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MAY 1996

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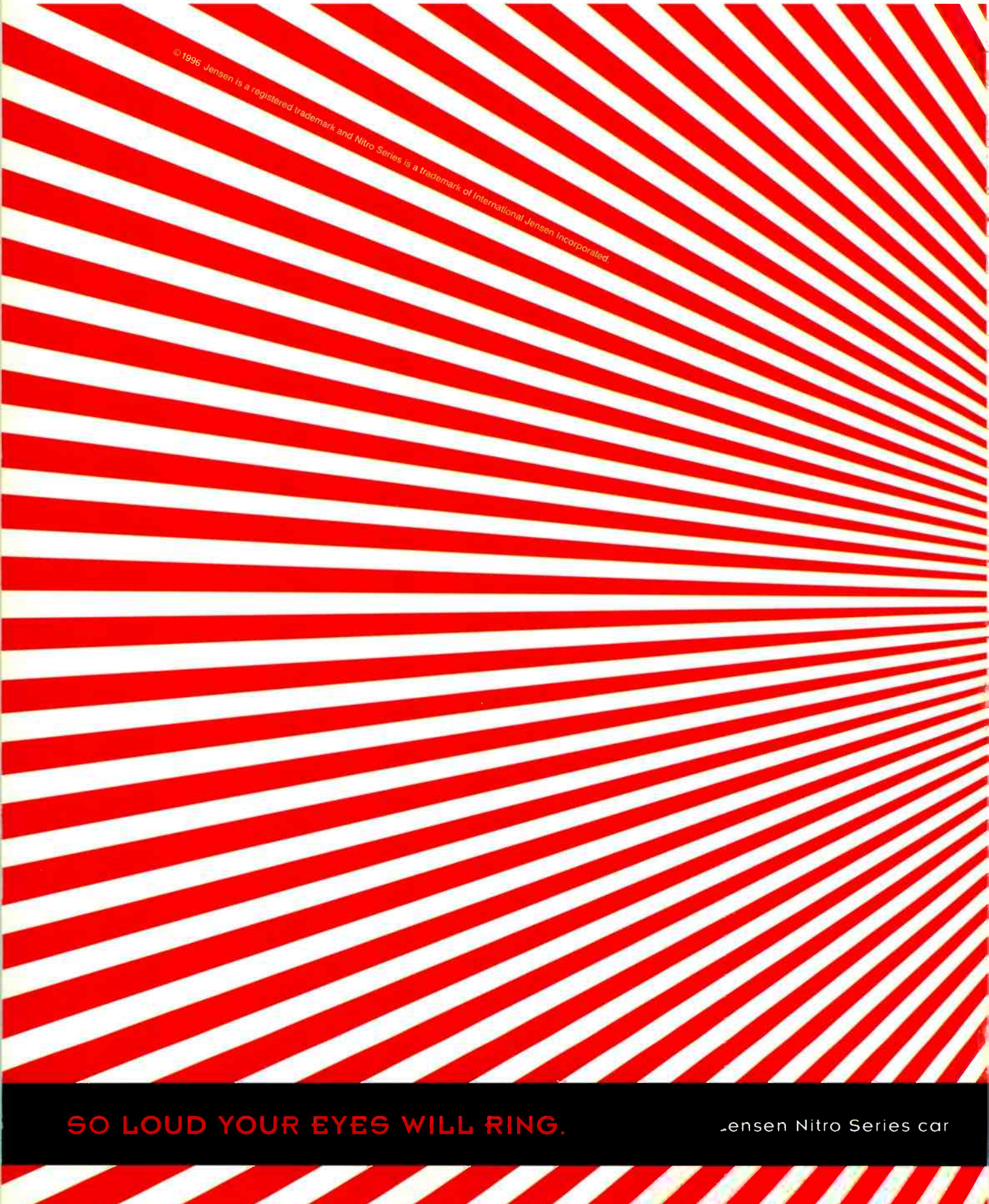
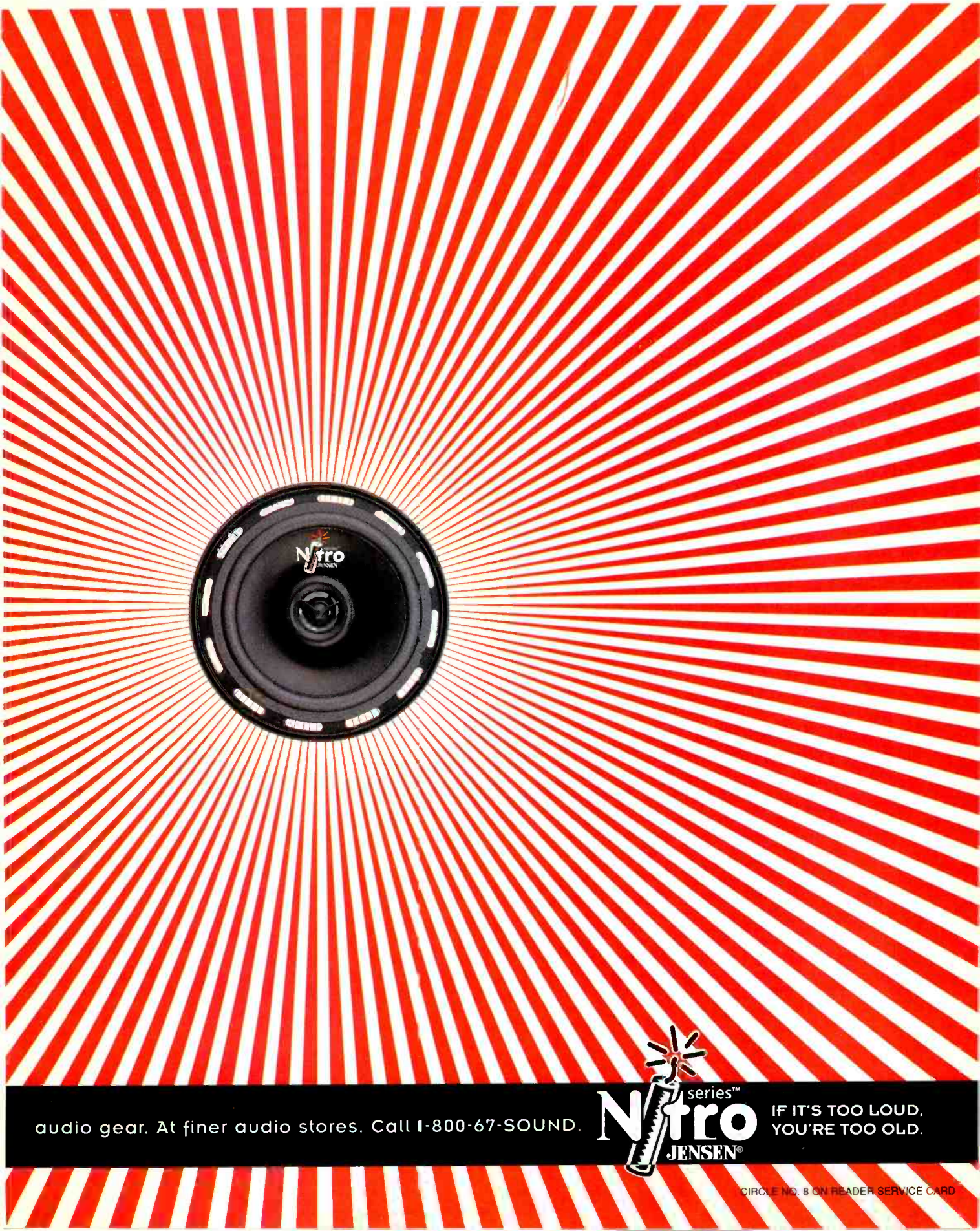


