires. The receiver is powered via a detachable two-wire line cord, and it has two switched convenience outlets rated for 300 watts total. A cooling fan activates as needed but is usually off.

For the most part, the SA-TX50 is digitally controlled; even the volume control adjusts level in discrete steps, although it feels continuous and sounds almost so. The main exceptions to this are the bass and treble controls, which seem conventional. Although they can’t be defeated manually, these controls are bypassed automatically in Pro Logic and THX; a wider range is available in the music modes.

With the final two pads in this control cluster, you select stereo or mono reproduction. If you make a mistake while operating the SA-TX50 or if the sound cuts out because of some operation that was performed, pressing the “Help/Reset” key (to the left of “Volume”) displays suggestions for correcting the problem. For example, if you mute the receiver and tap “Help,” “Muting On Now” will scroll across the display and you’re given instructions as to what to do: “Press The Muting Button On Remote Controller.” Pressing “Help/Reset” until “Reset” appears in the display will re-initialize the receiver to its factory settings.

The two pads to the right of the volume control are labeled “Input Selector.” You can advance forward or backward through the options: “Tuner,” “CD,” “Tape,” “VCR 1,” “VCR 2,” “VCR 3,” “VDP,” “VDPp6CH,” “TV,” and back to “Tuner.” Next are the tuner controls: two pads to advance up and down the FM or AM band in standard channel increments, two pads to advance up or down through the 30 possible station presets, a pad to select the band, another to choose between “FM Auto” (i.e., stereo) and mono reception, and a pad for loading the station presets (“Memory”). Pressing “Memory” briefly will load the currently tuned station into whatever preset slot you designate. Pressing it a little longer makes the TX50 automatically find and memorize the station presets ("Memory"). Pressing “Memory” briefly will load the currently tuned station into whatever preset slot you designate.
You can select any TV channel or AM/FM station preset by entering the channel or preset number; you can tune radio broadcasts directly by entering the station frequency on the numeric keypad.

The remote has the only facilities for balancing sound levels, with "Test," "CH Select," and "CH Level" pads for this purpose. Because the receiver lacks an ordinary balance control, readjusting the left/right front-speaker calibration is the only way to correct for a wayward stereo program.

Measurements

Although I didn’t have a schematic or signal-flow diagram for the SA-TX50, it became pretty clear from the test results that stereo signals are digitized whether they receive further digital processing or not. As you can see in Fig. 1, the amp section’s frequency response in stereo dies abruptly above 20 kHz (it’s down 3 dB at 21 kHz) and there’s some high-frequency ripple caused by the digital filters. That doesn’t bother me particularly (although I think it’s a needless complication). But given the fact that the signal is digitized, I see no reason for the response to be down 1 dB at 20 Hz.

Potentially more bothersome is the amp section’s nonlinear phase response, which occurs at both ends of the audio spectrum. The effect is seen in Figs. 2A and 2B. I seldom present curves of phase response because they usually reveal nothing significant. Not so in this case. Below 70 Hz and above 8.73 kHz, the curves exhibit substantial nonlinearity, which implies nonconstant group delay, a potentially audible form of "phase distortion." (Note that I’ve used a linear rather than logarithmic frequency scale, to facilitate your seeing the nonlinearity.)

Another cause for concern is the SA-TX50’s precariously low input-overload point of 2.02 volts. Although the quasi-standard 0-dBFS output level of digital-to-analog (D/A) converters is 2.0 volts, and it doesn’t pay to waste dynamic range by providing excessive headroom, this is cutting it too close. Some CD and laserdisc players put out more than 2.02 volts at 0 dBFS, and when they do, the SA-TX50 will clip sharply. This characteristic is particularly surprising given that Lucasfilm’s Home THX specs call for an overload point of at least 3 volts.

Fortunately, the tone controls seem to come after the A/D and D/A processors and do not affect input overload. Both controls shelled, the bass below 100 Hz and the treble above about 10 kHz. The control ranges were perfectly adequate and reasonably symmetrical (see “Measured Data”).

Figure 3 shows the crossover between the main and subwoofer channels. These curves are rather perplexing too. The high-pass section cuts off as mandated by Home THX standards (~3 dB at 80 Hz, 12 dB per octave), but the low-pass section is off the mark. The slope is okay (24 dB per octave), but the –6 dB point occurs at 91 Hz rather than at 80 Hz. Furthermore, the low-end response in the subwoofer channel rolls off—it’s down 1 dB at 31 Hz and 3 dB at 22 Hz—so there’s actually less bass output from the receiver when a subwoofer is used than when it’s not!

The amp section’s A-weighted noise, measured in stereo with the volume set according to IHF standards (about 11.2 dB below the THX reference mark), was a rather poor –69.7 dBW. The third-octave noise spectrum of Fig. 4 suggests why. Note the bump in noise power in a two-octave region (between approximately 150 and 700 Hz) in the upper bass and midrange. There’s also a fairly substantial power-supply hum component at 120 Hz and some line-induced hum at 60 and 180 Hz. These hum components are not that unusual, but the broad hump in noise is—and it is not suppressed by A-weighting.
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- D.B. Keele, Jr., on the Studio/100 Audio Magazine/July '96

"Extraordinary... Bravo Paradigm!"

- Andrew Marshall, on the Studio/80, CC-450, ADP-450 Audio Ideas Guide, Summer '96 Issue

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CIRCLE NO. 31 ON READER SERVICE CARD
Technics specifies output power only with 6-ohm loads and gives an FTC rating only in stereo (125 watts per channel at 0.05% THD. 20 Hz to 20 kHz). For home theater, power ratings are given at clipping and only at 1 kHz (120 watts per channel across the front, 100 watts apiece for the surrounds). I tested the receiver in stereo with standard 8- and 4-ohm loads and, with 4-ohm loads, tried the high- and low-impedance choices. Not having either 8- or 4-ohm manufacturer’s specifications, I couldn’t calculate dynamic headroom, but I did check dynamic power (see “Measured Data”).

The SA-TX50 uses Technics’ “Class H” power modules, which are transistor/IC hybrids. I take them to be similar to the modules used in the SE-A1000 stereo power amplifier that I reviewed for the May issue. Although purists sniff at such hybrid amps, I found that those in the SE-A1000 tested very well. I was rather surprised, therefore, that the test results for the SA-TX50 were substantially worse.

The curves of Fig. 5 plot total harmonic distortion plus noise (THD + N) versus output level, for 8-ohm loads at three test frequencies (Fig. 5A) and at 1 kHz for 4-ohm loads with both impedance settings (Fig. 5B). The “bumps” in the curves correspond to the output levels at which the SA-TX50 shifts between power-supply rails—low-voltage rails when delivering modest output power and high-voltage rails when approaching full power. As you can see from Fig. 5A, the switchover region varies with frequency and occurs at lower power levels with high-frequency signals than with low-frequency signals. Although the general shape of these curves is fairly typical of Class-H operation (it’s one of the prices paid for Class-H efficiency), these distortion levels are relatively high. At 20 kHz with 4-ohm loads, THD + N was especially high; in the transition region, around 7 watts, it hit nearly 1%.

However, they operate even when the speakers are turned off.)

What’s interesting about the curves in Fig. 6—especially those taken with the high-impedance setting (Figs. 6A and 6B)—is that over much of the frequency and power range, most of the distortion does not seem to come from the hybrid power modules but from elsewhere in the circuit. The irregularities in these curves and their relative parallelism suggest that the distortion mechanism lies in the analog-to-digital or digital-to-analog converters. There’s no justification for that; Technics certainly has better A/D and D/A converters at its disposal.

On the IHF tone-burst test for dynamic headroom, the SA-TX50 delivered about 0.5 to 1 dB more power than on a steady-state basis. Damping factor was nearly 100, and output impedance was relatively constant with frequency, rising from 85 milliohms at 1 kHz to 115 milliohms at 20 kHz. Channel separation in stereo mode was 53 dB or better across the meaningful ratings for either 8- or 4-ohm loads (the TX50 is rated for 6 ohms), I imposed my own ratings, based on the results in Fig. 5. Under steady-state, 1-kHz conditions with 8-ohm loads, the SA-TX50 clipped at 175 watts per channel, so I assigned it a power rating of 125 watts per channel (the same as Technics uses for 6-ohm loads). With 4-ohm loads and the low-impedance setting, the receiver clipped at 82 watts per channel; I therefore rated output as 75 watts. With the high-impedance setting, it delivered 215 watts per channel into 4 ohms at clipping. I thought this might be pushing it, so I ran one curve at 125 watts per channel and another at 200 watts per channel. At the very end of the 200-watt/channel test, the overload protector triggered, so I guess I was up against the stops. (The power meters, incidentally, are calibrated for 8-ohm loads and are reasonably accurate.)
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CIRCLE NO. 32 ON READER SERVICE CARD
portion of the spectrum. Channel imbalance in stereo amounted to 0.4 dB. Input impedance was fine; output impedance at the tape recording terminals was rather high, so keep the interconnects short. Recording output levels, however, were fine.

I tested the TX50's Dolby Pro Logic performance using 8-ohm loads on each channel and with the high-impedance setting. The test results are remarkably similar to those in stereo, often matching within the limits of measurement error. Main-front output power at clipping, for example, is 0.2 dB less with Pro Logic than in stereo; it's difficult to determine the clipping point more precisely than that.

With only the center channel driven, as Fig. 7 shows, output power at clipping rises to 205 watts, well above Technics' spec. The surround channels squeak through, if you take into account the difference between the 8-ohm loads I used and the 6-ohm loads Technics used for its specs. (The rated 100 watts per channel into 6 ohms is equivalent, on an output-voltage basis, to 75 watts per channel into 8 ohms.)

Figure 8 shows THD + N versus frequency with Dolby Pro Logic decoding. I measured all three front channels at 100 watts into 8 ohms (close to the voltage equivalent of the 6-ohm rating) and the surrounds at 75 watts a side. The front-channel curves are shaped remarkably like those taken in stereo (which again suggests that the distortion is coming from the converters). The maximum distortion levels (less than 0.43% from 20 Hz to 20 kHz) are also remarkably like those taken in stereo. Actually, it's a bit better, since the tone controls are bypassed in Pro Logic mode. As you can see in Fig. 9A, the surround channel rolls off above 6.5 kHz in Pro Logic mode, as it should, and the center rolls off below 100 Hz when in its "Normal" mode. Figure 9B shows the receiver's frequency response in the Home THX mode (note the change in scale). On the whole, these curves adhere to Home THX standards within acceptable tolerance limits.

The receiver's A-weighted noise in Pro Logic mode was similar to that in stereo; if anything, it was a tad better. Steady-state channel separation at 1 kHz varied from a low of 52.5 dB between the surround and right-front channels to a maximum of 70.8 dB between left front and surround. On the whole, separation averaged about 63 dB, which is very good.

When I test FM tuners, I often cannot verify a manufacturer's specs for alternate-channel selectivity, image rejection, and AM suppression. For the SA-TX50, however, my selectivity figure exceeded 'Technics' spec by 12.5 dB, AM suppression was more than 16 dB better than claimed, and image rejection beat the spec by a whopping 30+ dB! Adjacent-channel selectivity (which Technics, like most manufacturers, does not specify) was also remarkably high. There's usually a trade-off between high selectivity on the one hand and good capture ratio and low distortion on the other. That was the case here: Capture ratio was a relatively modest 2 dB, and although the SA-TX50's tuner beat its distortion spec in stereo, it missed the target on mono broadcasts. The tuner's THD + N is listed in "Measured Data" at 100% modulation; distortion at 50% modulation was a bit lower, 0.03% or less to about 4 kHz and less than 1% out to about 7.5 kHz.
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measured data

amp section, stereo mode

output power at clipping (1% THD at 1 kHz): 8-ohm loads, 175 watts (22.4 dBW); 4-ohm loads at low-impedance setting, 82 watts (19.1 dBW); 4-ohm loads at high-impedance setting, 215 watts (23.3 dBW).

dynamic output power: 8-ohm loads, 195 watts (22.9 dBW); 4-ohm loads at low-impedance setting, 90 watts (19.5 dBW); 4-ohm loads at high-impedance setting, 270 watts (24.3 dBW).

THD + N, 20 Hz to 20 kHz: 8-ohm loads, less than 0.406% at 125 watts/channel out and less than 0.416% at 10 watts/channel out; 4-ohm loads at high-impedance setting, less than 0.4% at 125 watts/channel out and less than 0.752% at 10 watts/channel out.

A-weighted noise: -69.7 dBW.

damping factor 8 ohms: 95 at 50 Hz.

output impedance: 85 milliohms at 1 kHz, 90 milliohms at 5 kHz, 105 milliohms at 10 kHz, and 115 milliohms at 20 kHz.

frequency response, tone controls at detent: 20 Hz to 20 kHz, +0.29, -0.95 dB (-3 dB at 10.4 Hz and 21 kHz).

tone-control range: bass, +10.2, -8.8 dB at 100 Hz; treble, +8.7, -8.2 dB at 10 kHz.

subwoofer crossover: high-pass, -3 dB at 80 Hz and -6 dB at 61 Hz, 12-dB/octave slope; low-pass, -3 dB at 76 Hz and -6 dB at 91 Hz, 24-dB/octave slope.

sensitivity: 30.9 mV for 0 dBW out.

input impedance: 32.4 kilohms.

input overload for 1% THD at 1 kHz: 2.02 V.

channel separation: greater than 53.3 dB, 100 Hz to 10 kHz.

channel balance: ±0.02 dB.

record output level: "VDP" input, 470 mV out for 0.5 V in; FM tuner, 520 mV out for 100% modulation at 1 kHz.

recording output impedance: 3.55 kilohms.

amp section, dolby pro logic mode

output power at clipping, 8-ohm loads: Main channels, 165 watts/channel (22.2 dBW) with "phantom" center setting; center channel, 205 watts (23.1 dBW) with "wide" center setting; surround channels, 82 watts/channel (19.1 dBW) with "wide" center setting.

THD + N at 125 Watts Output, 8-Ohm Loads: Main, less than 0.41% from 20 Hz to 20 kHz; center, less than 0.43% from 20 Hz to 20 kHz; surround, less than 0.34% from 20 Hz to 8.7 kHz.

frequency response: Main, 20 Hz to 20 kHz, +0.29, -0.92 dB (-3 dB below 10 Hz and at 21.08 kHz); center ("wide" mode), 20 Hz to 20 kHz, +0.06, -1.34 dB (-3 dB at 13.5 Hz and 21.15 kHz); center ("normal" mode), 104 Hz to 21.15 kHz, +0.06, -3 dB, surround, 11 Hz to 6.55 kHz, +0.11, -3 dB.

A-weighted noise: Main, -70.4 dBW; center ("wide" mode), -68.4 dBW; surround, -70.1 dBW.

channel separation at 1 kHz: 52.5 dB or greater.

FM tuner section

IHF usable sensitivity: Mono, 19.4 dBf; 50-dB quieting sensitivity: Mono, 21.3 dBf; stereo, 45.8 dBf.

S/N at 65 dBf: Mono, 74.3 dB; stereo, 64.8 dB.

frequency response, stereo: 20 Hz to 15 kHz, +0.13, -1.12 dB.

channel balance: ±0.00 dB.

channel separation: Greater than 32 dB, 100 Hz to 10 kHz.

THD + N at 65 dBf, 100% modulation: Mono, 0.49% at 100 Hz, 0.45% at 1 kHz, and 0.16% at 6 kHz; stereo, 0.25% at 100 Hz, 0.2% at 1 kHz, and 0.99% at 6 kHz.

Capture ratio at 45 dBf: 2 dB.

selectivity: Adjacent-channel, 9.5 dB; alternate-channel, 77.5 dB.

image rejection: Greater than 75 dB.

AM rejection: Greater than 66 dB.

Stereo-Pilot rejection: 35.9 dB.

Stereo-subcarrier rejection: 83.2 dB.