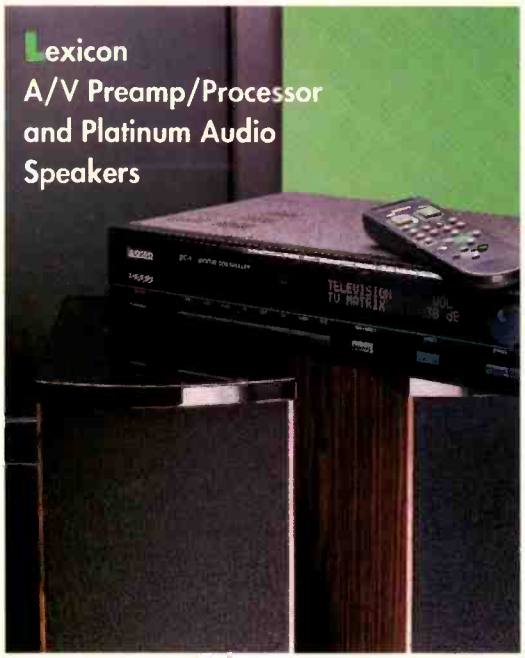


MAY 1996 VOL. 80, NO. 5

AUDIO

THE EQUIPMENT AUTHORITY

Mark Isham, *page 36*



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Cover Photographer: Bill Ashe Studio
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FAST FORE-WORD

When I fantasize about having gobs of free time (which I don't very often, because I don't have time for that sort of thing), I occasionally think about fooling around with designing and building my own loudspeakers. It might also be fun to fool around making my own amplifiers or D/A converters or whatever, but speakers seem more approachable—sort of like woodworking for audiophiles. And every once in a while I run into an application for which no commercially available speaker is really well suited. It would be nice to have the skill to whip together custom speakers for those oddball installations.

It would have to be for that sort of thing, however, and for the pure fun of it, since I don't kid myself that I would wind up with better-*sounding* speakers than I could buy off the shelf. I know plenty of people who have spent most of their adult lives designing speakers for a living, who know much more about it than I could hope to learn, and who still sweat mightily over every new model. It may be a lot easier to build a decent speaker than it used to be, thanks to improvements in drivers and ready availability of reasonably priced, computerized measurement systems, but greatness remains as elusive as ever. Speaker design is a labyrinth of trade-offs and compromises—engineering tempered by artistry.

On the other hand, that's exactly what makes talking to people who do it well so interesting. What got me started on this line of thought was this month's feature by Matt Polk about the ins and outs of his company's new HVCD subwoofer technology. It's intriguing to follow the line of thought and discovery that led them to a novel way of designing and building compact bandpass woofer systems optimized for deep bass reproduction. They've come up with an interesting solution to a set of problems that bedevil all speaker designers—and they're prepared to help you put the principles to work for yourself. Like me, you may not be ready to build a complete speaker system that you would want anyone else to hear, but I suspect that with a little guidance most of us could cobble together a dandy subwoofer. See page 32 for details.

On a different do-it-yourself note, see page 75 for information on getting a copy of the comparison CD mentioned last issue in "Digital Deliverance." On it you'll find a single stereo microphone feed of a piano performance as rendered by a variety of recording systems. Among them are an analog recording made on a 1-inch tape deck with custom tube electronics, a 20-bit digital recording reduced to 16-bit CD format via several different methods (including Sony's Super Bit Mapping and Apogee's UV-22), a straight 16-bit recording, and an HDCD recording. Hear for yourself what all the fuss is about!

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Tony Catalano 212/767-6061

V.P./ASSOCIATE PUBLISHER
Scott Constantine 212/767-6346

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CIRCLE NO. 20 ON READER SERVICE CARD

LETTERS

Ambisonic Boom?

Dear Editor:

Many years ago, the famous acoustician Wallace C. Sabine noted man's primal need to be enveloped by sound: "Since ancient times, man has been fascinated by the echoes and reverberations of cathedrals and caves." On this dawn of a new technological age in surround sound, I applaud Daniel Sweeney's "Multichannel Music Recording: A View from the Console" (February). Despite the apprehensions Sweeney expressed, I have no doubt that the industry ultimately will endorse discrete digital surround sound: It is technologically feasible, it justifies more hardware sales, it justifies the rerelease of the entire classical and film repertoire, it facilitates a new creative opportunity for producers and sound designers, and, finally, there is no room for improvement in two-channel stereo. Like it or not, surround sound delivers more bang for the buck. All else being equal, four (or more) loudspeakers are better than two. It's that simple.

Despite its invention nearly 20 years ago, Ambisonics has remained obscure because decoders have not been readily available for it. In order to sample a space ambisonically, a specially designed microphone, the Calrec Soundfield, is usually employed. The Soundfield contains a tetrahedral array of four supercardioid condenser capsules. The capsules' outputs are added and subtracted to produce omnidirectional, forward-facing figure-eight, side-facing figure-eight, and upward-facing figure-eight patterns. This enables both sound-pressure and directional information to be sampled at a single point in space. The full 360° horizontal sound field can then be reproduced by means of no fewer than four loudspeakers (preferably identical) positioned in a symmetrical layout—e.g., a rectangle, octagon, etc. (The representation of vertical information—i.e., the full spherical sound field—necessitates a similar layout above the listener.) Ambisonic decoders take into account any number of loudspeakers and their angular layout. In this respect, Ambisonics differs from the other multichannel surround systems that are designed to use a fixed number of speakers (Dolby Surround, for example). Since real sources of sound are more realistic than phantom ones, the more speakers, the better.

The *raison d'être* of Ambisonics is 360° localization: The musicians are heard before you, the audience behind, and ambience and reverberation all about. Indeed, it is ironic that although the high-end audio press rails against digital audio for not encoding ultrasonic information that might fall between 48-kHz samples, it entirely overlooks the fact that two-channel stereo reproduction itself is a grossly lossy system because about 80% of the sound field is forsaken. Not only is a performance space faithfully reproduced in Ambisonics, but the timbre of the instruments is not compromised, as happens in stereo because of the comb filtering produced by summing the direct and reverberant sound fields.

Employing a Soundfield microphone and a Nagra-D 20-bit digital recorder, I have been making Ambisonic recordings for more than two years. While these recordings are not yet commercially available, they have been praised by everyone who has heard them. When more sound engineers begin to record for multichannel sound, Ambisonics, I believe, will be found to provide the most convincing and palpable illusion of "being there." In the meantime, I welcome all surround sound enthusiasts to join an Internet mailserve list called "sursound." You can e-mail me at ambisonx@well.com and I will relay the subscription information.

Surround sound may not be the real thing, but, believe me, it's close enough to pretend!

Jeffrey Silberman
The Surroundworks
Mill Valley, Cal.

Nothing Like a Stiff Belt

Dear Editor:

In reference to finding replacement parts ("Letters," January), I recently had to replace the drive belts in my Philips N4504 reel-to-reel deck, which I bought in 1978. The belts finally stretched and glazed after all this time. (I think I got my money's worth with this deck; this was the first time it needed repair.)

In my search for new belts, I found a great source of replacement parts: MCM Electronics (650 Congress Park Dr., Centerville, Ohio 45459-4072; 800/543-4330). The company has a very good catalog.

C. Engebretsen
Hamilton Square, N.J.

Public Address, Addressed

Dear Editor:

After reading Edward Tatnall Canby's "Audio ETC" in the November 1995 issue, I can offer only the highest accolade for his observations about the sad state of public sound systems.

As a former installer of professional audio and sound-reinforcement systems for Houston's LD Systems, Inc., I am painfully aware of everything Mr. Canby wrote of, and more; he was very kind in not stating just how poor most of these systems sound. On numerous job sites, I was able to audition speakers from such well-respected pro manufacturers as Ramsa, Meyer, JBL, Eastern Acoustic Works, and Turbosound. The best among them were merely tolerable, and the worst sounded downright nasty.

In fairness, it should be mentioned that pro manufacturers have substantially different objectives from those of hi-fi manufacturers when they're designing speakers. First and foremost, pro speakers must be reliable and highly efficient. They must endure extremely high power levels for hours on end, often in harsh environments—for instance, an outdoor jazz festival in the brutal heat and humidity of summer. The pro manufacturer cannot even think about trying to make a speaker sound good until these requirements are met.

Canby's call for a new standard in public sound systems (i.e., multiple small speakers with delay operating at reduced volume levels) brought to mind one of the most memorable and outstanding systems we installed, in the old St. Matthew's Lutheran Church in Houston about three years ago. The church's gorgeous architecture and its traditional-minded parishioners precluded the use of the usual speaker cluster hanging high above the stage. The solution was a system exactly like Canby described.

We mounted three small Ramsa speakers under alternating rows of pews, equally spaced across their entire length. The speakers were positioned as far rearward under the pews as possible, aimed up at the pew behind them. Every four rows of pews (i.e., two rows of speakers) were set on a different delay zone, each zone receiving a longer delay time than the zone before it.

About 50 speakers were required to cover the entire sanctuary, which presented an interesting challenge: Buying enough amplifiers to run that many speakers would break the church's budget! Fortunately, the solution proved relatively simple. Since the speakers were only a few feet from the listeners, each speaker required only a few watts to be driven at sufficient volume. We connected the outputs of each amp to heavy-duty 70-volt transformers, and small transformers at each speaker reverted the signal and delivered the correct wattage. Although this is the same method typically used in driving multiple ceiling speakers in office buildings and other commercial applications, it is usually frowned upon as a method of delivering high-fidelity sound. However, since the system was going to be used primarily for vocals, this proved not to be a concern, and we were able to drive the whole system—plus a couple of balcony speakers—with only five stereo amplifiers.

The finished system was truly astounding. I sat near the rear as a colleague read from the podium. The sound seemed to come from everywhere, completely filling the room. It was exactly like his voice, only louder. Now that's high fidelity, folks! Furthermore, the volume level was very reasonable and uniform at any seat in the house.

In essence, every benefit Canby claimed could be realized by such a system was delivered in spades! As he stated, ". . .with digital well in hand and multiple channels easily available, the many-speaker system is not a problem in present engineering terms. Those who haven't tried it, take note." Amen.

Wayne A. Pflughaupt
Katy, Tex.

Erratum

In D. W. Fostle's look at noise shaping ("19 Bits in a 16-Bit Sack," March), Apogee Electronics was incorrectly referred to as Apogee Sound. *Audio* regrets the error.