Although the TX50's tuner is unusually selective, its sensitivity is no better than average. As seen in the quieting curves of Fig. 10, the tuner reaches 50-dB quieting with a 21.3-dBf mono signal and a 45.8-dBf stereo signal. Below 38 dB (the point at which the stereo curves begin), the tuner receives stereo broadcasts in mono. Signal-to-noise ratio at 65 dBf was good, better than 74 dB in mono and almost 65 dB in stereo. Channel balance was perfect. Frequency response was smooth, extended, and extremely flat. Tape recordists will appreciate the better-than-average pilot rejection and total absence of subcarrier residue in the audio output. Incidentally, because I measured the FM tuner characteristics at the tape output (as usual), I presumably bypassed the SA-TX50's digital conversion process.

Use and Listening Tests

I know from experience that the technology of Matsushita, the parent company of Technics, is world-class and that Technics has delivered many excellent products over the years. But I was disappointed in the SA-TX50 in a home theater; after all, video can pass off for 100% modulation at 1 kHz.

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Although the TX50's tuner is unusually selective, its sensitivity is no better than average. As seen in the quieting curves of Fig. 10, the tuner reaches 50-dB quieting with a 21.3-dBf mono signal and a 45.8-dBf stereo signal. Below 38 dB (the point at which the stereo curves begin), the tuner receives stereo broadcasts in mono. Signal-to-noise ratio at 65 dBf was good, better than 74 dB in mono and almost 65 dB in stereo. Channel balance was perfect. Frequency response was smooth, extended, and extremely flat. Tape recordists will appreciate the better-than-average pilot rejection and total absence of subcarrier residue in the audio output. Incidentally, because I measured the FM tuner characteristics at the tape output (as usual), I presumably bypassed the SA-TX50's digital conversion process.
Listen Past the Equipment and Experience the Music as Intended

Once in a while an idea comes along which represents a significant step forward in advancing the current state-of-the-art. We feel our new ST Series amplifiers exemplify this unique distinction.

A new approach to low-noise, low distortion signal-path has produced a line of amplifiers which is actually quieter and more transparent than any source material currently available.

THE BRYSTON ST SERIES AMPLIFIERS

Bryston ST amplifiers, from the top: 8B ST 4 channel 120 wpc, 5B ST 3 channel 120 wpc, 4B ST 250 wpc stereo, 7B ST 500 watts mono. Not shown is the 3B ST 120 wpc stereo.

The Bryston ST innovation: our ultra-linear “input buffer-with-gain” substantially lowers the distortion and inherent noise floor — hearing is believing. Completely separate power supplies for each channel eliminate any crosstalk to ensure firm focus and completely accurate imaging of musical instruments. Switchable gold plated RCA unbalanced and XLR-1/4 inch balanced inputs, with equal gain, allows flexibility for multi-channel system configurations.

Bryston Ltd, P.O. Box 2170, 677 Neal Drive, Peterborough, Ontario, Canada K9J 7Y4 Tel: (705) 742-5325 Fax: (705) 742-0882 CIRCLE NO. 8 ON READER SERVICE CARD
The Baron tube power amp’s heritage stems from Mesa Engineering’s success as a maker of musical instrument amplifiers. Randall Smith, the company’s president and chief designer, saw a need in the early ‘80s for a guitar amplifier that could be rack-mounted, so he developed the Mesa M180 and M190 amplifiers. These early models, which found their way into the hi-fi systems of some of Smith’s audiophile friends, were so well received that he decided to build a high-end amplifier for use in the home. This led to the introduction of the Baron.

In designing the Baron, a complex and unusual amp, Smith relied heavily on a listening panel that was fairly evenly divided between musicians and audio enthusiasts. The panelists rejected many design choices that would have given the amplifier better measurements in favor of those they felt would improve its sound. The Baron’s design was finalized when its sound character satisfied both the panel and Smith.

The most unusual aspect of the Baron’s design is its Tandem-State Imaging (patent pending), a system for tailoring the amp’s sonic performance to suit different tastes and speakers. Tandem-State Imaging comprises two parts, a rear-panel switch to select any of four negative feedback levels (“0,” “I,” “II,” and “III”) and an output-tube setup for pentode or triode operation as well as mixtures of the two.

To accomplish the latter, Mesa partitioned each channel’s three pairs of output tubes into two unequal groups. Switches on top of the chassis enable each group to be set for triode or pentode operation. Four modes of operation are available: full pentode, two-thirds pentode and one-third triode, one-third pentode and two-thirds triode, and all-triode.

Power output varies according to the operating mode, with each group of output tubes delivering about 60% less power in triode than in pentode mode. But what matters most, according to Mesa, is the range of sonic choice that Tandem-State Imaging gives you. For example, the Baron’s instruction manual states that you might prefer triode operation with little or no negative feedback for “bringing lushness to...acoustic instruments in a playback setting,” whereas pentode operation might be better “for playing back modern electronic music, where bass fundamentals require considerable—and fast—amplifier power with enough negative feedback to keep speaker motion tight.”

The Baron’s very attractive front panel has mirror-image symmetry—which is logical, since the Baron is a dual-mono design and has separate AC power cords for each channel. The prominent, illuminated meters normally indicate output level but are

**THE MESA BARON’S DESIGN CHOICES WERE BASED ON LISTENING PREFERENCES, NOT MEASUREMENTS.**

---

**Rated Midband Power at Onset of Clipping, All-Pentode Operation into 8 or 4 Ohms:** With Type 5881 output tubes, 135 watts per channel; with Type 6L6 output tubes, 150 watts per channel.

**Rated Midband Distortion with No Negative Feedback:** Less than 1% THD.

**Dimensions:** 19 in. W x 8¼ in. H x 14½ in. D (48.3 cm x 22.2 cm x 36.8 cm).

**Weight:** 75 lbs. (34 kg).

**Price:** $3,695.

**Company Address:** 1317 Ross St., Petaluma, Cal. 94954; 707/433-8663; E-mail, audioguy@mesaboogie.com

For literature, circle No. 91
Introducing MovieWorks™
No-Compromise Home Theatre Surround Sound
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For many, many people, MovieWorks is the perfect home theater speaker system. It delivers incredible no-compromise performance that doesn't require disclaimers or apologies. We don't know of any other system in its price range that approaches its performance.

What Is MovieWorks?
MovieWorks is a set of carefully matched speakers — including a powered subwoofer — for Dolby Pro Logic® or Dolby Digital® (AC3) surround sound systems. Each speaker is designed to accurately reproduce music and movie soundtracks with outstanding realism.

Main Speakers.
The left and right speakers in MovieWorks use a two-way, shielded design. They are acoustically similar to the satellite speakers in our acclaimed Ensemble™ speaker system, which Audio magazine called “the best value in the world.”

The Center Speaker.
The center speaker is a wide-dispersion, high-output shielded design with two 3 1/2" midrange drivers and a tweeter identical to that in the main speakers. Its low profile makes it ideal for use above or below a TV monitor.

The Surround Speakers.
For the rear channel, we chose an acoustically matched dipole radiator speaker. Each speaker has two high-frequency drivers — one facing forward, one to the rear. They send out-of-phase signals to the front and rear of the room, where they reflect off walls, "surrounding" the listener. We feel dipole speakers are ideal for home theater — including Dolby Pro Logic and Dolby Digital (AC3) systems.

"The Cambridge SoundWorks dipole surround speaker sounded absolutely great. These will stay on my surround speaker shelves for a long time."
— Home Theater magazine — 3/96

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At $1,299, we think MovieWorks is the ideal home theater sound system for people who aren't willing to compromise on performance. As an introductory offer, MovieWorks comes with $100 Bonus Dollars for use towards the purchase of anything in our catalog.

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"Cambridge SoundWorks' Powered Subwoofer was clearly the best subwoofer of the pack...it blew them away on dynamics."
— Stereo Review — 9/96

HOW DOES MovieWorks COMPARE TO THE COMPETITION?

<table>
<thead>
<tr>
<th>COMPETITOR</th>
<th>DIPOLE SURROUND SPEAKER?</th>
<th>WOOFER SIZE</th>
<th>SUBWOOFER POWER</th>
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<tbody>
<tr>
<td>CAMBRIDGE SOUNDWORKS</td>
<td>YES</td>
<td>12&quot;</td>
<td>140 WATTS</td>
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<tr>
<td>POLK (M5, M311, CS250S, PSW300)</td>
<td>NO</td>
<td>10&quot;</td>
<td>125 WATTS</td>
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<td>BOSTON ACOUSTICS (Micro90, 9DX, 9GC)</td>
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<td>75 WATTS</td>
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<tr>
<td>KLIPSCH (KSS3, KSS2, KSS1)</td>
<td>NO</td>
<td>6.5&quot;</td>
<td>50 WATTS</td>
<td>$1,199</td>
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†Price includes $100 Bonus Dollars good towards any product in the Cambridge SoundWorks catalog.
The Baron’s input circuit is a differential amplifier that uses a 12AX7 dual triode as a phase inverter. One grid is fed from the incoming input signal, the other to ground through a resistor that forms the shunt element for the negative feedback. Because of the impedance difference between these grids, the Baron is set up, despite the presence of XLR jacks, for unbalanced signals. In the unit I received, pin 2 of the XLR input connector was tied to the hot lead of the RCA input connector and to the signal input grid; pins 1 and 3 were grounded. Grounding one phase of a balanced input this way could conceivably cause distortion in some preamps. (For that reason, according to Mesa Engineering, Baron amps produced since August of this year have pin 3 grounded through 60 kilohms, to match the input impedance of pin 2 and the RCA connector.) The cathodes of the input tubes are tied together and returned to about -60 volts through a resistor whose value sets the stage’s current at the desired level. Output is taken from the plates of the first stage and capacitor-coupled to the next stage through an attenuator that uses one resistor for each signal phase.

The second stage, which also uses a 12AX7 dual triode, is a push-pull amplifier whose cathodes are tied together and connected to ground through a self-biasing resistor. This resistor is bypassed with an electrolytic capacitor. An AC-balance control is incorporated in the plate circuit. (This is a service adjustment and should not be confused with the accessible balance adjustment described below.) A small capacitor is connected from one of the plates to ground; this is just one of many touches that tailor the sound in a way Mesa Engineering considers desirable, although it also increases measured high-frequency distortion. Plate outputs of this stage are capacitor-coupled to the grids of the output tubes.

The plates of the output tubes are fed from a 460-volt supply. The screen grids of the output tubes are fed through a filter choke from this supply and are bypassed through a capacitor to ground. Two adjustable bias-voltage dividers are used to feed the tube grids in each half of the push-pull output stage through individual grid-leak resistors. When the meter switches on the front panel are set for bias adjustment, the meter reads the voltage drop across a common-cathode sampling resistor. This represents the sum of the DC currents in the three output tubes near the Baron’s front. When the meter switch is set for balance adjustment, the meter is connected between the sampling resistor and a similar resistor in the cathodes of the other three output tubes. When the amp has been properly balanced, the cathode currents in both halves of the push-pull circuit are equal and the meter reads zero. Global negative feedback is taken back through a switchable series resistor (the four-position feedback switch on the back panel) from the 8-ohm output tap to the aforementioned shunt feedback resistor.

In the power supply, the B+ voltage for the output stage passes through a solid-state, full-wave rectifier bridge and six 4,700-microfarad, 100-volt filter capacitors in series (an effective filter capacitance of 783 microfarads and 600 volts). Identical resistors across each of the capacitors equalize the voltage distribution in the series string and function as high-voltage bleed resistors when the Baron is turned off. The soft-start position of the AC power switch temporarily places a resistor in series with the power transformer’s primary winding, thereby reducing inrush current. This current can be appreciable because the tube heaters have low resistance when cold and the capacitance of the B+ filter is high. Flipping the power switch up to its operating position shorts out the resistor. Simple and effective. B.H.K.

The innermost toggles are used to illuminate each meter, a nice touch.

On top of the chassis, near the rear edge, are sets of toggle switches for each amplifier channel. In each set, one switch selects pentode or triode mode for four output tubes, another selects the operating mode for two tubes, and a smaller switch between them selects whether the circuit’s common ground is connected to the chassis and power-line ground or isolated from them.

On the Baron’s rear panel are, for each channel, three rugged gold-plated binding posts for speaker connections (“Common” flanked by “4 Ohm” and “8 Ohm”), RCA phone and XLR connectors for signal inputs, an AC line fuse, and an IEC power-cord socket. The “Negative Feedback” also referred to when you adjust the output tubes’ bias and balance. A rotary switch below each meter sets the meter to show output level (with a choice of 15 or 150 watts as the 0-dB point), bias, or balance.

Between the two rotary switches are six toggle switches, three per channel. The outermost toggles are unusual, three-position power switches. To turn the Baron on, you should hold each switch all the way down for 2 seconds (its soft-start position), to start the amp without a current surge; then you flip each switch up to its top position. The middle position turns the amp off. The adjacent standby switches also have three positions, for warm-up, standby, and operation. These switches control the high-voltage level fed to the tubes; the tube heaters remain on in all three positions so that the amp can start operating without waiting for the tubes to heat up. The warm-up mode reduces the high voltage by half, which cuts off the output stage, greatly reducing heat and overall power consumption. The standby position shorts out the resistor. Simple and effective. B.H.K.

UNIQUELY, THE BARON OFFERS TRIODE AND PENTODE OPERATION PLUS TWO INTERMEDIATE MODES.

by position cuts the high voltage off completely, reducing heat and power draw even more. However, the Baron attains its characteristic sound faster when you switch on from warm-up than from standby mode.
Introducing The Tower™ Series By Henry Kloss.

Cambridge SoundWorks' new Tower series speakers combine musical accuracy, very natural tonal balance, precise stereo imaging and an incredibly dynamic presence—all without reinventing the laws of physics.

No Mumbo Jumbo.

We don't claim our designs are based on amazing scientific breakthroughs. No mystery material. No magical formula. No revolutionary technology. We offer carefully fine-tuned designs, based on years of experience, using the best materials. But we aren't obsessed with materials. We're obsessed with sound.

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The result is somewhat unusual: speakers combining the dynamic presence of high-efficiency studio monitors, and the precise musical accuracy and pinpoint imaging of low-efficiency "reference" speakers.

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Tower III is a three-way design using a wide-dispersion tweeter and a single 8" woofer. Like the more expensive models in the Tower series, it combines high sensitivity and outstanding dynamic range with the natural, wide-range sound (including terrific bass) that results from a generously-proportioned cabinet. It has been meticulously "voiced" by Henry Kloss for superb musical octave-to-octave tonal balance and precise stereo imaging. These benefits come at a much lower cost than superficially similar models through a combination of Henry Kloss' design expertise, plus Cambridge SoundWorks' highly efficient direct-to-the-consumer sales policy: Tower III is the most affordable high-performance floor-standing speaker we know of.

Like other models in the series, Tower III is magnetically shielded and features removable black grilles, fully-finished cabinets (front and rear) and gold-plated binding posts. It is finished in black ash vinyl. Factory-direct price: $599 pr.

Tower II by Henry Kloss

Tower II is a three-way system that is substantially larger than Tower III. It features two 8" polypropylene woofers, a 5 1/4" polypropylene midrange driver, and a 1" soft-dome tweeter. A flared low-frequency vent is located at the lower rear of the enclosure.

The large cone area of Tower II's multiple drivers contributes to an effortless sound quality, giving music a strong feeling of "presence" that is easier to hear than describe. That presence, along with Tower II's smooth, musical octave-octave tonal balance and precise stereo imaging, produce what we think is the finest speaker system ever offered for under $1,000.

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CenterStage is a two-way, three-driver center channel speaker that complements our Tower speakers. It matches the tonal balance of all three models. Its bass reach is significantly greater than that of most center speakers, thanks to its dual-vent enclosure. The dynamic range of its long-throw drivers is enough to handle the most demanding of video soundtracks, while their dispersion is broad enough to include all listening positions. It is finished in black vinyl. Factory-direct price: $349

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connect the top of the front panel with the back corners of the chassis; these bars will help you lift the amp and enable you to turn it over without damaging the tubes. All metalwork is aluminum, even the transformer covers. The inside of the chassis is mostly occupied by printed circuit boards for each channel's audio circuitry and power supply. The Baron is very well built, with high-quality parts.