WHAT'S NEW

ROTEL PREAMPLIFIER

Unlike most current preamps, Rotel's RC-995 BX has a phono stage (plus six line-level inputs). The phono stage, made of discrete components, is switchable for use with MC or MM cartridges. Other features include a remote control and tape monitor facilities. The high-current, low-impedance output stage feeds both balanced XLR and unbalanced RCA jacks. Price: $899.90.
For literature, circle No. 106

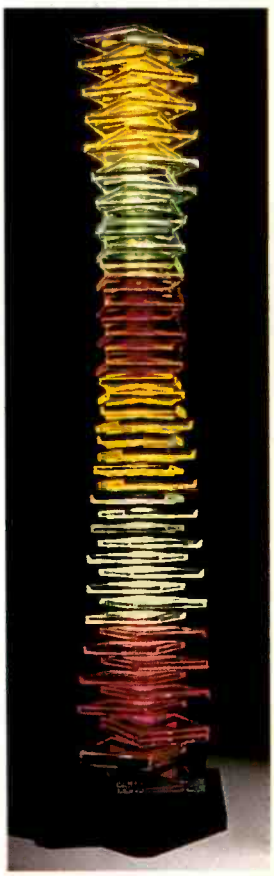
NAIM AUDIO SURROUND PROCESSOR

Using Naim's SFX 20-bit digital signal processing, the AV1 delivers phase-modified, delayed signals for surround speakers. Like many audiophile components, the AV1 has separate volume controls for each channel. Specifications include an A-weighted S/N ratio of 96 dB, a THD + N level of –88 dB, and a frequency range from 5 Hz to 22 kHz. Price: $3,300.
For literature, circle No. 107

TDK Cassette

As in TDK's original SA-X high-bias (Type II) cassette, the SA-X Limited has a dual-layer formulation, with an upper layer tuned for high-frequency response and a lower layer optimized for bass; response is specified as 20 Hz to 20 kHz. Low noise and high output give it a dynamic range of 66.5 dB, expandable to more than 96 dB with Dolby S noise reduction. The cassette's High Density SP-ARII shell also uses dual-layer construction, to combat shell resonances and vibration and to keep modulation noise low.
Prices: 90-minute, $5; 100-minute, $5.50.
For literature, circle No. 108

Sm'Art Designs CD Rack



Because polycarbonate, the plastic used in CD jewel boxes, transmits light, Sm'Art Designs incorporated colored filters over fluorescent bulbs in its unusual Ne-onn Display Rax. Each unit is 10 inches wide and 54 inches tall and holds 50 CDs; a double-sided, 100-disc model is available. The Ne-onn is offered in black- or white-painted metal or in maple, pine, or cherry wood finish. Prices: single unit, $169.99 in metal, $299.99 in wood; double unit, $199.99 in metal, $359.99 in wood.
For literature, circle No. 105

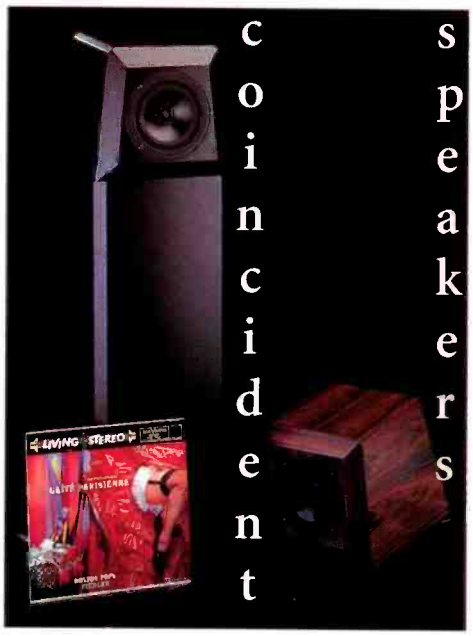
Mission Home Theater System

A new approach to an all-in-one home theater system, Mission's M-time incorporates two subwoofers, a center-channel speaker, and complete home theater electronics while doubling as a stand for a TV and two other video components. The Dolby Pro Logic decoder enables you to balance channels automatically, using a supplied microphone.

The amplifier section has inputs for up to three stereo A/V sources and one audio-only source. (There's also a built-in AM/FM tuner with 29 presets.) Separate audio signals can be distributed to two zones; an infrared local remote and an RF second-zone remote are supplied. The nine channels of amplification comprise two 60-watt subwoofer amps; 100 watts each for the left, center, and right front channels; and 40 watts per channel for the two surround speakers and for zone 2. Two communication ports on the back panel allow computerized testing at the factory and will accept processors for Dolby AC-3 or other discrete digital surround systems. Price: $3,995.
For literature, circle No. 109

WHAT'S NEW

coincident speakers



Coincident Speaker Technology's Troubadour uses a coaxial driver for improved soundstaging; the enclosure's walls are nonparallel, to minimize standing waves. The optional stand shown can be replaced with a nearly identical-looking subwoofer, the Troubass. The claimed frequency range is 45 Hz to 20 kHz for the Troubadour, 30 to 100 Hz for the Troubass; sensitivity for both models is 90 dB SPL at 1 meter for a 1-watt input. Prices: Troubadour, $1,495 per pair; Troubass, $1,595 per pair; stands, $495 per pair. For literature, circle No. 110

B&W Speaker

Below the P6's independently mounted tweeter (a signature of B&W's top speaker models) are two 6½-inch drivers. But the two differ significantly from each other: The bass/midrange unit has a Kevlar cone, whereas the woofer is a high-mass Cobex driver optimized for low frequencies, operating in a dedicated sub-enclosure. Rated frequency response is 40 Hz to 20 kHz, ±2 dB, with −6 dB points at 29 Hz and 30 kHz; sensitivity is 90 dB SPL for 2.83 volts in, and impedance is a nominal 8 ohms, 3.5 ohms minimum. Price: $1,800 per pair. For literature, circle No. 112

ruark speaker

The Icon speaker's woofer cone has a pentagonal perimeter instead of the usual circle. Ruark, its manufacturer, says vibrations reflecting from that edge scatter randomly instead of causing standing waves. The woofer also has an injection-molded polymer chassis to reduce chassis ringing and flux leakage; a self-shielding, "cancelling" magnet structure that also increases motor strength; and a phase plug for smoother high-frequency rolloff and better voice-coil cooling. The tweeter is a 1-inch dome. Rated frequency response is 58 Hz to 20 kHz, ±3 dB; rated sensitivity is 88 dB. Available finishes are natural cherry (shown), dark walnut, and black ash. Price: $699 per pair.
For literature, circle No. 111

Celestion Home Theater System

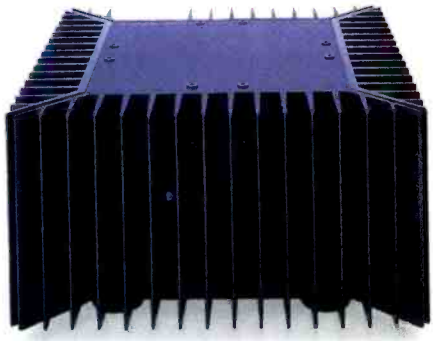
For simple installation, Celestion's Home Theater in a Box tucks its Dolby Pro Logic processor and all its amplifier channels into the subwoofer enclosure, gives those electronics a remote control, and includes wiring for its center-channel and four satellite speakers. Amplifier power is 60 watts for the subwoofer plus 30 watts each for the other five channels. All drivers, including the 10-inch subwoofer and the 3½-inch woofers, are shielded. The subwoofer's molded enclosure includes a status display panel. Rated frequency range of the system is from 35 Hz to 20 kHz. Price: $1,199. For literature, circle No. 113

WHAT'S NEW

Virtual Listening Systems Headphone Surround Decoder

The Auri decoder, from Virtual Listening Systems (VLS), reproduces Dolby Pro Logic surround sound through standard headphones. The Auri uses the principles of binaural hearing and head-related transfer functions. A radio transmitter broadcasts the decoder's signal to a handheld unit, which contains the headphone amplifier and controls; the handheld unit, in turn, transmits control settings back to the decoder. Price: $399.99.
For literature, circle No. 114

Pass Laboratories Amp



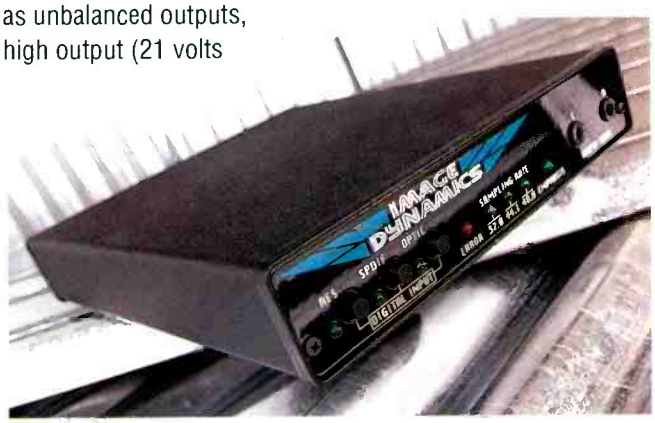
Consistent with Nelson Pass's philosophy of keeping parts in the signal path to a minimum, Pass Laboratories' Aleph 3 power amp has only two gain stages. The single-ended Class-A output stage develops 30 watts per channel into 8 ohms or 60 watts per channel into 4 or even 2 ohms. Both stages use MOS-FETs, which the company says were chosen because their transfer curve in single-ended Class A resembles the acoustic characteristics of air. The heat-sink chassis radiates heat from all external surfaces, at a temperature of only 122° F. The amp's power consumption is 250 watts. Price: $2,000.
For literature, circle No. 117

CWD Home Theater Cabinets

CWD's Wildwood Collection is designed for rear-projection televisions (as shown) as well as for direct-view sets. Both cabinet configurations include two Audio Towers and a Bridge Kit whose shelf width is adjustable from 30 to 55 inches; the direct-view cabinet also includes a TV stand that has compartments for a center-channel speaker, CDs, and VHS tapes. Medium oak and pickled birch finishes are available. Prices: Rear projection, $2,400; direct view, $2,850.
For literature, circle No. 115

Image Dynamics Car D/A Converter

The DAC-20-Dg, from Image Dynamics, uses low-noise 20-bit DACs and eight-times oversampling. To overcome electrical noise problems common in cars, it includes balanced as well as unbalanced outputs, high output (21 volts balanced, 10.5 volts unbalanced), and a digital noise gate. Three digital inputs (optical, S/P DIF unbalanced, and AES/EBU balanced) can be selected from the front panel. Price: $2,300.
For literature, circle No. 118



ONKYO A/V RECEIVER

Surround and ambience sound fields in Onkyo's TX-SV828 receiver are handled by a 24-bit Motorola DSP chip. Home THX and Dolby Pro Logic processing are among the seven ambience and surround modes provided, and an access port allows the addition of a Dolby Digital AC-3 decoder. Other features include multiroom/multisource preamp outputs and an Academy filter for old mono film soundtracks. The amp section's output power is 100 watts/channel in stereo; in surround modes, the front channels produce 90 watts apiece. Price: $1,499.95.
For literature, circle No. 116

WHAT'S NEW

PHASE TECHNOLOGY HOME THEATER SPEAKER

A rotating tweeter/midrange assembly lets Phase Technology's PC-3 maintain correct dispersion whether the speaker is oriented vertically for main channels or horizontally for center-channel use. The assembly, which holds a 1-inch dome tweeter and 1½-inch dome midrange, is flanked by two 6-inch woofers with solid flat-piston diaphragms. PC-3s can also be used as surround-channel speakers. Price: $499 each.
For literature, circle No. 125

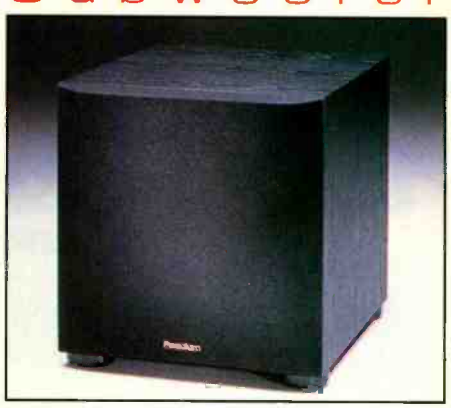
Acoustic Research Speaker

The flagship model in AR's new High Output series, the 312 HO has a rated sensitivity of 97 dB and a rated frequency response of 30 Hz to 20 kHz, ±2 dB. The 12-inch subwoofer of this three-way system fires to the side, for better coupling to the room; this also allows a narrow front baffle. The 1-inch dome tweeter, molded from low-mass, closed-cell foam, is mounted between two 5¼-inch cone midranges.
Price: $1,099 per pair.
For literature, circle No. 127