Measurements

To simplify references to the Baron's four operating modes, I'll abbreviate them as P/P (all-pentode), P/T (two-thirds pentode, one-third triode), T/P (two-thirds triode, one-third pentode), and T/T (all-triode). Data presented is for the left channel, which had higher distortion than the right. Inputs were applied to the RCA connectors in all cases.

The Baron's voltage gain varied somewhat, depending on the operating modes of its output tubes and the feedback setting. The amount of negative feedback was small, ranging from about 1 to 8 dB according to the load and, again, the output mode and feedback setting. The Baron's gain was greatest in P/P mode (38.31 dB without feedback), decreasing as I switched through the P/T, T/P, and T/T modes (minimum gain was 30.22 dB). As I switched through them, I found it interesting that over most of the audio range each mode's gain and frequency response under load with maximum feedback was very similar to the next mode's gain and response with zero feedback. Table I presents IHF sensitivity for the chassis is mostly occupied by printed circuit boards for each channel's audio circuitry and power supply. The Baron is very well built, with high-quality parts.

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The Baron's frequency response is shown in Fig. 1 for various loading conditions. The high output impedance and the load's impedance variations. Needless to say, this will affect the sound and will vary according to the impedances of the speakers you use. The variation is greater in pentode than in triode mode; this would be even more evident if I had used a lower feedback setting for Fig. 1A. Similarly, the response with the dummy load in Fig. 1B would have been smoother had I used maximum feedback.

The low-frequency peak with open-circuit loading seen in Fig. 1A occurs only in P/P mode (where the amp's open-loop gain is highest) when maximum feedback is used. This peak might cause output-transformer saturation and consequent intermodulation distortion, but only in the unlikely event that you use material containing a lot of infrasonic energy at high levels into speakers whose impedance at low frequencies is high.

Square-wave response is shown in Fig. 2. The pairs of traces at the top and in the middle are for a 10-kHz signal; the faster (square) trace in each pair is for an 8-ohm load on the 8-ohm tap, while the slower (more rounded) trace shows the effect of 8 ohms paralleled with a 2-microfarad capacitance. The mode in the top traces is P/P with maximum feedback; the middle traces are for T/T mode and maximum feedback. The Baron's P/P mode has the greater bandwidth (because of decreased damping of the output transformer's resonance at

![Table I—IHF sensitivity, 8-ohm load on 8-ohm tap.](image)

- **Sensitivity, mV**
  - **FEEDBACK SETTING**
    - **I**
      - P/P Mode: 34.4
      - P/T Mode: 34.4
      - T/P Mode: 47.2
      - T/T Mode: 47.2
    - **II**
      - P/P Mode: 38.0
      - P/T Mode: 50.7
      - T/P Mode: 50.7
      - T/T Mode: 50.7
    - **III**
      - P/P Mode: 42.0
      - P/T Mode: 54.8
      - T/P Mode: 54.8
      - T/T Mode: 54.8

The Baron's chassis is fairly conventional and is divided into three zones. First is the front panel, with a cover for the meters extending about 2 inches behind it. Next are the power and output transformer covers. Behind them are the tubes, the switches for operating mode and ground selection, and access holes for the bias and balance adjustment pots. Ample slots in the sides and top allow plenty of air to flow into the chassis and up past the tubes. Metal bars on each side

![Fig. 1—Frequency response in all-pentode (P/P) mode with maximum feedback (A) and in all-triode (T/T) mode with zero feedback (B).](image)
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Fig. 2—Square-wave response for 10 kHz in P/P mode (top) and T/T mode (middle) and for 40 Hz in T/T mode (bottom). The overlaid 10-kHz traces show effects of 8-ohm loading and of 8-ohm loads paralleled by 2 pF (see text); the 40-Hz curve is for 8-ohm loading.

Fig. 3—Distortion vs. power for all-pentode and all-triode modes.

about 50 to 60 kHz) but is more affected by load; T/T mode is slower but has greater load tolerance. In the bottom trace, a 40-Hz waveform with the Baron in T/T mode, the pronounced tilt is caused by the rolled-off low-frequency response seen in Fig. 1.

Figure 3 shows distortion for P/P and T/T modes with maximum feedback. The SMPTE intermodulation (IM) distortion is considerably higher in T/T mode because of power-supply ripple modulation that seemed to occur mostly in this mode.

Figure 4 shows 1-kHz total harmonic distortion plus noise (THD + N) versus power in P/P mode with maximum feedback (Fig. 4A) and in T/T mode with zero feedback (Fig. 4B) for various loads on the 8-ohm tap. Some of the well-known differences between pentode and triode operation are clearly seen here. Specifically, the triode mode is, again, more load-tolerant; the distortion near full power stays more constant with changing load. In pentode mode, however, the attainable power and the distortion at specific power levels vary more with load. The Baron’s load matching is typical for a tube amplifier: There is little change in power when an output tap is loaded with half its rated impedance (e.g., 4 ohms on the 8-ohm tap), but when the load is twice the rated impedance, power output drops appreciably.

Figure 5 shows how the Baron’s THD + N varies with frequency at several power levels in P/P mode with maximum feedback. This push-pull amplifier’s performance here is entirely in keeping with its small amount of feedback and is as good as (or better than) the distortion of some of the single-ended tube amplifiers that are popular these days.

The Baron’s dynamic power in P/P mode was 150 watts at the beginning of the 20-millisecond tone burst and 144 watts at the end of the burst. Mesa Engineering does not provide conventional specifications for the Baron’s power output and distortion, but the company does give (in a document titled “Mesa Baron Technical Update”) power output of 55, 85, 120, and 150 watts per channel for the T/T, T/P, P/T, and P/P modes, respectively. If you take 150 watts as a reference, dynamic headroom would be 0 dB. Based on the data for Fig. 5, the power levels attainable at clipping (2% THD + N) for the four output modes were, respectively, 49, 76, 116, and 134 watts at 300 to 400 Hz (where the amp’s distortion at most power levels is lowest).

Even though the Baron is dual mono, with separate power supplies and such, the two channels, otherwise completely independent, have sensitive leads in close proximity at the feedback switch. Crosstalk was less than ~80 dB below 1 kHz but increased above that frequency; by 20 kHz, it was between ~65 and ~75 dB—depending on the direction of measurement, whether or not the amp was grounded to my Audio Precision test system’s chassis ground, and how I set the amp’s ground-isolation switches.

Like most characteristics I measured, output noise varied with the Baron’s operating mode and feedback level. The absolute value of the noise in the band from 22 Hz to 22 kHz was about 1 millivolt with the feedback set to zero—except in T/T mode, where it dropped to 0.5 millivolt. The major contributions to these readings came from power-supply hum components. The IHF signal-to-noise ratio (A-weighted noise relative to 1 watt into 8 ohms) varied with operating mode and feedback; it was 81 dB in P/P mode with zero feedback and 88 dB in T/T mode with maximum feedback.

Damping factor was only about 1 for most conditions; it dropped to 0.5 or less in P/P mode at all feedback levels. The damping factor was relatively flat with frequency between 100 Hz and 20 kHz but decreased below 100 Hz, varying with mode and feedback level.

The Baron’s current drain from the AC line was 1.7 amperes in the standby and warm-up modes and 4 amperes at idle in all operating modes.

Use and Listening Tests

During the review period, I used a Sonic Frontiers SFT-1 or a Counterpoint DA-11A CD transport to drive a Genesis Technologies Digital Lens jitter-reduction device. The output of the Digital Lens drove a Sonic Frontiers SFD-2 MKII, a Classé Audio DAC-1, a Dodson Audio DA-217, or a Manley Reference D/A converter. Phono source components were an Oracle turntable fitted with a Well Tempered Arm and an Accuphase AC-2 moving-coil cartridge used with a Vendetta Research SCP-2C phono preamp. I also used a Nakamichi ST-7 FM tuner, a Nakamichi 250 cassette recorder, and a Technics 1500 open-reel recorder. The preamplifiers in my system were an Audio Re-
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search LS22, a Pass Labs Aleph-P, and my custom-made Forssell balanced tube line driver. For comparison with the Baron, I used a pair of Sonic Frontiers Power 3 mono tube amps, a pair of Quicksilver M135 mono tube amps with Svetlana 6550C output tubes, and a Spectron 1KW digital switching amplifier. The loudspeakers were Genesis Technologies Vs and B&W 801 Matrix Series 3s; the B&Ws were augmented from 20 to 50 Hz by subwoofers, placed against the wall behind each 801. Speaker and interconnect cables were from MIT and Transparent Audio. Digital interconnects were Audient Technologies Datrix AES/EBU Reference active cabling, in conjunction with Audient’s Tactic and Audit cable driver and receiver, and AES/EBU balanced Illuminati DX-50s.

I first listened to the Baron on the Genesis V speakers. I was surprised to find that the sound was not as affected by the speaker’s impedance variations as I had expected. The sound was laid-back, with a softened high end. The speaker’s low-frequency impedance rise below about 150 Hz (stemming from the high-pass crossover between its powered woofer and passive midbass driver) generally caused the Baron no problems with overall blend and balance in the bass and lower midrange. I did notice some mild boominess from 100 to 200 Hz on some music when the Baron was in all-pentode mode. Some of my favorite pop CDs sounded fun and involving. Yet some other music sounded more irritating and distorted with the Baron than with the other amps in my system. On classical pieces, there was a better sense of “thereness” with the other amps; the Baron sounded more closed in and not as airy and spacious. But I must say it did put out power: Even in all-triode mode, it would play most music louder than I wanted.

I liked the sound of the Baron better with the B&W 801s than with the Genesis Vs, despite the 801s’ greater impedance variations in the midrange. (The 801s’ maximum and minimum impedances are similar to those of the NHT dummy load.) I played quite a variety of music and generally enjoyed the experience. More than once I found myself thinking that this amp really sounded pretty damn good. The Baron sounded best to me in its all-triode mode with full feedback. As I switched in more and more pentode operation, the sound got harder and the frequency response aberrations became too noticable. Surprisingly, considering the results of my measurements, the Baron’s bass was anything but flabby and undamped. I thought it was quite tuneful and not too dissimilar from the bass of other amplifiers I’ve used with the 801s.

Operation of the Mesa Baron, both in the lab and in my listening room, was straightforward. One surprise, however, was a small blap from the speakers when I unplugged an input lead to the amp just after I’d placed the Baron in standby mode. Clearly, the filter capacitors still held enough of a charge to amplify for a short while. Solution: wait just a few seconds longer!

I thought that the power transformers got a bit too hot after several hours of operation on a hot day. It would be wise to follow the operating manual’s recommendations regarding fan cooling.

The Baron is an interesting design. Its basic design concept is valid, but its sound (for me, at least) was undercut by its high output impedance and the variations in frequency response this caused when it drove real speaker loads. Yet it does represent a good value in terms of power and features per dollar and gives you unique ways to tailor your system’s sound. If you like a warm, full sound and enjoy equipment that you can play with in ways that make a sonic difference, you may find that it’s your cup of tea, even if it isn’t entirely mine.
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This matched home theater system consists of the new RT20P main speakers with built-in powered subs, LS fx bipole/dipole surround speakers and the awesome CS350 center speaker.
ACOUSTIC RESEARCH
312 HO SPEAKER

Acoustic Research dates back to the early '50s, when company founder Edgar Villchur developed and marketed the world’s first acoustic-suspension speaker systems. The very popular AR-1 was the first modestly sized speaker with honest-to-goodness, wall-shaking bass. The AR-3 was the first to incorporate a soft-dome tweeter and midrange. Acoustic Research kept on developing innovative products through the years, including the AR turntable in 1963 and the AR-9 speaker in 1978, which used an acoustic blanket to minimize diffraction.

Although the original AR speakers were known for their low efficiency (the trade-off that gained them better and deeper bass), the company recently introduced the High Output series, a high-efficiency line aimed at high-performance audio and home theater. It comprises 10 models: five full-range systems (led by the 312 HO), a center-channel speaker, an indoor/outdoor speaker, and three subwoofers.

The AR 312 HO is a three-way, floor-standing system with a 12-inch side-firing woofer in a vented enclosure, two 5¼-inch cone midranges, and a 1-inch dome tweeter. The midranges are placed symmetrically above and below the tweeter, in a D'Appolito-style arrangement that AR calls a “focused array configuration.” The nominal crossover point between the woofer and the midranges is a low 180 Hz; transition between the midranges and the tweeter is said to occur at 2.5 kHz.

The 312 HO’s cabinet is nearly twice as deep as it is wide, which gives the speaker a relatively tall, narrow look. Its narrow baffle and rounded front edges are intended to minimize diffraction and reduce blurring of the aural image. The cabinet is made from ¾-inch medium-density fiberboard, braced internally to minimize wall flexing and vibration. Heavy molded-plastic rails on each side of the bottom broaden the cabinet’s footprint, for better side-to-side stability. When the speaker is placed on a carpet, it rests on these rails. For hard-surface floors, threaded nylon screws can be extended down to serve as leveling feet and glides; these screws can be replaced with spikes (not supplied). At 70 pounds, the 312 HO is fairly heavy but not so massive that it can’t be moved around easily. The speaker’s grille is an open-frame design of molded

**Rated Frequency Response:** 30 Hz to 20 kHz, ±2 dB.

**Rated Sensitivity:** 97 dB at 1 meter, 2.83 V rms applied.

**Rated Impedance:** 8-ohm compatible.

**Rated Power Handling:** 25 to 250 watts.

**Dimensions:** 43⅞ in. H x 10⅞ in. W x 19¼ in. D (111 cm x 26.8 cm x 48.6 cm).

**Weight:** 70 lbs. (31.8 kg) each.

**Price:** $1,199 per pair; available in black ash, maple, or cherry vinyl.

**Company Address:** 9424 Eton Ave., Suite J, Chatsworth, Cal. 91311; 818/407-4820.

For literature, circle No. 92
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Pure and Simple.

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Bi-amped and tri-amped systems are easily accommodated by this flexible arrangement.

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The minimalist aesthetics of the GFP-565 are deceptive in their simplicity. Without being overly complicated to use, this preamplifier is able to integrate and control all of the components in the most sophisticated of music systems. There are five high-level inputs as well as a phono input. A separate front-panel switch allows the use of an external processor, only when needed, leaving both tape circuits free. And, of course, you may listen to one input while recording from another.

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CIRCLE NO. 3 ON READER SERVICE CARD
tive energy from radiating off the baffle. Made from reticulated foam of varying density and thickness, the baffle is designed to reduce diffraction, minimize lobing between the midrange and tweeter, and enhance dispersion characteristics. The foam baffle also significantly improves the speaker's appearance.

The 312 HO's come in mirror-image pairs, with the woofers on opposite sides of the individual cabinets. Each woofer is vented to the rear of the cabinet though a port tube, 4 inches in diameter and 5½ inches long, just below the center of the back panel. The port, which is flared to reduce air turbulence, is covered by tightly stretched black fabric that hides internal cabinet details. Keeps small children from dropping things into the speaker, and presumably adds acoustic resistance to the flow of air in the port.

All of the 312 HO's drivers are magnetically shielded so as not to interfere with a TV picture in a home theater setup. The long-throw woofer's cone is a laminate of paper and polypropylene. It has a polyurethane foam surround and an inverted dust dome. The voice coil is of oxygen-free pure copper wire wound on an epoxy-laminate coil former. The midrange drivers, similar in design to the woofer, are mounted in sealed sub-enclosures. The tweeter's low-mass diaphragm is made of a gas-filled, closed-cell foam that AR calls Aerofoam. This material is said to be very light and strong, with good internal damping, and is claimed to prevent dome breakup.

The crossover network contains three resistors, five inductors, and six capacitors. Three additional, low-value polypropylene capacitors are utilized to bypass larger capacitors in the crossover’s mid- and high-frequency portions. Four of the five inductors have laminated steel-plate cores; the tweeter crossover’s coil has a ferrite-rod core. Electrically, the crossover provides a second-order low-pass filter for the woofer, a fourth-order bandpass filter for the parallel-connected midranges, and a second-order high-pass filter for the tweeter. The crossover board is attached to the back of the input-connection cup. Internal connections are of 18-gauge stranded wire. Gold-plated double-banana binding posts on the bottom rear of the speaker enable bi-wiring, with the woofer connected separately from the rest of the system. Straps are provided for single-wire operation.

**Measurements**

Figure 1 shows the Acoustic Research 312 HO’s on-axis frequency response in a large anechoic chamber. Measurements were taken on the top midrange’s axis, as recommended by the manufacturer, and smoothed with a tenth-octave filter.

With the grille removed, the 312 HO’s response fits a tight, 5.5-dB, window between 130 Hz and 20 kHz. Above 200 Hz, the response is quite flat and extended, with only slight roughness above 7 kHz. (With the speaker’s grille on, response roughens significantly above 2 kHz. I measured peak deviation in the range of 1 to 2 dB.) Below 130 Hz, output diminishes: From about 100 Hz down to 50 Hz, the average level is about 5 dB lower than it is above 200 Hz, and then it rolls off. This may be deliberate, to compensate for possible bass augmentation from the side-mounted woofer’s proximity to the wall behind the speaker.

When I reversed the polarity of the woofer’s connections, I noted a sharp null, about 25-dB deep, at 120 Hz. This indicates that the true crossover point between woofer and midrange is at about 120 Hz, lower than the claimed 180 Hz.

Averaged from 250 Hz to 4 kHz, the 312 HO’s sensitivity was 93.7 dB, 3.3 dB less than AR’s rating but nonetheless unusually high. Below 9.5 kHz, the right and left speakers matched within a fairly close ±1.5 dB. At higher frequencies, the deviation was...
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Figure 3 shows the 312 HO's horizontal on- and off-axis responses (the bold curve at the rear of the graph is on-axis response). The curve-to-curve uniformity indicates very even horizontal coverage, with minimal narrowing evident above 10 kHz.

The 312 HO's response above and below axis is shown in Fig. 4. (The bold curve in the middle of the graph is response on the top midrange driver's axis.) The curves are quite uniform except in the upper crossover range, 1.5 to 5 kHz, where the response narrows significantly. From 10° below axis to 5° above it, the response is fairly uniform and flat. Above and below these angles, there's a dip in the upper crossover range. When measured on the top midrange driver's axis, as recommended by AR, the polar pattern in this range was skewed slightly downward; this would not be the case if response were measured on the tweeter's axis. A listener's ears would normally be about halfway between the axes of the tweeter and the top midrange driver.

The 312 HO's impedance magnitude curve (Fig. 5A) has many peaks and dips. The impedance ranges from a high of 11.4 ohms at 16 Hz down to a low 2.6 ohms at 158 Hz. Above 20 Hz, the maximum impedance is 9.6 ohms at 50 Hz, a moderate 3.7 times the 2.6-ohm minimum; this makes it possible to have up to 40 millionths of cable series resistance before cable-drop effects cause response peaks and dips greater than 0.1 dB. For a typical run of about 10 feet, 16-gauge (or larger), low-inductance cable would suffice to achieve that.

The speaker's impedance phase (Fig. 5B) reaches its maximum of +33° (inductive) at 180 Hz and its minimum of −56° (capacitive) at 59 Hz. The combination of the 3.7-times impedance variation, the fairly wide phase variations, and the low minimum impedance means that the 312 HO will be a moderately difficult load for most receivers that are rated only for 8 ohms. However, an amplifier or receiver without that limitation, used with cables having low resistance and inductance, should be able to drive the 312 HO quite well—especially as the AR's high efficiency means you'll rarely tax the amp or receiver's output capabilities.

When I swept the 312 HO with a high-level sine wave, I noted only one significant cabinet wall resonance, in the vicinity of 230 Hz. At that frequency, the top sides of the cabinet, next to the midrange drivers, vibrated to my touch. I was impressed with the 312 HO's clean bass output from 30 Hz up. Below 30 Hz, the output was much attenuated. There was also significant noise generated by vibration of the fabric covering the port. But even at 20 Hz, the woofer could handle very high levels, in excess of 20 volts rms (100 watts into 4 ohms), without undue strain.

The 312 HO's woofer had impressive excursion capabilities (¾ inch, peak to peak) and overloaded very gracefully. No port wind noise was evident, and there was only slight dynamic offset. The vented enclosure loaded the woofer only moderately well; by temporarily closing the port, I determined that the vent reduced cone excursion at and near box resonance by only one-third. This excursion reduction covered a broad range, from about 30 to 40 Hz, with no sharp reduction at any single frequency. In this respect, the 312 HO is reminiscent of other lossy-port systems I have tested, such as the Variovent in the Dynaudio Special One (Audio, December 1990).

Figure 5 shows the 312 HO's 3-meter room response, with raw and sixth-octave-smoothed data. The speaker was in the right-hand stereo position, aimed at the test microphone. The microphone was at ear height (36 inches), at the main listening position on my sofa. From 800 Hz and up, the smoothed curve fits a very tight, 6-dB, window. The deviation increases below that frequency, with significant peaks at 150 and 530 Hz and a dip at 235 Hz. Except for the
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CIRCLE NO. 41 ON READER SERVICE CARD
determined this was the flapping of the fabric stretched across the 312 HO’s port; pressing the center of the cloth with my finger cleaned the sound up significantly. At 1 meter in free space and with a 200-watt input, the AR system generated a healthy 103 dB SPL at 41.2 Hz. As you can see in Fig. 8, the $A_2$ (110-Hz) distortion rises to a moderate 8.1% second harmonic and a much lower 2.5% third harmonic. Higher harmonics were below the floor of my analyzer. At 1 meter in free space and with a 200-watt input, the 312 HO generated a loud 113 dB SPL at 110 Hz. The $A_2$ (440-Hz) distortion (not shown) rose only to the very low level of 0.4% second harmonic and 0.6% third. All higher harmonics were less than 0.4%. The IM distortion created by tones of 440 Hz ($A_2$) and 41.2 Hz ($E_1$) of equal power was also very low, reaching only 1.2% at 200 watts.

Figure 9 shows the 312 HO’s short-term peak-power input and output capabilities as a function of frequency, measured using a 6.5-cycle, third-octave-bandwidth tone burst. The peak input power was calculated by assuming that the measured peak voltage was applied across a 4-ohm impedance.

In the bands handled by the woofer and midrange drivers, below 2 kHz, the 312 HO’s power handling is uniformly high. Starting at an unusually high 1,100 watts at 20 Hz, peak input power rises to 2,500 watts at 100 Hz, drops somewhat to 1,000 watts at 160 Hz (where the midrange drivers have started operating), and then increases to a maximum of 5,600 watts at 1.6 kHz. But in the tweeter’s range, above 2 kHz, peak input power drops significantly, to a low of 250 watts at 5 kHz, and then rises somewhat, to 400 watts above 10 kHz. At slightly higher power levels, with output approaching 120 dB SPL, the sound suddenly turned very harsh and restricted when the tone bursts got up into the tweeter’s range. Suspecting the problem was a saturating inductor core in the tweeter’s branch of the crossover, I bypassed the crossover and drove the tweeter directly. The tweeter’s sound immediately improved. It became quite clean and effortless, and input power capability rose to the 2,500-watt range.

With room gain, the 312 HO’s maximum peak SPL starts at a healthy 104 dB at 20 Hz. It then rises rapidly, passing 110 dB at 30 Hz and 120 dB at 50 Hz, until it reaches a local maximum of 125 dB at 70 Hz before falling slightly, to 123.5 dB at 100 Hz. This high maximum peak bass output places the AR 312 HO in the top 5% of all speakers and subwoofers I have tested. From about 200 Hz up, the AR’s output rises smoothly, to a very loud 131 dB at 1.6 kHz, the top of the midrange drivers’ frequency band. Above 2 kHz, maximum peak output falls, but only into the quite usable range of 117 to 119 dB.

**Use and Listening Tests**

The AR 312 HO's are packed individually in sturdy cartons that can be moved easily by one person. Although quite large and tall, the cabinets are not as heavy as their bulk might suggest. From the front, they present a rather stately narrow and tall appearance. My review samples were finished in a fine black ash; I was impressed with the cabinets’ appearance, construction quality, and finish.

The ARs looked particularly good when their front grilles were removed, which they were for most of my listening. The grille is quite easy to remove and replace. The molded foam bezel around the upper-frequency drivers is quite handsome, enhancing the speaker’s appearance when the grille is off. The side-mounted 12-inch woofer is covered with its own grille, a molded plastic ring covered with black cloth.

When set up on my carpeted floor and without spikes, the AR speakers were very stable laterally, thanks to their molded plastic bases. The connection cup was quite ac-
Life's philosophical sound check
ultimately boils down to this:

You can let other folks dictate
what's cool. Or, you can trust
your own gut. And your own
ears. And in the process, actually
evolve your own standards.
(Remarkable what a little self-
confidence can do.) By then, you
might even appreciate something
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Server...Its unique union of sophis-
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Photograph of Ernie Watts by William Claxton
CIRCLE NO. 9 ON READER SERVICE CARD
The AR's low-bass output, however, was very impressive with either placement, both in extension and in the high levels that could be achieved without audible distortion.

I evaluated the 312 HO's as music playback systems, not as main speakers for a home theater setup. Auxiliary review equipment included a Krell KRC preamp, a Crown Macro Reference power amplifier, and Straight Wire Maestro cabling. The first disc I selected was the entertaining Music From and Inspired By the Motion Picture Mission: Impossible (Mother Records 314-531 682-2). The ARs boogied on the rock tracks, playing loud and clean. And the precision with which the 312 HO's powerful low-bass output and extended, smooth frequency response rendered the intricate percussion and sound effects of track 4 was an absolute delight.

The 312 HO's home theater orientation was clearly evident on everything I listened to. The ARs produced a close-up, in-your-face sound that was quite flattering to some recordings but not so inviting on others. Switching to the AR systems was like bringing the speakers closer to my listening position and reduced the room's effect on the sound, exactly what a good front speaker in a home theater should do! The B&W speakers often sounded somewhat dull and distant by comparison. The ARs' imaging and soundstaging, both horizontal and vertical, were excellent. They had an uncanny ability to act as a sonic magnifying glass on much of the music I listened to. Their reduction of room sound imparted a dry and analytical character to some program material.

The ARs' sensitivity was very high; I had to attenuate the input signal to my amplifiers by a significant 7 to 8 dB to match the 312 HO's output level to that of the B&Ws. As a result, the Crown power amp was working significantly harder when driving the B&Ws than when driving the ARs at the same acoustic level. Using the ARs instead of less sensitive speakers is like giving your amp a free power boost, enabling a modest 50-watt/channel receiver to pound like a 250- to 300-watter!

I enjoyed listening to the ARs with music that profited from their high output capabilities, such as film sound effects and concert-level rock and country music. These speakers sure could play loud and clean when required!

When I stood up while listening to pink noise, the 312 HO's sound changed significantly. There were moderate tonal changes through the upper midrange, but I was even more aware of a reduction in volume. When I stood, the image receded into the distance, similar to the presentation of the more diffuse-sounding B&Ws. Proper tonal balance was achieved only when I was sitting.

On third-octave pink noise band-limited to 32 Hz and above, the 312 HO's bass output was very impressive, significantly louder and cleaner than the B&Ws. The ARs' output in the 20- and 25-Hz bands was just usable, however, with significant flexing of the port's cover adding extra distortion. The B&Ws could generate room-shaking bass in these two lower bands, but this was accompanied by high levels of port wind noise that the 312 HOs did not produce.

The 312 HO's performance in other areas was equally impressive. This included smooth and extended high-frequency response, with broad coverage, as well as a smooth, accurate midrange response that worked well on male and female vocals. The ARs handled large-scale classical orchestral music with equal ease, exhibiting a broad and accurate soundstage with extended response. But they could also bring forth subtle details in less complex recordings, such as chamber music. On some recordings, the ARs did slightly emphasize analog tape hiss that was not evident through the B&Ws.

At only $1,199 per pair, the Acoustic Research 312 HOs offer extremely good value and compete well even with systems costing up to $2,500 per pair. Their combination of extended low end, high efficiency, smoothness, solid construction, and good looks is hard to beat at the price. They are an excellent choice for any music system and would be particularly good in a dual-use setup for music and home theater.
The Theater

The DSP-A3090 lets you choose from 30 sound field modes. From L.A.'s Roxy and New York's Cellar Club, to churches and concert halls around the world. Seven-channel amplification sends 80 watts to each of the main, center and rear speakers, plus 25 watts to both front effects speakers. Analog, video and S-video, plus RF, coaxial and optical digital inputs link you to today's and tomorrow's Dolby Surround AC-3 components.

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Raise the curtain on a conventional home theater and listen closely. What's missing? • The theater. Until very recently, the expansive acoustic environment that helps give a real movie palace its sense of grandeur just didn't seem possible from a sound system sandwiched between a sofa, a coffee table and a couple of ficus trees. • Decades of Yamaha experience in sound field measuring and processing, custom integrated circuit design and audio microchip fabrication changed all that. And now with the new DSP-A3090 Digital Sound Field Processor, we've introduced unique technology that creates the unmistakable sensation of a first-run theater's acoustic spaciousness, combined with the unparalleled accuracy and dynamic range of Dolby Surround AC-3. Proprietary Yamaha processing techniques maintain the depth, openness and realism the director envisioned when mixing the original soundtrack for the big screen. While also preserving the directional relationships of every sound. So you hear each note and every squeak, creak, rattle and roar -- positioned exactly where the director intended. • We call it Tri-Field Processing. And it's made possible using the latest generation of the Yamaha Cinema DSP technology that's kept us at the forefront of home theater for more than a decade. • For the dealer nearest you, call 1-800-4YAMAHA. Or visit us on the web at http://www.yamaha.com. Then listen to the DSP-A3090 and hear the results for yourself. • You may take home a 1200-seat movie theater. But you'll still only have to vacuum under the couch.

Yamaha
WHERE HOME THEATER LIVES.
Lexicon may not be the first name that springs to mind when you think of power amplifiers. But the company is a leader in surround processors and preamp/processors, so it's entirely logical that it should offer multichannel amps to go with them.

The five amps in Lexicon's NT series each bear the company's characteristic green stripe. Three of them—the Models 212, 312, and 412—are functionally identical except for channel count. The $2,995 Model 412 is, naturally, the four-channel version.

The 412 is a relatively compact component whose sheet metal, heat sinks, and rear panel have a distinctly Bryston look about them. Moreover, the test sheet packed with the amp is in English and French, and Bryston is a Canadian outfit. Hmm. Then I noticed the small back-panel graphic: "Made in Canada by Bryston Ltd." Some detective I am.

The 44-pound, Home THX-certified Model 412 is rated to supply four channels of 120 watts each into 8 ohms or 200 watts per channel into 4 ohms and to permit two bridged channel pairs to produce 400 watts each into 8 ohms (all from 20 Hz to 20 kHz at less than 0.01% THD).

From the outside the 412 looks very professional, with unusually heavy, non-sense metalwork and square-key, security-screw fasteners. ( Providentially, I had just bought a cool $19.95 set of every screwdriver bit known to man.) The black-anodized finish is of obviously high quality, and the sheet-metal quality of the rugged-looking frame-and-pan construction is way above average. (I can tell—my first paying job was in a sheet-metal shop.) A 19-inch rack-mount front panel is optional.

The front panel presents just a push-button power switch and four centrally located LEDs, one per channel. These glow green to indicate normal operation and are said by the manual to flicker yellow at the threshold of clipping and to turn red to indicate overload, distortion, excessive DC or ultrasonic signals, shorts, etc.