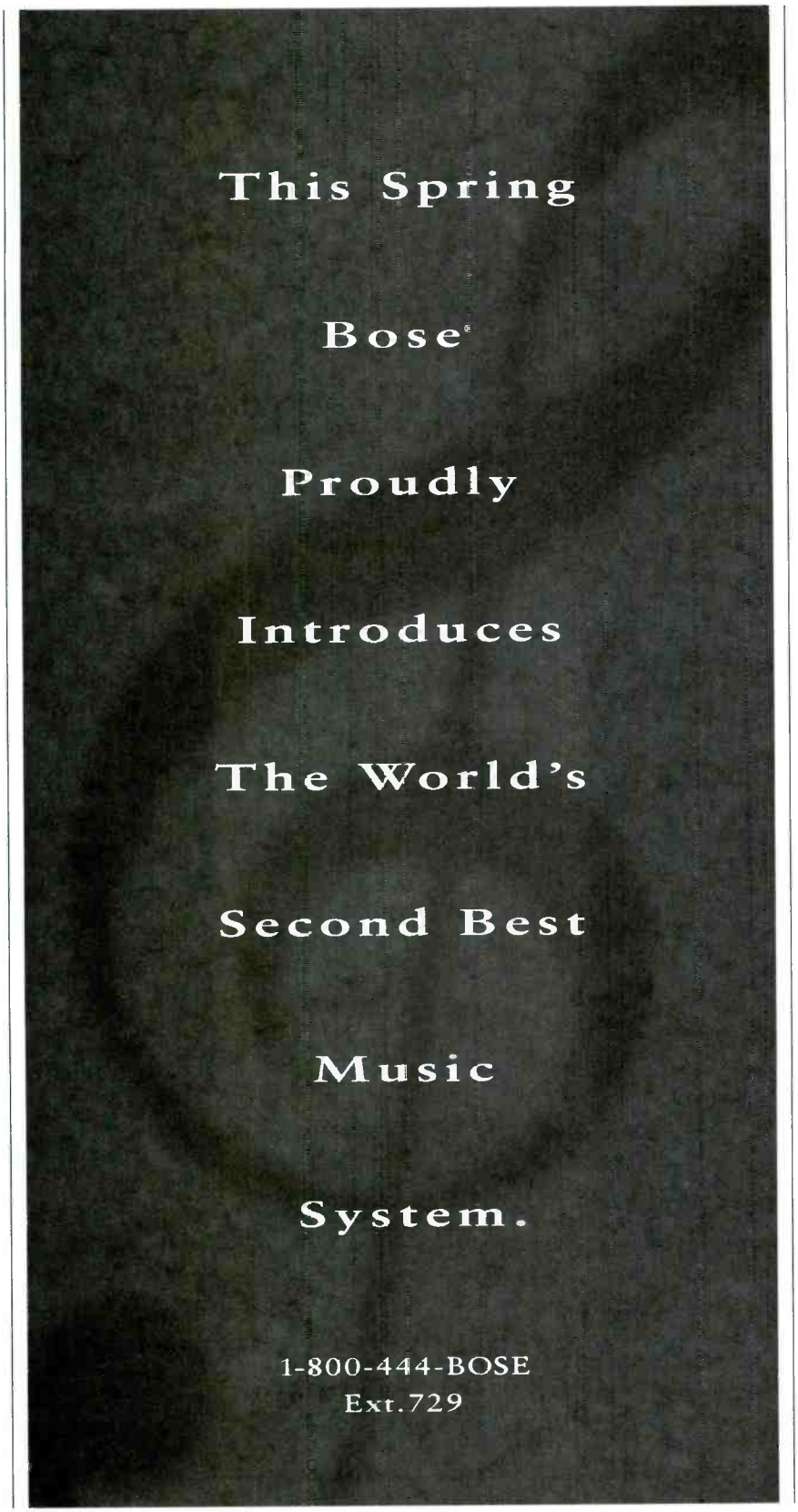
DD-AUDIO SPEAKER

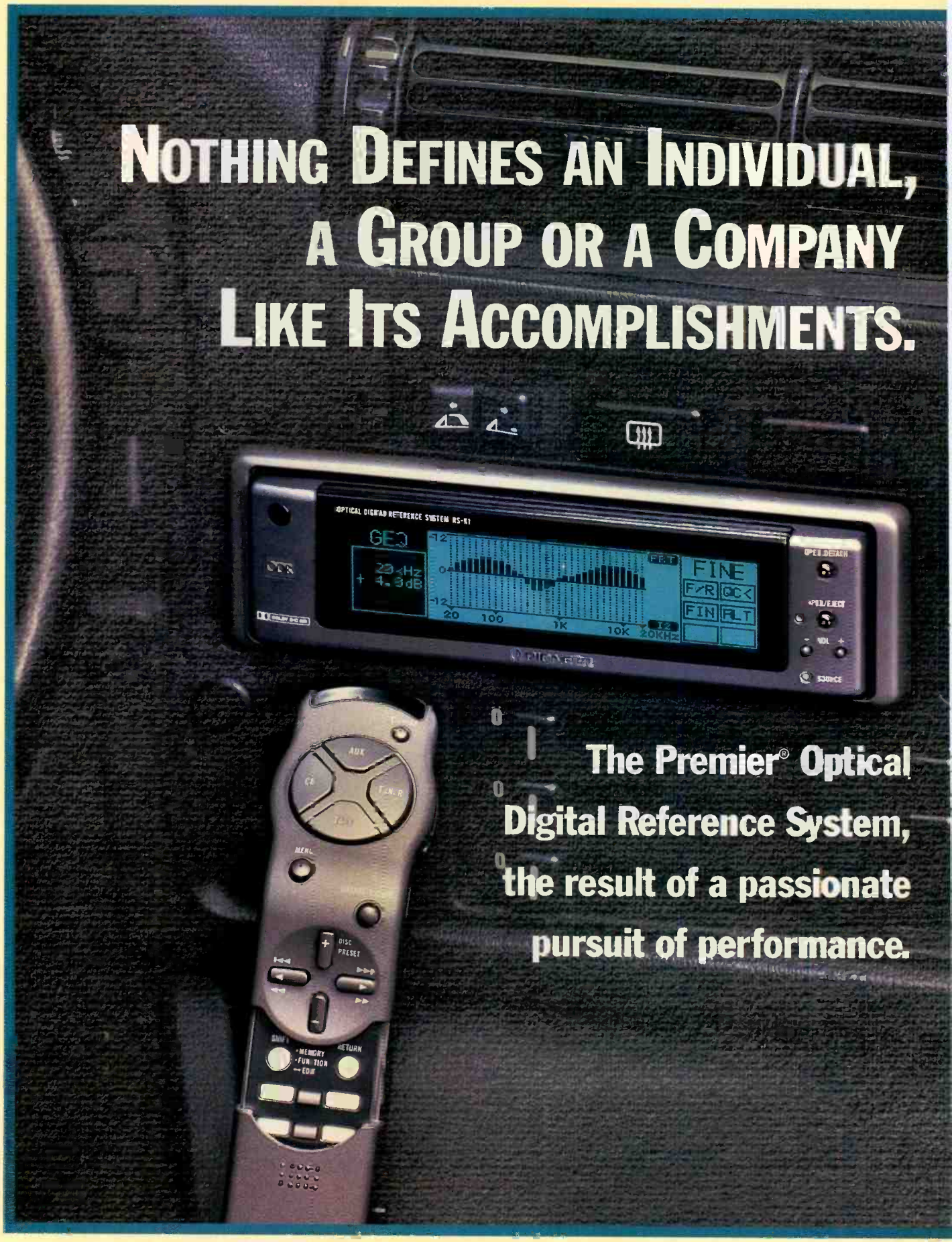
Carved from green or gray Finnish soapstone, the DD-Stone Exquisite is a three-way system. Its driver array comprises a 6½-inch bass-reflex woofer with Kevlar cone, a 5-inch magnesium-cone midrange in its own reflex enclosure, and a 1-inch hard-dome tweeter. Price: $4,320 per pair.
For literature, circle No. 126