The Lexicon's deep heat sinks dominate both sides of the amplifier; they are nicely corner-cut and smoothed, to prevent wrist-gashing. Each channel has two heat sinks, each consisting of two groups of fins with a clip-on, spring-steel cover between them. Snapping each cover off reveals a complementary pair of Motorola bipolar output transistors and an adjacent thermal sensor. Since the transistors are mounted on the outside of the heat sink, I understand the cosmetic need for these covers, but their snap-on design lets each cover go "tick!" and then spring back if you gently press it in. It is highly unlikely that this could have any audible effect (the spring action is stiff enough to prevent any resonance, I should think), but somehow the whole setup just doesn't feel right for a $3,000 amplifier. Covers held down with screws might be a better solution.

For a power amp, the 412 fairly bristles with rear-mounted connectors and controls. The back panel is enameled black instead of anodized like the rest of the amp, and the screened-on graphics are bright white and are relatively large and legible—very nice touches. The panel's center is dominated by four pairs of five-way binding posts; these are the heavy-duty variety, with big screwdriver slots starring their ends. Directly below is an IEC power block.

- Rated Power: 8 ohms, 120 watts/channel; 4 ohms, 200 watts/channel.
- Distortion: Less than 0.01% IM or THD.
- Dimensions: 17 in. W x 5¼ in. H x 15½ in. D (43.2 cm x 13.3 cm x 39.4 cm).
- Weight: 44 lbs. (20 kg).
- Price: $2,995.
- Company Address: 3 Oak Park Dr., Bedford, Mass. 01530; E-mail, 71154.1331@compuserve.com
- For literature, circle No. 93

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Lexicon 412 FOUR-CHANNEL AMPLIFIER
S-125

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"It utterly blows away most of what passes for "high-end" loudspeakers on the market at any price." —Corey Greenberg, Home Theater magazine

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Docking Module stands shown in the photo are optional.
comprising a removable power cord and a convenient, snap-out fuse carrier holding a pair of 8-amp fuses.

On each side of the speaker outputs are two pairs of input jacks and adjacent switches for selecting balanced or unbalanced input. The unbalanced jacks are the usual RCA type; the balanced jacks are Neutrik combination connectors (new to me) that accept either XLR or ¼-inch tip-ring-sleeve phone plugs. Another pair of slide switches, intelligently oriented at right angles to the input-selector pair (presumably to reduce confusion when you’re fumbling by touch with the back panel), selects bridged or unbridged input mode; easily legible graphics outline the speaker connections for each mode. A small toggle switch between the speaker outputs lifts the three-wire power cord’s ground, a pro audio feature that is unusual on consumer audio amps. (The manual admonishes never to flip this unless it audibly reduces hum—good advice!)

The last item on the panel is a two-wire clamping input for a low-voltage (nominally 12-volt AC or DC) turn-on signal. Such a signal is available from Lexicon’s preamps and processors and from several other high-end A/V and multi-room front-end products. An associated rotary switch has four positions, with which you can select 0 to 4 seconds of turn-on delay when the amp is triggered by this signal; this prevents the circuit breaker on your AC line from tripping in response to, say, four high-power amplifiers trying to juice up their supplies simultaneously.

Under the hood, the Lexicon is no less well crafted than it is externally. Components, printed circuit boards, and jumper wiring are all well above average in quality. Two amp modules stand on edge along each side of the interior, and the individual input circuit boards hang from the rear panel. The circuit is, for the most part, built up from discrete devices: A single TL074 op-amp appears to be the only signal-path IC in each channel.

In its essence, the Lexicon 412 looks to be a "quad-mono" design: Each channel has its own subcompact toroidal transformer, a pair of fairly squat 10,000-microfarad storage capacitors, and an individual driver/output board. The four toroids, the size of jelly doughnuts, are arrayed unusually, with two hanging from the front panel and two stacked on the amplifier’s floor. I infer that this geometry was adopted for hum-bucking, to reduce radiated interference. And Lexicon does specify such interference (which very few manufacturers do) as a very low 3 gauss or less within 2 inches of the case. An informal check, with my Fender Stratocaster guitar’s single-coil pickups serving as interference probes, proved that the Lexicon 412 is indeed one very non-polluting power amp.

Measurements
On the test bench, Lexicon’s 412 power amp performed impressively, like the proverbial straight wire with gain—but in this case, four of them. Its frequency response (Fig. 1) was the first tip-off: Note the greatly magnified vertical scale! Within the audio band, the response is essentially flatter than my test instruments can measure and is down no more than about 0.25 dB two octaves above the band; only at 200 kHz does response droop by almost—but
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better to wring out the 412’s four channels. The system’s front end was the excellent Citation 7.0 preamp/surround processor, and sources included CDs, laserdiscs, and DSS satellite audio/video.

The Lexicon 412’s performance can be summed up quickly and easily: Plays loud, sounds clean, stays quiet. The four-channel Lexicon delivered very dynamic, sharply etched, highly defined sound with no hint of transient harshness or hardness. Low-end impact was particularly impressive: The 412 was quite adept at wringing every last hertz out of the front-channel B&Ws, with a maximum of timbral definition and natural acoustic feel. Overall tonal balance seemed perfectly neutral. While I could not characterize the 412 as noticeably “warm” or “liquid,” neither did it ever show any hint of artificial brightness or extra snap on percussion, horn attacks, and the like. The sole exception was that the Lexicon did take on a slight sheen when pushed well into clipping—but this was at painfully loud levels. Spatial reproduction was equally balanced, with good soundstage depth and breadth, free of any apparent limitation or exaggeration.

About the only aural wart I could find was a faint mechanical buzz from the 412’s transformers. As near as I could tell, this was constant; it was never obtrusive and was all but impossible to hear when any program material was playing, even at the faintest levels, unless I placed my ear to the top cover. But in a quiet room, say, reading with the amp powered on but inactive, the buzz will be audible.

The Lexicon’s output, however, was impressively quiet. Noise at idle was about as low as I’ve encountered; even when I set my system’s volume control to produce full movie-theater level in the listening room, then put the laserdisc on pause, I could hear no noise until my ear was within about a foot of a tweeter or midrange. The amp turned on and off gracefully, without snaps or thumps, though its lack of any output muting system means a dying “fizz” can be heard as the output circuits starve out.

The 412 was almost cool to the touch when idling and most of the time ran just barely warm. Even under the abuse of the test bench, the amp never became too hot when I left my hand on it (though it wasn’t terribly comfortable to touch), and it never once shut down, popped a fuse, wafted unpleasant odors, or otherwise complained.

The Lexicon 412’s outstanding performance and truly professional build quality complement a comparatively livable size for a multichannel power amp. The 412 is not cheap, but it is an attractive package for the multiamping power needs of any high-end home theater or multimroom installation. A
### Sonic Frontiers Line 1 & Line 2 Preamplifiers

#### Sonic Frontiers Line-2
- Separate Outboard Power Supply: Yes
- Fully Balanced Design: Yes
- Direct Coupled Output: Yes
- R/S: Yes
- Inputs/Outputs: Yes
- Full Function Remote Control: Yes
- Remote Control Housing: Aluminum
- Remote Control Functions: Yes
- Display/LED Dimming: Yes
- Relay Switching: Yes
- Output Impedance (SE/BAL): 150/200
- Regulation Stages: Yes
- Standby Function: Yes
- Balance Control: Yes
- Volume Steps: 193 - 0.5 dB
- Constant on Filament: Yes
- Headphone Amplifier: Yes - Headroom™
- SSP "Bypass" Loop: Yes
- Fono Functions: Yes
- Tape Loop - Actively Buffered: Yes
- IR JACK: Yes
- Relay Trigger: Yes
- Phase Control: Yes
- Detachable AC Power Cord: Yes
- Chassis Damping: Yes
- SMDPE PCB Construction: Yes
- Toroidal Power Transformer: Yes
- Weight (Net): 18 lbs.
- Electronics Warranty: 5 Year Full
- Tube Warranty: 1 Year

#### Sonic Frontiers Line-1
- Separate Outboard Power Supply: No
- Fully Balanced Design: Yes
- Direct Coupled Output: Yes
- R/S: Yes
- Inputs/Outputs: Yes
- Full Function Remote Control: Yes
- Remote Control Housing: Aluminum
- Remote Control Functions: Yes
- Display/LED Dimming: Yes
- Relay Switching: Yes
- Output Impedance (SE/BAL): 150/200
- Regulation Stages: Yes
- Standby Function: Yes
- Balance Control: Yes
- Volume Steps: 193 - 0.5 dB
- Constant on Filament: Yes
- Headphone Amplifier: Yes - Headroom™
- SSP "Bypass" Loop: Yes
- Fono Functions: Yes
- Tape Loop - Actively Buffered: Yes
- IR JACK: Yes
- Relay Trigger: Yes
- Phase Control: Yes
- Detachable AC Power Cord: Yes
- Chassis Damping: Yes
- SMDPE PCB Construction: Yes
- Toroidal Power Transformer: Yes
- Weight (Net): 18 lbs.
- Electronics Warranty: 5 Year Full
- Tube Warranty: 1 Year

#### Audio Research LS-15
- Separate Outboard Power Supply: No
- Fully Balanced Design: No
- Direct Coupled Output: Yes
- R/S: Yes
- Inputs/Outputs: Yes
- Full Function Remote Control: Yes
- Remote Control Housing: Plastic
- Remote Control Functions: Yes
- Display/LED Dimming: Yes
- Relay Switching: Yes
- Output Impedance (SE/BAL): 300/400
- Regulation Stages: Yes
- Standby Function: Yes
- Balance Control: Yes
- Volume Steps: 68 - 0.5 to 30 dB
- Constant on Filament: Yes
- Headphone Amplifier: Yes - Headroom™
- SSP "Bypass" Loop: Yes
- Fono Functions: Yes
- Tape Loop - Actively Buffered: Yes
- IR JACK: Yes
- Relay Trigger: Yes
- Phase Control: Yes
- Detachable AC Power Cord: Yes
- Chassis Damping: Yes
- SMDPE PCB Construction: Yes
- Toroidal Power Transformer: Yes
- Weight (Net): 18 lbs.
- Electronics Warranty: 3 Year Full
- Tube Warranty: 1 Year

#### Conrad-Johnson Premier 14
- Separate Outboard Power Supply: No
- Fully Balanced Design: No
- Direct Coupled Output: Yes
- R/S: Yes
- Inputs/Outputs: Yes
- Full Function Remote Control: Yes
- Remote Control Housing: Plastic
- Remote Control Functions: Yes
- Display/LED Dimming: Yes
- Relay Switching: Yes
- Output Impedance (SE/BAL): 300/400
- Regulation Stages: Yes
- Standby Function: Yes
- Balance Control: Yes
- Volume Steps: 68 - 0.5 to 30 dB
- Constant on Filament: Yes
- Headphone Amplifier: Yes - Headroom™
- SSP "Bypass" Loop: Yes
- Fono Functions: Yes
- Tape Loop - Actively Buffered: Yes
- IR JACK: Yes
- Relay Trigger: Yes
- Phase Control: Yes
- Detachable AC Power Cord: Yes
- Chassis Damping: Yes
- SMDPE PCB Construction: Yes
- Toroidal Power Transformer: Yes
- Weight (Net): 18 lbs.
- Electronics Warranty: 3 Year Full
- Tube Warranty: 1 Year

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**M.S.R. Price (US$)**

- Sonic Frontiers Line-2: $2995
- Sonic Frontiers Line-1: $1995
- Audio Research LS-15: $2995
- Conrad-Johnson Premier 14: $3995

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*The information contained in this chart has been sourced from manufacturer brochures, reviews and physical examinations. It is accurate to the best of our knowledge, as of October 1st, 1996. Sonic Frontiers Inc. makes no warranty, either expressed or implied, as to the accuracy of this chart. Manufacturer specifications are subject to change. Contact them directly to confirm.*
When I auditioned Atlantic Technology's flagship $3,500 System 350 last year, I was really amazed by this Home THX-certified speaker system's high degree of musicality, even when playing straight two-channel recordings. With the memory of System 350's excellent sound still fresh, I looked forward to more great things from Atlantic Technology when it sent me the new $1,736 System 250.1.

Spurred by the success of Dolby Digital (AC-3) discrete soundtracks on laserdiscs, the System 250.1 is essentially a retooled and beefed-up version of Atlantic's older $1,500 System 250. The new models are designed to play much louder in all five speaker positions around the room and to have greater high-frequency extension in the surrounds to accommodate Dolby Digital's full-range stereo surround tracks. At a system price of just $1,736 with one subwoofer or $2,385 with two, Atlantic is again throwing a lot of speaker for the money into one of the most competitive price ranges for home theater speakers.

The Model 251.1 LR main-channel speaker ($369 per pair in black) and Model 253.1 C center speaker ($319) feature a pair of 4-inch woofers sandwiching a 3/4-inch dome tweeter. The woofers, as well as the crossover circuits, have been upgraded from those of the System 250 for higher power handling and lower distortion. The 3/4-inch dome tweeter remains unchanged from the older system, although a circle of foam now surrounds it to reduce cabinet reflections. All three drivers are on a composite-plastic front panel that is attached to a 3/4-inch, medium-density fiberboard cabinet (upgraded from the half-inch-thick cabinets of the older System 250).

The Model 253.1 C center speaker is nearly identical in design to the 251.1 main speaker but incorporates a few significant changes. A pair of continuously adjustable knobs on the 253.1's rear panel, labeled "Midrange Timbre" and "High Frequency Level," enable you to vary midrange and treble response if you want to match the sound of the 253.1 to another manufacturer's main speakers (the default settings for use with the rest of the System 250.1 are clearly marked on each control). The 253.1 is meant to be used on its side as a horizontal center speaker, so it's got a pair of wooden rails on its belly that fit snugly into the scooped-out channels of the supplied low-profile stand. Unlike the 251.1's rectangular cabinet, the 253.1's is tapered toward the rear. Thus, no matter how high or low you place...
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—Michael Tilson Thomas
Music Director, San Francisco Symphony
Artistic Director, New World Symphony

When asked why he had four Parasound high-end audio systems installed throughout his home, Michael Tilson Thomas said it's because his favorite music system has over 100 musicians and doesn't fit in his living room.

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this center-channel speaker, you can tilt it up or down to aim it at the listening position.

The Model 254.1 dipole surrounds ($399 per pair) are an all-new design with more extended treble response. A pair each of 1/2-inch dome tweeters and 4-inch woofers replace the two 2-inch cone tweeters and single 4-inch woofer of the older Model 254 dipole surround. Unlike most dipole surrounds, however, the 254.1’s fore- and aft-firing drivers are angled into the room slightly, rather than facing fully forward and backward. This is to strike a balance between the “disappearing” job of a true dipole and having just enough directivity to enable good localization from Dolby Digital’s stereo surround tracks. As with all dipole surrounds, Atlantic Technology recommends placing the 254.1s on the walls to the sides of the listener, a few feet above the seated listener’s ear level.

The new Model 262 PBM powered subwoofer ($649) has a 150-watt amplifier versus the older Model 252 PBM’s 90-watt amp. Along with a subwoofer level control, the front panel sports an LED that glows green when the auto-on circuit senses an input signal and glows yellow for standby mode (after 7 to 10 minutes of no signal). Stereo line- and speaker-level inputs and outputs accommodate anything from a budget A/V receiver to high-end separates. Although many rooms will be provision for threaded spiked feet, which I think is a must for achieving rigid, wobble-free support. I got much better sound when I used 24-inch, sand-fillable Merrill stands, and I can also recommend similar stands from Target and Sound Anchor.

I spent several weeks listening to the System 250.1 driven by my reference system: Theta Digital’s Data III LD/CD transport and DS Pro Generation V D/A converter, an RCA DSS with a modified digital audio output feeding Meridian’s 563 D/A converter, a Rega Research Planar 3 turntable with a Sumiko SHO phono cartridge and McCormack Audio’s Micro Phono Drive phono stage, a Citation 7.0 surround pre-amp, a Marantz DP-870 Dolby Digital processor, Aragon 4004 Mk.II and Acurus 200X3 power amplifiers, API Power Pack AC line filters, Kimber Kable PBJ and Silver Streak interconnects and 4TC speaker cables, and Canare 75-ohm digital/video cables. Before attempting any serious listening, I broke in System 250.1 by playing high-level pink noise from an XLO test CD continuously for 48 hours.

Like most people, I have one main system in my home that I fire up for music, movies, television, and the occasional Joyce Chen How To Steam Perfect Fluffy Rice Every Time instructional tape. So a home theater speaker system has got to be able to shine on both music and movies to get my thumbs-up. Contrary to THX wisdom, I strongly prefer a matched quintet of neutral, musically accurate speakers for home theater. This type of system not only “does” music but also sounds better and more involving on soundtracks than any of the “movie-optimized” speakers I’ve heard.

Atlantic’s new speaker system, on the other hand, was expressly designed to smooth over and warm up the sound of bright soundtracks. And this it does: The shrillest laserdisc in my collection, the wretched-sounding Stargate, was smoothed out enough to be almost listenable, even with my Citation processor’s THX mode disengaged. But while System 250.1 reproduced an expansive, full-range movie surround experience, its performance on stereo music was not nearly so impressive.

My main criticism centers on System 250.1’s rolled-off tonal balance. Despite a bit of low-treble peakiness that lent dialog a cutting presence, both the 251.1 main speakers and 253.1 center speaker suffered from a distinct lack of top-octave air. Atlantic’s Peter Tribeman says that System 250.1 was designed to sound a bit warmer than neutral, to counter the overbrightness of many movie and TV soundtracks. However, although System 250.1 did render bright-sounding soundtracks more listenable, it also made many of my music CDs and LPs sound rather dull and lacking in detail. Even with the speaker grilles removed, which is how I did most of my listening, System 250.1 sounded too dark.

System 250.1’s problem in this area isn’t just quantity of treble but also quality. The fine sense of treble definition I’m used to hearing from the best speakers in this price range just wasn’t there. I’m usually forgiving of a warm, low-rez treble when it comes to budget speakers, but these aren’t budget speakers. Atlantic should have upgraded System 250.1’s tweeters along with the rest of the retooling from System 250, because they’re the most obvious weakness.

System 250.1’s performance was much more impressive on film soundtracks, where, given their frequent overbrightness, its rolled-off treble was less of a hindrance and more of a help. The Model 251.1 main speakers, as well as the nearly identical
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Model 253.1 center speaker, sounded acceptably smooth in the midrange, although some peakiness in the low treble lent dialog and percussive sounds a bit more of an edge than I’m used to hearing from speakers in this price range. Overall, dialog intelligibility was good, and the close timbre match between the 251.1s and the 253.1 made for smooth pans across the front.

The Model 254.1 dipole surrounds did a good job of throwing up the kind of cloudy, diffuse ambience that dipoles do best. But because these dipoles’ front- and rear-facing drivers are angled slightly into the room, the 254.1s are more localizable and less “lush” and fully ambient. Atlantic says this is an intentional effect, for improved sound on Dolby Digital soundtracks. Still, I would have preferred a closer timbre match between the main and the surround speakers. I felt Dolby Digital soundtracks sounded much better and more coherent when I used an additional pair of Model 251.1 main speakers for the surround channels, placed in the rear corners of the room.

System 250.1’s greatest strength is the Model 262 PBM powered subwoofer. I remember well the older 90-watt 252 PBM, and the 262 stomps all over it. The sealed-system 262 goes loud and low; unlike many of the ported and bandpass-loaded subs in its price range, it produces bass that is tight, well defined, and more than “fast” enough for music. Most subs in this price range can rumble real well on movie soundtracks, but they sound thick and sluggish on music, turning good bass lines into unrecognizable mush. Not the 262 PBM—it’s one of the best subs I’ve heard in its class. And when I used two of them, the quality and quantity of bass were clearly in line with what I’ve heard from the better $1,500 subs around.

But except for the excellent 262 PBM subwoofer, I can’t give Atlantic Technology’s System 250.1 an unqualified thumbs-up. Three years ago, an $1,800 home theater speaker package like this would have garnered an unqualified rave, because high-end music performance just wasn’t expected from home theater speakers in this price range. But today that same amount of money can buy you a full-range surround system that offers true audiophile-grade sound on both music and movies. That’s why I find it hard to recommend a similarly priced system whose tonal balance and treble quality are so skewed toward mellowing film soundtracks that it renders music recordings uninviting (especially when so many A/V processors, preamps, and receivers provide switchable or adjustable means for taming overaggressive soundtracks when that is necessary). I look forward to hearing a future System 250.2, with (I hope) upgraded tweeters and a more neutral tonal balance. As it is, only the 262 PBM sub stands out as a good value. The complete System 250.1 performs well as a reproducer of movie and TV soundtracks, but if you want music, too, you can do better for the money.

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-Woody Cade
Almas Hi-Fi Stereo
Dearborn, Michigan

Q: Should I buy a laserdisc player now, or wait for DVD?
A: It depends on how long you want to wait and why. When compact disc players were first released, it took pressing plants over four years to distribute enough titles to make it an attractive alternative to the LP. By that time, the performance and features of compact disc players had improved measurably as well as dropped in price. I hate to say it, but there may be some benefit to waiting to purchase the new DVD technology, even if it comes to market in early 1997. There’s no escaping the fact that it will eventually become the leading digital format for audio and video playback. Meanwhile, a laserdisc player for between $400 and $600 will give you an immediate selection of over 20,000 titles providing top-flight picture and superior sound quality (now including Dolby Digital AC-3). You will be able to enjoy your laserdisc player now and for years to come. So why bother waiting?

-Dave Smyth
Soundscape
Baltimore, Maryland
Each month, Audio Magazine’s feature “See a Specialist” showcases the finest audio/video dealers from across the country. The dealers, chosen as a result of recommendations from equipment manufacturers, Audio Magazine staff and industry organizations, exemplify the best audio/video dealers from New York to California. The chosen dealers offer solutions to problems that can best be handled by a specialty audio/video retailer.

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Q: Since many stores do not carry the same lines of equipment, how can I fairly compare the products that interest me?

A: The smartest thing you can do is bring your own demo music, say three to five compact discs, and always listen to the same music in the same sequence at each store you visit. The CDs you bring should definitely include music that you know intimately and is representative of what you normally listen to. Ideally, your demo music should be well recorded and cover a wide range of frequencies and dynamics. I like to bring at least one recording of someone who I have heard play in a live situation, that way I have a clear frame of reference for judging the believability of the product I’m evaluating. If you are looking for some suggestions, many of the audiophile labels such as Mobile Fidelity, Audioquest, Chesky, and Sheffield Labs have beautifully mastered discs that are great for testing systems. Finally, listen to suggestions made by your audio specialist, but ultimately trust your own ears and heart. Happy listening!

-Jeff Fandal/Irv Gross
Soundings
Denver, Colorado

Q: I am disappointed with the sound coming from my center channel speaker. What can I do to get better sound?

A: Properly positioning the center-channel speaker and acoustically isolating it from the TV can make a dramatic difference in sound quality. There are several ways of achieving this. Using isolation cones under the center-channel speaker can effectively decouple it from the TV. A better method is to purchase a steel center-channel speaker stand called a “Director.” This raises the center channel speaker about one inch above the the top of the TV. The center-channel speaker should be positioned to project forward of the TV, eliminating any acoustic interference from the sound reflecting off the top of the TV. This also will diminish defraction from the front surface of the TV as well as help eliminate possible vibration of the TV cabinet. The rear spike of the “Director” is adjustable in height and should be raised slightly so that the center speaker is angled down to direct sound toward the listeners. Once positioned in this manner, you will notice a discernable improvement in clarity and a much more natural sound.

-Peter Horvath/Chris Anderson
Systems Design Group
Redondo Beach, CA
The owner's manual for the Hales Design Group Concept Five recommends that this speaker be "burned in for at least 100 hours before any critical listening is performed." The manual is correct: The Concept Five did perform better with extended burn-in. However, it also proved to be a superb speaker right out of the box. It began by doing everything very well, then proceeded to do it better.

The Concept Five may not provide the ultimate in bass or dynamics or provide the soundstage size and drama of a large electrostatic or ribbon speaker, but its transparency, soundstage focus, and natural musical timbre are truly outstanding. At a price of $6,150 per pair ($5,800 without grilles), the Concept Five competed favorably with speakers that are priced well in excess of $10,000 per pair. In fact, its performance was just about as good as high-end sound gets.

The Hales speaker's styling was the first indicator of its quality; it is not just another box that sticks out in the middle of a room. Hales followed the lead of a number of other manufacturers by sloping the speaker's front panel to improve time coherence. There's an almost parallel slope on the back, emphasizing the speaker's depth over its width. As a result, the Concept Five has a streamlined look—even though it measures 12 inches wide, 21 inches deep, and 48 inches high. It has an excellent veneer and finish. The grille is nicely styled, too, but the speaker sounds slightly cleaner without it.

The most striking aspect of the Concept Five is its sheer mass. Each speaker is in a tuned, sealed, low-Q enclosure weighing 225 pounds, making this one of the heaviest speakers around. As with some other high-end designs, the drivers are on an extremely heavy, resonance-resistant front baffle of 3-inch-thick cast cement reinforced with fiberglass. The cabinet is similarly dense and vibration-resistant; its rear and front panels are 2-inch-thick slabs of medium-density fiberboard; the sides are 1 inch thick.

This mix of mass and solidity paid off in sonic transparency, absence of bass coloration, and smooth, clean performance at high sound levels. At reasonable listening levels, the Concept Five was exceptionally free of the common tendency to add increasing coloration as the music becomes more dynamic. It had excellent consistency during transitions to loud, complex passages—such as in full orchestra, grand opera, and...
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big band jazz—and it stayed clean even during prolonged loud passages.

In fact, I would urge you to audition the Concept Five simply to hear what a speaker with properly controlled cabinet resonance can do—as distinguished from what is accomplished by some accessory devices being sold for resonance control. Although good stands, for example, can help most speakers to a degree, the Concept Five demonstrates that there is no substitute for size, weight, and the laws of physics. When mass and solidity are necessary, you need mass and solidity.

The Hales Concept Five is a three-way design comprising a 10-inch Kevlar woofer, a 2-inch aluminum-dome midrange, and a 1-inch aluminum-dome tweeter. The midrange is a European driver that is exclusive to Hales in the United States. The tweeter and woofer are proprietary drivers designed by Hales and manufactured by Vifa and Focal, respectively. The tweeter is particularly outstanding. Its underhung voice-coil is intended to provide better linear excursions than its audible range. The bass driver has exceptional damping for a woofer made for sealed enclosures, and it has a very heavy magnet structure, a long linear excursion, and a rigid, low-mass Kevlar sandwich cone.

Hales put a major effort into this speaker’s fourth-order Linkwitz-Riley crossovers. (Crossover points are specified as 600 Hz and 2 kHz.) They are hard-wired with Cardas cable, have short signal paths, and use low-inductance resistors, proprietary capacitors, and air-core inductors.

The Concept Five proved to be a very easy load on amplifiers and was compatible with a wide range of speaker cables, including those from AudioQuest, Goertz, Discovery, and Wireworld. This speaker’s nominal sensitivity is very low (86 db), and I strongly recommend using a high-powered amplifier to get optimum bass and dynamic performance.

Speaker setup and placement were relatively simple in one sense and a bit complicated in another. It was difficult to find a bad place for the Concept Five. It is designed to ensure that any halfway reasonable placement, a few feet away from the nearest walls, will produce good results. At the same time, this speaker is capable of extraordinary resolution if you minimize side reflections and is capable of equally extraordinary bass reproduction if you strike it properly and minimize the effects of room interference. Yet it takes extended listening to different placements, left/right speaker spacings, and toe-in angles to get the level of excellence the Concept Five can provide. Happily, Hales’ instructions on speaker placement are the best I have ever read (with the possible exception of those from Vandersteen). The instructions are complex and seem to assume you have an ideal, sealed rectangular room whose walls, ceiling, and floor are free from absorption and transmission in the low frequencies. Nonetheless, the directions are good enough to help even the most seasoned audiophile place the speakers optimally.

It is hard to put the sound of a product like the Hales Concept Five into perspective. You have to pay a lot for excellence at a time when you can buy a pair of good floor-standing, three-way speakers for several hundred dollars and a pair of very good floor-standing, three-way speakers for around $1,000 from mainstream manufacturers. And once you rise above that level, much depends on your personal taste, associated equipment, and listening room.

I listened carefully to a fully burned-in pair of Concept Fives with test records, DAT tapes of live performances, acoustic recordings of different types of voice and solo instruments, and a wide range of classical, jazz, and rock albums. At no time did the Hales falter. The Concept Five had one of the smoothest and most natural timbres, or overall frequency responses, I have ever heard. It was exceptionally free from the minor colorations in specific frequency ranges that can affect the timbres of certain instruments or the human voice. Further, the timbre of the Concept Five was consistent at all dynamic levels.

I found the Concept Five to be exceptionally live and dynamic. It had outstanding musical life and the speed and power-handling capability necessary to resolve loud bass transients and musical changes with even the most demanding recordings. This was evident on guitarist Carlos Heredia’s Gypsy Flamenco (Chesky WO126). There were rational limits as to how loud I could drive these Hales speakers, however. If I pushed the envelope to ear-bleeding levels, the woofer began to break up when I played ultra-demanding deep bass, such as Pink Floyd’s famous heartbeats on Dark Side of the Moon or the bass drum on Eiji Oue’s recording of Le Sacre du Printemps (Reference Recordings RR-70). Let me emphasize that you’ll encounter this problem only if you play deep bass transients at levels greater than 100 dB. (And if you listen to a lot of massive bass pressure waves at these levels, it won’t be the speaker that will need its screws adjusted.)

Although the Concept Five’s deep bass was flat, extended, and well defined, it was not as deep as that of subwoofers or speakers whose woofers and enclosures are far larger. By using a 10-inch woofer in a sealed enclosure rather than a larger driver or a ported enclosure, Hales Design traded off some frequency extension and power-handling capability in order to gain exceptional bass detail, transient performance, and flat bass response.

With several recent high-end speaker systems, I have been particularly impressed by the smoothness of the transition from the deep bass to the midrange; the Concept Five handled this as well as any system I have heard. The Hales brought the guitars alive on the Newman and Oltsman Guitar Duo’s Passions (Sheffield 10058-2 F) and gave the cello a special magic on William DeRosa and Noreen Cassidy-Polera’s Cellist’s Holiday (Audiofon CD 72046).

The Concept Fives are “voiced” differently from the Thiel CS7a I used for comparison, in the sense that the Thiel’s had distinctly more upper-octave energy. The Concept Fives also had slightly less apparent upper-octave energy than Apogee Studio Grands and B&W 801 Matrix Series 3s. Yet the Hales reproduced the upper octaves with great success. Their upper midrange and treble were very smooth and had great detail. The upper strings were sweet. Female vocal sibilants were extremely realistic, without the touch of harshness found even
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Carver Research Lightstar Reference Amplifier

Recommended Component, Stereophile, April 1996 (Vol. 19, No. 4)

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Carver TFM-35x THX Amplifier

Stereophile Guide to Home Theater, Fall 1996 (Vol. 2, No. 3), Robert Deutsch

"It's very modestly priced but doesn't sound like it...There are two groups of audiophiles to whom I particularly recommend the TFM-35x: those who are drawn to the tonal qualities of tube amplifiers but don't want the responsibility of their care and feeding, and those who are attracted to the sound of the Carver Lightstar Reference but deterred by the price...In the right system, it can give the big boys a good run for their money."

Carver AV-806x Multi-channel Amplifier

Recommended Component, Stereophile, April 1996 (Vol. 19, No. 4)

"I was expecting competent performance; what I got instead was magic," enthused TJN [Thomas J. Norton] about the six-channel Carver... "My favorite current multichannel amp."