Paradigm Powered Subwoofer



Power for Paradigm's PDR-10 subwoofer comes from a built-in amp, a high-current design rated at 80 watts continuous. The woofer itself uses a 10-inch driver with a 1½-inch voice coil, in a bass-reflex cabinet with a critically tuned resistive port. The subwoofer's cutoff frequency is variable, and the amplifier turns on and off in the presence or absence of a signal. Line- and speaker-level inputs are provided. Price: $349 each.
For literature, circle No.128

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FINE
The Premier® Optical
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Pioneer Electronics has always been inspired by the goal of reproducing music with all the passion and integrity of the original live performance. The Premier® Optical Digital Reference System is the result of an intense quest for the absolute best performance in the car environment. It's simply the finest system of advanced, integrated audio components ever crafted for the automobile offering precision adjustment ordinarily available only in a professional recording studio.

31-BAND DIGITAL GRAPHIC EQUALIZER offers unprecedented digital control over the sound field environment in your car.

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OPTICAL DIGITAL LINK provides a fiber optic connection that's impervious to a car's electrical interference. The Optical Digital Reference System extends the optical connection further than ever—from the audio source all the way to the output stage of the power amplifier.

CLASS A AMPLIFIERS deliver audiophile performance—superb linearity, low distortion and high musicality—in a car environment.

CDR SPEAKERS are designed, engineered and manufactured by the world's leading car speaker manufacturer. They feature ceramic graphite diaphragms, titanium tweeters, alginate fiber composite cones and edgewise-wound voice coils for uncompromising reproduction.

The best audio system in the world is only as good as the person installing it. So Pioneer hand picks a select group of car audio experts across the country to ensure that the sound quality engineered in the studio comes through loud and clear in your car. These experts are Premier Installation Specialists, and car audio is their passion.

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PREMIER

AUDIO CLINIC

JOSEPH GIOVANELLI

Cascading Two Preamplifiers

Q *I would like to use my Carver C1 preamplifier as an outboard Sonic Holography processor, feeding another preamp, so I can use the latter's built-in crossover. How should I connect the two units?*—Name withheld

A It depends on which preamp you prefer to use as your main system controller, based on control feel, features, and performance. If you prefer the second preamp, hook the Carver into its external-processor or tape-monitor loop. You would connect the output from the loop on the second preamp to a line-level input on the Carver and the main output on the Carver back to the input of the loop on the second preamp. Keeping the Carver's source selector always set to the input connected to the other preamp will then enable you to switch the Carver in and out of the circuit simply by pressing the second preamp's tape-monitor or external-processor button. Program sources would connect to the second preamp, though if you needed additional inputs you could use those on the Carver as well, in conjunction with its source selector. Normally you would want to set the Carver's volume control so that switching it in and out doesn't change the level and then leave the control at that position. (You might want to mark or tape it.)

If you prefer the Carver, use it as the input preamplifier and feed its main output to a line-level input on the second preamplifier. Keep the the second preamp's source selector set to that input at all times and adjust its volume control just high enough to ensure it does not overload on loud signals from the Carver, but not so high that it adds audible noise. Once you've attained that level, leave the second preamp's volume control alone.

The best way to get started with the volume adjustment probably is to feed the Carver directly to your amplifier and play a familiar selection. Then insert the second preamp between the Carver and your amp and set the second preamp's volume control to produce the same sound level you had originally. It will be hard to do this perfectly, but you can easily get close enough.

If you need more inputs with this setup, you could get them by attaching sources directly to inputs on the second preamp. Those additional sources won't benefit from the Sonic Holography, however.

Power-Transformer Ratings

Q *I am constructing Dr. Norman E. Thagard's 100-watt, Class-A mono amp* (Audio, *January to March, 1995). The Parts List calls for a power transformer whose 80-volt, center-tapped secondary is rated at 5 amperes. Do I need a transformer that puts out 80 volts peak or 80 volts rms? And does this refer to the voltage appearing across the entire secondary or the voltage between the tap and each half of the winding?*—James F. Quinn, Jr., Waukegan, Ill.

A In power-transformer ratings, all voltages are rms, including the input voltage to the primary. And "80 volts, center tapped" means that this voltage is present across the entire winding, with 40 volts between the tap and each end of the winding.

Using Speaker-Selector Buttons

Q *My receiver has selectors and terminals for two sets of speakers. Does this mean I have four channels?*—Mike Dox, New York, N.Y.

A No, you have only two channels. Your "A" and "B" speaker terminals are both connected to the same two output stages. This allows you to put speakers in two rooms and operate them separately or together.