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in some of the best speakers; reproduction of male voice was equally exceptional. The dynamics, timbre, and transient performance of the Concept Fives were remarkably consistent from very soft to all but the very loudest levels. Many speakers seem to have a single listening level for best performance. You have to play music at this level to make the speaker come alive and deliver a natural frequency response, being careful not to push the overall listening level any higher because the response will start changing or the sound will begin to harden. The Concept Fives can sneak up on you in this respect. In fact, I'd be a bit careful about letting their transparency and speed seduce you into listening at too high a level. These speakers are a little like a fine Mercedes: Everything goes so smoothly that you don't realize it when you have pressed too hard on the accelerator.

The Concept Five's soundstage was natural, not bigger than life. It extended to the right and left of the speakers and had exceptional depth. It also had superb focus and stability and an unusual degree of center fill. The Concept Five provided as good a soundstage as any speaker using conventional drivers I have heard, and its soundstage definition equaled that of the best bipolar speakers that use cone and dome drivers. This was clearly audible on naturally miked CDs or LPs—as well as in more complex mixes, such as on Bernard Herrmann's LP The Four Faces of Jazz (Mobile Fidelity MFSL 255).

The Concept Fives provided a generously sized, two-person listening area where soundstage detail was simply superb. I heard none of the etching or artificial precision that tends to make speakers more like sound-effects machines than reproducers of music. A few small reference monitors on stands come close to furnishing the same left-to-right imaging, but they seldom yield anything approaching the Hales' depth, extended frequency response, and smoothness. If you listen to live acoustic music, you will find that the soundstage delivered by the Concept Fives is about as musically realistic as the recording permits.

I am all too aware that praising the Concept Five, which costs around $6,000 per pair, is praising a product few people can afford. In defense of its price tag, this is a truly outstanding speaker whose sound quality is competitive with that of a number of speakers costing $10,000 per pair or more. I realize this is not much consolation if you don't have the money in the first place. So let me give you a bit of good news: Hales Design Group has two other, more affordable models whose technology is very similar. The Concept Three costs $4,100 per pair ($3,800 without grilles), and the Concept Two costs $2,245 per pair ($1,995 without grilles). Still not cheap, yet certainly within the budget of more audiophiles. But, like every other glorious excess in the high end, even the Concept Five can be rationalized as a bargain!

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Tchaikovsky: Symphony No. 5
in E Minor, Op. 64;
Overture “1812,” Op. 49
Chicago Symphony Orchestra,
Daniel Barenboim
TE DEC 0630-10904
CD; DDD; 59:41
Sound: A-, Performance A+

chaikovsky's symphonies are so popular that, all too often, conductors simply read through the work with little forethought. For this very reason, the Chicago Symphony Orchestra's new recording of Tchaikovsky's Fifth is a breath of fresh air. Its conductor, Daniel Barenboim, acknowledges, "We relearned the work specially for this recording, and I can truthfully say that there isn't a single note in the whole recording that hasn't been thought afresh."

One of Barenboim's novel ideas is to perform all four movements "attacca," or without a break. It becomes quite a recording challenge to give the impression of a live, straight-through performance (though without extraneous audience noise). Although this approach would be meaningless with most symphonies, it works well in Tchaikovsky's Fifth. The end of each movement is tonally, and often melodically, related to the beginning of the next. Barenboim's interpretation is forceful and triumphant, and the Chicago Symphony Orchestra's execution is without blemish. The brass is particularly excellent, and Dale Clevenger's horn solo in the second movement displays the sweetness and control of a true virtuoso.

Likewise, the Chicago's "1812" presents us with a distinctive performance. Even from the opening chords, you'll likely notice a difference: Where the Russian hymn is typically performed by the entire string section, often doubled by many of the winds (especially in outdoor concerts), it is played here by a sextet of violas and cellos, according to Tchaikovsky's original version. The effect is intriguing and creates

Elliot Goldenthal is probably best known by film-score fans for his cinema music, including Alien 3 and Interview with a Vampire. Like many other film composers, he has also labored in the abstract-music field, and the Pacific Symphony commissioned this work from him for the 20th anniversary, in 1995, of the formal end of the Vietnam conflict.

The sprawling work combines orchestral, choral, and ethnic elements in Asian and Western forms, and the many contrasting texts (both spoken and sung) address the emotions of those involved in the war and its memories, often with great poignancy. The performers include a soprano, baritone, one adult and two children's choruses, and an orchestra enhanced by an expanded percussion section. There's even a snippet of Jimi Hendrix's famed "Star-Spangled Banner."

Cellist Yo-Yo Ma plays a role in the first and longest movement, including a moving solo cadenza; the images here deal with fire and the sacrifice of individuals who immolated themselves as a protest to the war. The second movement follows the metaphor of paper, using quotes about war from many texts, ranging from the ancient Romans to the Pentagon Papers. The closing Hymn movement follows the theme of water with descriptions of the travails of the "boat people." Undeniably moving words and ideas, but musically the sum is not greater than the parts.

Undeniably moving words and ideas, but musically the sum is not greater than the parts.

Goldenthal: Fire Water Paper,
A Vietnam Oratorio
Yo-Yo Ma, solo cello; Ann Penagulas,
soprano; James Maddalena, baritone;
Pacific Chorale; Pacific Chorale
Children's Chorus; Vietnamese
Children's Chorus; Pacific Symphony
Orchestra, Carl St. Clair
SON Y CLASSICAL SK 68368
CD; DDD; 65:43
Sound: A, Performance: A

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CIRCLE NO. 4 ON READER SERVICE CARD
like Wynton, the blind pianist has a strong interest in exploring the jazz heritage but focuses on the American solo-piano tradition. This exciting release presents three of Roberts’ very personal and inventive improvisations for piano and “crossover” orchestra.

One might wonder what fresh approach could be taken on Gershwin’s “Rhapsody in Blue.” Yet Roberts does more than lift quotes and wall on them before continuing with roughly the original score: He creates new bridging sections that often comment on Gershwin’s themes and adds entirely new material inspired by the original. (This track runs double the work’s normal playing time.) It’s a bit like hearing a complete ballet for the first time when you’re familiar only with its suite.

The 38-member band includes a dozen top jazz musicians; the longhair members can really cut a rug, too. Roberts had observed that Gershwin’s melodies are blues-based, and he and the band play the blues “Rhapsody in Blue” ever. The verve and vitality conveyed in “Rhapsody,” as well as in Gershwin’s “I Got Rhythm” Variations and James P. Johnson’s “Yamekraw,” are a delight. You can never predict what’s going to happen in this bubbling-over classical/jazz stew.

This is obviously a multimiked studio recording, with all the aural spotlighting that entails. But it’s appropriate here and probably makes the sound more exciting. John Sunier

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It may come as a shock to realize that something is missing from the Three Movements of Buenos Aires Tangos: It’s the bandonéon! In this very concentrated and intense contemporary orchestral work, Piazzolla poured the emotion he normally expressed on his instrument into the complex and virtuoso parts for the other players. The final five tangos are more than fillers, including such gems as “Adiós Nonino” and “La Muerte del Ángel.”

Schumann: Songs, Volume 1
Christine Schäfer, soprano;
Graham Johnson, piano
HYPERION CDJ33101, CD; DDD; 75:11
Sound: A, Performance: A–

Hyperion and, even more to the point, Graham Johnson have decided to do for Robert Schumann’s song literature what they have been doing for Schubert’s. How pianist Johnson manages all he does, let alone manages to do it all with such polish, thoroughness, and evident enthusiasm, is unfathomable. He is among the very finest and most prolific of accompanists, and his voluminous notes are wonders of scholarship and enlightenment.

This first volume is devoted to 32 late songs, including the six of Opus 107 and the “Six Poems and Requiem” of Opus 90. Few will be on the favorites list of even a devoted Schumannophile, but their relative obscurity, in fact, a major recommendation for this CD. Christine Schäfer sings very well indeed but without much individuality. Presumably, as in the Schubert project, a variety of singers will appear in future volumes.

Robert Long

Mozart: String Quartet No. 22 in B-Flat Major, K. 589; String Quartet No. 23 in F Major, K. 590
The Shanghai String Quartet
DELOS DE 3192, CD; DDD; 51:49
Sound: A, Performance A+

Mozart’s last three string quartets are often labeled the Prussian Quartets or the Berlin Quartets, but musicians often call them the Cello Quartets because of the instrument’s prominent part. All of these names make historical sense: In 1789, Mozart was desperately in need of money and traveled to Berlin to meet William II, King of Prussia, who was also a music patron and a talented cellist.

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CIRCLE NO. 7 ON READER SERVICE CARD
Richard Robbins: Via Crucis
(The Way of the Cross)
Richard Robbins, keyboards;
sexet of instrumentalists; three vocalists
POINT MUSIC 454-055-2; CD; DDD; 61:14
Sound: A, Performance A

Via Crucis is the second release of new liturgically oriented works by composers known mainly for film scores (Elliott Goldenthal's Fire Water Paper; reviewed on page 92, is the other). Richard Robbins' scores include Remains of the Day and Howard's End.

This powerful work is not your normal choral meditation on the Stations of the Cross. The small performing group includes six synthesizers, an electronic reed instrument, a violin, a cello, two ouds, a psaltery, and percussion instruments. There are three voices, usually vocalizing wordlessly, plus church bells and environmental sounds, all skillfully blended into a very moving experience.

Robbins originally created the music as a sound painting to accompany 14 visual collages on the Passion. They are printed on the album insert, but too small to be appreciated. "Via Crucis" is a modern religious "Pictures at an Exhibition," with a closer connection and flow between images. Within minutes, the mesmerizing story in sound changes from Arabic prayer chanting to gamelan music, African drums, strumming piano strings, and meditative Spanish guitar over nocturnal insect sounds and thunder. You can either follow the Christian images or float along with the sounds, creating your own visual impressions.

John Sunier

Mussorgsky: Songs and Dances of Death et al.
Marjana Lipovsek, mezzo-soprano;
Graham Johnson, piano
SONY CLASSICAL
SK 66858, CD; DDD; 62:37
Sound: A; Performance: mostly A+

Though this CD carries the title of Mussorgsky's best-known song cycle, Songs and Dances of Death, it contains a lot more: the other two cycles, The Nursery and Sunless, plus the individual songs "Hebrew Song," "The Song of the Flea," and "Hopak." This is not everything Mussorgsky ever wrote for voice and piano, but it includes all of his most famous works.

Marjana Lipovsek is a born actress. Her fine voice, which she uses with much imagination and craft, gives the songs wonderfully vivid contours. The mother-and-child songs, in particular, are harrowing in their dramatic impact. Least successful is Lipovsek's "Song of the Flea": perhaps I'm just not ready for a female Mephistopheles, despite her blood-curdling laugh at the end. Graham Johnson is, as always, a superb accompanist.

The recording was made in Vienna, in the Brahms Hall of the Musikverein, and the sound is fine—though you may never notice once the songs get to you. Sony Classical has supplied full transliterations and English translations (French and German editions evidently are available as well), for which, heart-felt thanks. It adds up to an outstanding package. But be warned: Mussorgsky songs can be depressing.

Robert Long
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JOHN SUNIER - Audio Magazine

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In Canada, please call 1.800.267.1216.
Nihilism never goes out of style in rock; for proof, all you have to do is tune into your local modern rock radio station for half an hour. Listening to Dance Hall at Louse Point, it would be easy to accuse Polly Jean Harvey of being a nihilist (she even covers that old chestnut of existential angst, Peggy Lee’s “Is That All There Is?”). But Harvey isn’t your average rock 'n' roll bonehead advocating “live fast and die young 'cause life is not worth living.” She’s got deep, deep roots in the blues, and although we can argue about authenticity and whether a Gen X intellectual from rural Yeovil, England, can ever really understand, say, Otis Rush, I think she truly feels the cathartic essence of the music. She knows that the simple act of singing—even if you’re singing about how much life sucks—is, in fact, life-affirming.

Publicists have stressed that Dance Hall at Louse Point is a collaboration: Harvey wrote the words to the 11 originals, while guitarist/percussionist John Parish wrote the music, mostly during 1995's busy year of touring. But for all intents and purposes, this is a new P. J. Harvey album. She leaves her mark on every tune, transforming the simple musical backgrounds of a guitar riff, some organ, and maybe a bit of clattering percussion into dramatic passion plays. In “Taut,” she takes Patti Smith’s version of “Gloria” (with its “Jesus died for somebody’s sins but not mine” intro) a huge step further, contrasting the blind faith in an abusive relationship by singing in an angry growl during the song’s verses, then mockingly crooning “Jesus save me” in the choruses.

Nearly every song boasts that kind of intensity, and the chameleon-like Harvey changes her persona and vocal histrionics to match each role.
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Misha's unprecedented use of acoustic piano, trombone, spoken word and fresh urban rhythms is captured here, not only on XRCD, but through the three dimensional sound of the Spatializer Recording System.
Rather than make a third album as Jellyfish, key members Eric Dover and Roger Manning jettisoned the name and the record deal, found a new rhythm section, and renamed their group Imperial Drag. Here, they've assimilated more '70s influences while moving away from their signature Badfinger-esque sound. It's glam rock for the '90s, with a little Led Zep and Deep Purple thrown in. The result is quite engaging, with a high degree of musicality and intelligence. Songs like "Boy or a Girl" and "The Man in the Moon" evoke T-Rex, while "Zodiac Sign" and "Kiss It All Goodbye" summon up golden-era Zeppelin songs such as "Trampled Underfoot" and "Houses of the Holy." There's a Queenish touch to the production throughout, and clever segues make the album appear more as a unified whole than just a bunch of songs put together.

Will heavy rock from 1977 make a comeback via these neo-'90s glitterati? Can Jellyfish find happiness as Imperial Drag? Only their hairdressers know for sure.

Jon & Sally Tiven

Yes, the subject matter is unrelentingly dark. That's why we rock critics, a generally miserable lot, love Harvey so much. But the result, like the best blues, is uplifting and spiritually enriching. The key line comes in "Girl," when she pays her lover the ultimate compliment. "You move me like music," she sings, but the way she savors each syllable, wrapping her supple instrument around every note, indicates that she's lying. Nothing—not even great sex—moves her the way that music does.

We should be thankful for that, because there isn't much rock music these days that's as moving as Polly Jean Harvey's. Jim DeRogatis

The Subtle Body

Arto Lindsay

BAR/NONE RECORDS AHAON-078, 34:06

Sound: A-, Performance: A-

During his time in the downtown ensemble DNA, Arto Lindsay developed a new vocabulary for the electric guitar, altering his instrument into a rhythmic noisemaker. As a member of the Ambitious Lovers, he dipped into his childhood in Brazil, along with downtown jazz, funk, and whatever else happened to be available. On this solo record, he leans heavily on the samba, sounding much closer to Michael Franks than No Wave, New Wave, or any wave. Indeed, the wry "Child Prodigy" could segue neatly in so many ways with Franks' "Popsicle Toes." Tunes like "Unbearable" and "Enxugar" sound as familiar as the lone Jobim cover on the album, "Este Seu Olhar."

The musical subversion for which Lindsay earned notoriety is, as the album title suggests, subtle here, present in strange harmonies, themes, and altered sonics—all courtesy of...
contributors Brian Eno, Yuka Honda, and Towa Tei. The delightfully ingenuous voice with which Lindsay performs these sambas and ballads undergoes intentional sonic decay in "Animas Animale." Odd sounds fill the sonic cracks where more conventional records might have used strings. The record also makes some strange bedfellows. Japanese composer/synthesist Ryuichi Sakamoto plays acoustic piano on tracks with earthy Brazilian percussionist Naná Vasconcelos. Deee-Lite DJ Towa Tei plays alongside master Brazilian guitarist Romero Lubambo. Lubambo also gets the opportunity to duet with downtown "fission" guitarist Marc Ribot.

Lindsay occasionally lapses into annoying distortion; this only serves to illuminate how good the recording sounds otherwise. The songs come through with no-nonsense sonic clarity, while the understated treatments and samples of Eno, Honda, and Tei remain substantial in the mix.

Hank Bordowitz

Everything Must Go
Manic Street Preachers
EPIC EK-48393, 45:19
Sound: B-, Performance: B

It's been over a year since Manic Street Preachers' co-founder, Richey James, was reported missing from an English hotel. At first, it seemed impossible that the group could continue without its tortured, flamboyant rhythm guitarist/lyricist, but the Manics have created their most passionate music to date. Everything Must Go isn't the cynical, unruly disc fans might expect from the frustrated quartet (now, however fleetingly, a trio); it's an album of hope and discovery, a testament
to adaptation and survival. Instead of striking out in frustration, the bandmembers have delved within themselves and discovered that the best way to cope with pain is to celebrate pleasure.

Not that Everything Must Go is a hedonistic excursion. It's more like a self-confidence seminar. Many of the songs swell with strings and jaunty rhythms, and "Elvis Impersonator: Blackpool Pier" and "Kevin Carter" resonate out in frustration, the bandmembers have delved within themselves and discovered that the best way to cope with pain is to celebrate pleasure.

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hen Weather Report disbanded in 1986, its guiding light, keyboardist Joe Zawinul, began searching for his own sound. Immersing himself in the South African music of Salif Keita, he released three consecutive albums that were chock-full of exotic vocals, four-on-the-floor grooves, and his trademark masterful keyboards. The Immigrants, Black Water, and Lost Tribes had trouble finding an audience, however, as Zawinul's fans tired of his fascination with African music or simply moved on to something else (corporate-sponsored trad jazz, lite-jazz, or rock).

Many people credit (or lay blame on) Weather Report, a band that originated from Miles Davis's late-'60s electric-jazz sessions, as the archetypal fusion group. In retrospect, it was a World Music group long before the media conjured the label. Weather Report foresaw the merging of colliding cultures and electro-organic music by some 25 years.

That said, My People is Zawinul's best album since Weather Report's final album, This Is This. As far back as 1979's live 8:30 and its snippets of continent-crossing radio dialogs, Weather Report reflected its endless travels. Zawinul continues the ritual. Opening with Duke Ellington's sampled voice ("My people? Which people are my people? The people are my people") over a backwards-looped choir, "Waraya" sneaks in as hip-shaking world boogie, with Zawinul's rich voice boiling through rumbling effects. His keyboards scoot and swirl through My People like a familiar friend-familiar, because the bear-like Austrian hasn't bothered to update his sound, and each scrunchy call-and-response finger-finding run or resounding chordal layer acts as sly commentary. Zawinul...

My People
Joe Zawinul
ESCAPADE MUSIC
ESC 63651, 52:40
Sound: B, Performance: B

NEW YORK DANCES
The Jack Jeffers N.Y. Classics Big Band
MAPLESHADE MS 03632, 65:52
Sound: B-, Performance: A-

Bass trombonist/composer Jack Jeffers' N.Y. Classics Big Band album begins with a flourish that sounds like the intro to a 20th Century Fox movie, but it quickly morphs into a funkified march. This very uptown 12-piece band's sound swings from New Orleans to Latin, gospel, and blues while working through a host of Jeffers' originals and reworkings of the "classics." These guys never stand still for too long. The centerpiece suite, "New York Will Keep You Dancing," is a dazzling musical tour of the N.Y. street-dancing scene.

Sonically, New York Dances is a mixed bag. Mapleshade's sound is crystal clear, but the discrepancy in perspective between some instruments is unfortunate (close-up tuba and percussion versus a distant ensemble horn sound, for example). Back on the music front, producer Hamiet Bluiett has nurtured a joyously loose and easy atmosphere throughout; New York Dances is a feel-good, toe-tappin', big band romp. (Available from Mapleshade Productions, 2301 Crain Highway, Upper Marlboro, Md. 20774.)
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Pianist Marcus Roberts has long been considered Wynton Marsalis' prime disciple; since 1989, he's created a string of recordings that have been overtly reverential of his musical heroes and influences. His first few CDs felt more like recitals than real jazz albums, but he seemed to catch his stride on 1992's As Serenity Approaches. Still, his devotion to past masters—notably Monk, Ellington, Jelly Roll Morton, Fats Waller, and Gershwin—has overshadowed any sustained exposure of Roberts' own music.

Until now. Time and Circumstance, his impassioned 77-minute suite, thematically contemplates a lifelong love affair. That's quite a task for a piano trio, but Roberts and his youthful bandmates, 18-year-old bassist David Grossman and 19-year-old drummer Jason Marsalis, prove themselves more than ready for the challenge of conveying a range of emotions with limited instrumental colors.

The album's theme is clear from the get-go, as the lovers' attraction heats up pretty quickly on the smoldering opening track, "Soul Mates." Roberts charts the lovers' growing sense of trust and commitment, but by the middle of the disc, "Alone" shows that some painful realities have set in. Grossman's heart-wrenching arco bass solo plays off Roberts' sweeping piano, and together they find resolution. To ignite the title track's propulsive thrust, Roberts employed a cue-based system to enable each member of the trio to lead the group during his solo.

Here, Marsalis' powerful Tito Puente-influenced groove translates as a choppy, nervous accents. And in what could be Zawinul's second radio smash, the lifting reggae sway of "In an Island Way" makes for perfect sunrise music.

Joe Zawinul has aged gracefully. My People confirming his garrulous sense of humor and youthful vision. May the new Weather Report be as rich as this.

Ken Micallef

**Time and Circumstance**

Marcus Roberts

COLUMBIA CK 67567, 76:42

Sound: B+, Performance: A-

Cuban expatriate Paquito D'Rivera is a true jazzman renowned for his pyrotechnical, Latin-accented saxophone and clarinet improvisations. Carlos Franzetti is a master arranger who knows the robust tendencies of Cuban music but chooses also to explore softer hues. Put the pair together with 18 of New York's finest players, and an historic repertoire (some 100 years of Cuban music, including originals by D'Rivera and Franzetti) comes alive with the sounds of D'Rivera soaring over dramatic orchestrations of smooth, elegant woodwinds and bold, emphatic brass.

D'Rivera, who spends five of 13 cuts on soprano (his main axe when he was a child prodigy), alternates subtle displays of melancholia with dynamic outbursts of intense joy. He eases into his solos, probing every nuance of Franzetti's lush orchestrations, all of which seem capable of inducing D'Rivera's recollection of his earlier life experiences.

**Portraits of Cuba**

CHESKY JD145, 60:36

Sound: A, Performance: A

**Portraits of Cuba** is a fine example of jazz concertos, prodding the soloist with lush, big band voicings and providing all of the ingredients necessary for his spontaneity. As each arrangement unfolds, D'Rivera's eloquently spinning lines heat up, becoming more and more aggressive without forsaking the highest degree of musicianship. Described by D'Rivera as "a jazz tribute to the Cuban tradition," this joint venture between soloist and arranger invites comparison to a similar Miles Davis/Gil Evans collaboration, Sketches of Spain. Perhaps Portraits of Cuba will also come to be known as a classic.

James Rozzi

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Bill Evans’ longtime producer/manager Helen Keane fought long and hard to gain the necessary clearances to release this dynamic music from two 1974 European concert radio broadcasts. Norman Granz recorded these two giants together in 1964, but the limited outcome from that session never hinted at what would be heard in these later sessions.

It’s an accepted fact that both Getz and Evans are not only true stylists but also virtuosos. Evans’ skillful blend of classical piano technique and harmonic coloring with the rhythmic aspects of jazz remains unmatched. And Getz’s smooth tone and complex, cool lines defined the tenor saxophone, spawing a host of imitators.

Given the inclinations of these two, it should be no surprise that half of the songs are beautifully performed ballads ("But Beautiful," "Emily," "Lover Man," and "The Peacocks"). The subtle, empathic backing given to Getz’s smooth, linear flights is absolutely sublime. What may prove a bit surprising is the manner in which he programme’s remainder ("Grandfather’s Waltz," "Stain’s Blues," "Funkallero," and "You and the Night and the Music") was accomplished.

As an added bonus, two tracks sans Getz ("See-Saw" and "The Two Lonely People") are tucked on at the end, presenting Evans, bassist Eddie Gomez, and drummer Marty Morell ("See-Saw" and "The Two Lonely People") are beautifully performed ballads ("But Beautiful," "Emily," "Lover Man," and "The Peacocks"). The subtle, empathic backing given to Getz’s smooth, linear flights is absolutely sublime. What may prove a bit surprising is the manner in which he programme’s remainder ("Grandfather’s Waltz," "Stain’s Blues," "Funkallero," and "You and the Night and the Music") was accomplished: Tarzan couldn’t have swung any harder.
grab your attention. After we've tiptoed on the netherworldish “Sun Rays,” ridden shotgun on the swinging rails of “The Nac,” and pondered the pointed wit of “Remember,” “Led Astray” reveals the eye of a hurricane. Written by Rhonda Ross (Kendrick's girlfriend and the daughter of Diana Ross), the song is framed by Kendrick's sparse chords, its supple melody stated by alto saxophonist Justin Robinson. Elegant and melancholy, "Led Astray" is one of those rare moments when musicians are granted a sublime melody, then gracefully build on it. Kendrick's piano commentary alone sends chills up the spine.

As humorous and unpredictable as his music is exciting, Rodney Kendrick knows his history but isn't chained by it. Common Sense wins out over blind worship any old day.

Ken Micalef

Michael Wolff was an in-demand sideman (Nancy Wilson, Cal Tjader) before he was lured away to Easy Street, playing musical foil to George Winston's New Age noodling, but his improvisational ambition and the album's spontaneous approach is, on the whole, enjoyable. It's on the title track that the trio moves into fifth gear and demonstrates some unretained interplay. But that said, it would've been nice to hear Tony Williams really play the drums like the innovator he is—stuck in "ballad" mode for most of this album, he doesn't really solo until the final cut.

Which is essentially what 2 AM is—an album of textural, ballad-tempo compositions. If you're a fan of this genre, by all means check it out. But if you're looking for a barn-burner, don't look here. 2 AM is nice, and it's pretty, but it's not about up-tempo "excitement."

Perhaps that's subsequent Michael Wolff albums. Mike Bieber

**Number Two Express**

Christian McBride

VERVE 314 529 585, 63:58

Sound: A. Performance: A

Bassist Christian McBride's second album as a leader dispels the notion that current jazz lacks innovation. Although the advances of modal and free jazz of the '60s continue to form the basis of today's acoustic jazz, McBride demonstrates that there's plenty of room for individualized update. A quantity of thoughtful, original compositions unlocks the musician's creativity, "Whirling Dervish," for example, doesn't sound like the basic 12-bar blues that it is. And what's more, it's in the key of F sharp, an unlikely choice capable of nullifying musical clichés (i.e., those same old boring riffs) during improvisation.

The name of the composition "EGAD" is derived from the roots of its bass line. As the form unfolds, the same intricate rhythmic and harmonic variants heard in the opening statement are inserted as accompaniment behind the tune's improvisations, spurring the soloists to exciting heights.

Now add to the mix some of the most talented, individual voices in jazz today: masters Kenny Barron and Chick Corea share the piano duties, alto saxophonists Gary Bartz and Kenny Garrett cover the gamut of emotions from cool to frenzied, and Steve Nelson adds his vibraphone to two of the smoother cuts. Percussionist Mino Cinelu gives added color to a reading of Freddie Hubbard's "Little Sunflower," featuring four harmonized, overdubbed acoustic basses with an electric bass playing the melody.

McBride has quickly established himself as one of the most talented young bassists to hit the jazz scene in a long while. With many other album credits already under his belt as a sideman, this particular release presents him as a dynamic writer and leader in his own right.

James Rozzi

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Another entry in the growing lineup of dedicated headphoneamps, the HPA v1.0 is a small Class-A power amp with theHeadRoom Audio Image Processor circuit built in. As with anyheadphone amp used with quality phones, the immediacy of thesound makes it easy for you to focus in on even the smallest changesin your audio chain—for example, you may suddenly notice that thesound is better if you feed the signal from your D/A converter orCD player rather than via your system’s tape or line output.

The HPA v1.0’s sound was top-notch; it lost just a pinch in bassfoundation to my reference headphone amp—but the AudioAlchemy, at $295 (including the Power Station One power supply),costs about one-fifth as much. The HPA v1.0 delivers 1.5 watts intoan 8-ohm load; that was plenty, even for inefficient phones.

Even if all the Audio Alchemy did were amplify, it would be a best buy. But it provides theHeadRoom circuit (also included in the amps madeby HeadRoom). Switching thiscircuit in when you listen to stereo recordings through headphonesreduces the tendency of sounds toclump together at your ears and thecenter of your head, and it spreads them more seamlessly (though it doesnot move those sounds outside your head). I found the circuit most usefulwith studio-created pop and rock, least noticeable with classical and jazz. It is neitherneeded with, nor suitable for, binaural recordings.

John Sunier

Case Logic CDV-12 CD Visor

It’s not a good idea to leave CDs naked and defenseless in your car, but it’s a pain to juggle them in and out of their jewel boxes while you drive. When I change the disc in my in-dash CD player, all I have to do now is flip down my car’s visor, slip the old CD into a cloth-lined slot in Case Logic’s CDV-12 CDVisor, and pluck out the next disc I want to play. The CDV-12 has pockets for12 CDs, an elastic loop for a pen or tire gauge, and a mesh bag for change andtoll tickets. (You can also use the mesh bag to hold a 13th CD.) The morecolorful your CD collection, the easier it will be to find the disc you want; ifall your discs are standard silver, make sure you orient them so that you canread the disc titles quickly.

The CDV-12 attaches with straps you adjust via hook-and-loopfasteners—ugly, but convenient. The straps also let you flip the holder up touse the vanity mirror (ain’t technology grand?). Inserting the CDs in theside of the visor that’s normallyfolded out of sight makes them a bit less ac-

ccessible but keeps them away from sunlight and the eyes of thieves. Itried it the other way but disliked the oppressive mass of black just at the top of my field of vision.

List price is only $9.95, certainly cheap enough to consider using multiple CDV-12s: I’d put another CD holder on the passenger-side visor for long trips or let every driver in the family have one to preload withfavorite discs. People with children might want a pair ofCDV-12s in hopes of keeping the kids relatively quiet on a trip to Grandma’s or the mall.

Ivan Berger

For literature, circle No. 122

Shure V15VxMR Phono Cartridge

Shure’s new V15VxMR moving-magnet cartridge ($299.95) is essentially identical to its predecessor, the V15 Type V-MR, except for a burgundy hue on the Dynamic Stabilizer brush and a somewhat warmer tonal balance. Boasting a rigid, low-mass beryllium stylus cantilever tube and aMicro-Ridge hyperelliptical stylus, it is specified to track optimally at 1.5 grams (the dynamic stabilizerabsorbs 0.5 gram, for a net pressure of 1 gram at the stylus, 1.25 grams maximum).

I installed the V15VxMR in the tonearm of a mammoth Yamaha YP-D10 PLL direct-drive turntable, afterdiscovering that years of listening to CD had sensitized me to the intrinsic flutter of my audiophile belt-drive table,which made solo piano LPs unlistenable. Alignment was checked with Shure’s supplied gauge, then verified with a DB Systems protractor.

The V15VxMR effectively suppressed the hum field radiated by the Yamaha’s motor (some poorly shieldedcompetitors don’t). And it sailed through the torturous flute, harp, and orchestral bells tracks from various Shure AudioObstacle Course test records. Only the highest level of complex tones on Shure’s TTR117 disc caused the V15VxMr to mistrack slightly. I suspectthat in a better arm it would have taken even the top levels in stride.

On LPs of all sorts—direct-to-disc, half-speed mastered, and 45-rpm audiophile platters to commercial rock and pop albums—the V15VxMRproved a neutral window to some of the best and worst sounds from the heyday of vinyl. If, like me, you have hundreds (or thousands) of LPs tucked away that you never seem to play anymore, there’s much to rediscover, and I know of no better cartridge for the purpose.

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Alan Lofft

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