If you do use two sets of speakers at once, make sure their combined impedance is not too low for your receiver's amplifier section to handle. Usually, the speakers are connected in parallel, so their combined impedance is lower than the impedance of either speaker by itself; two 4-ohm speakers wired this way would create a 2-ohm impedance, which many receivers cannot handle. Your receiver's instructions should tell you what impedance limits, if any, apply. If the speakers are connected in series, their combined impedance will be higher than that of either speaker, which avoids the problem. But unless the speakers connected to the two sets of terminals are identical, a series connection will degrade frequency response when both are playing at once, reducing sound quality. A quick way to tell what type of connection you have is to disconnect the speakers from one set of outputs. Turn the switch for the still-connected set on. Then toggle the switch for the disconnected outputs on and off. If the speakers stay on, you have a parallel connection (usually preferable); if they go off when you turn the other switch on, you have a series connection.

A Forgetful Receiver

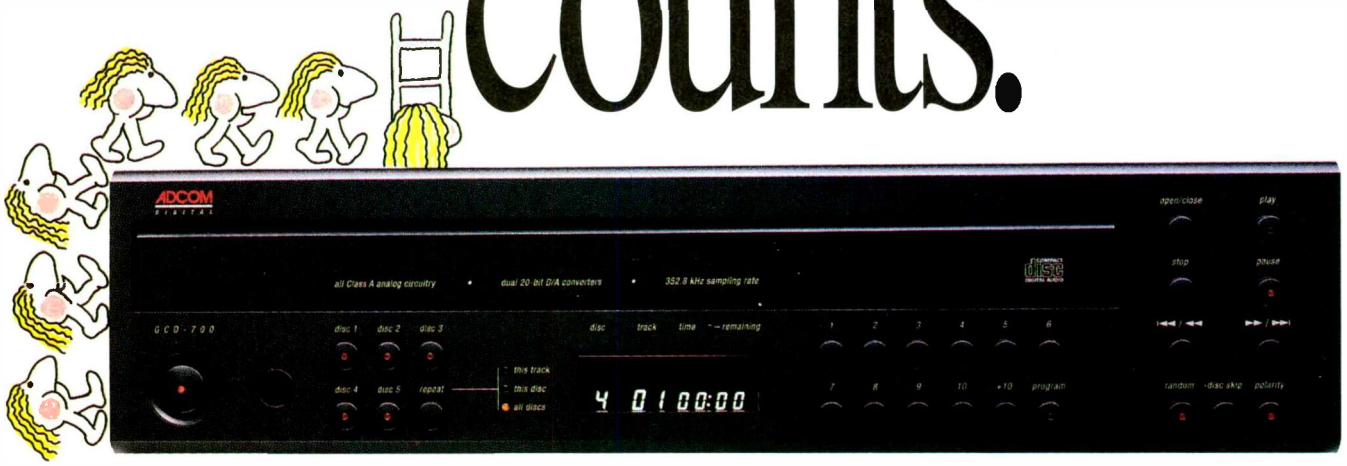
Q *My 10-year-old Yamaha R-9 receiver can be switched off from its remote as well as its front panel. When I use the remote to turn it on or off, the receiver behaves normally. When I turn the receiver off via the main power switch, the contents of its memories are lost; originally this did not happen. Do I have to bite the bullet and take the unit to a repair shop?*—Forrest S. Ward, Poquoson, Va.

A The on/off switches on many components that have remote control actually just switch them from active to standby, with power applied to the circuits that respond to the remote and to memory back-up. On the other hand, if your manual on/off switch is a real power switch, it would open the line to the primary of the power transformer. All power would be gone, including that used for memory hold. Many receivers therefore back up their memory circuits with a small battery or a capacitor.

Yamaha says your receiver uses a capacitor, which has obviously failed. If you feel comfortable replacing soldered-in components, you can get the necessary part from Yamaha and replace it yourself. Otherwise, you will need to take your receiver to a repair shop.

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.

Every little bit counts.



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Minimizing Amplifier Hum

Q *I hear a hum in my loudspeakers, loud enough to interfere with soft musical passages, whenever my power amp is running. I've noticed this problem is common among amplifiers that have three-prong AC plugs. Plugging the preamp and the power amp into separate outlets helped. So did bypassing the ground pin on the amp's power cord through the use of a two- to three-prong adaptor. What else might I try to minimize or eliminate the hum?*—Sal Rosselli, Leominster, Mass.

A You probably have a grounding problem. If you have grounded any component's chassis to a radiator, water pipe, or such, try disconnecting it and see if the hum diminishes or disappears. You might also try cutting the shield away from the plug at one end of *one* of the cables from your preamp to your amp. (It's usually best to have the cut end nearer the amp.) Another possible cause of the problem could be differences in potential between the equivalent pins of the AC outlets feeding the amp and preamp.

I have sometimes seen outlets whose wiring was reversed, with the "hot" wire connected to the "cold" (neutral) outlet terminal (and vice versa). This can be a problem, even when the ground is properly wired to the U-shaped hole. The *large* slot on the outlet should be at the same potential as the U-shaped hole; check this with a test light. If voltage is present, the outlet is wired incorrectly. This miswiring can cause hum and is dangerous as well. (Most Radio Shack and hardware stores sell outlet testers, which are worth having even if you don't have a hum problem.)

If your system includes a cable TV connection, try disconnecting it to see if the hum disappears. If it does, place an *isolated* balun transformer between the cable and the rest of your equipment. (I believe that Gem and Radio Shack have such transformers, or you may be able to get one from your cable company.) Or you could use Mondial's very effective MAGIC cable hum eliminator.

You can also get hum if your amplifier's sensitivity is too high for your preamp. This can be cured by turning down the amplifier's input level controls (assuming it has them) until you hear little or no hum with the preamp connected. Then see whether your system still has enough gain to let you hear music at normal volume. (If your current amplifier settings force you to use only the first quarter or third of the preamp's volume-control range, this was almost certainly your problem. And fixing it will let you spread your volume settings over a wider control range, making it easier to get the setting you want.)

Amplifier vs. Speaker Ratings

Q *If an amp delivers 100 watts per channel, should the speakers used with it be rated for a maximum—or a minimum—of 100 watts? And if the amplifier is rated for 6 ohms per channel, do my speakers have to be 6-ohm models or can I use 8- or 4-ohm speakers?*—Mike Dox, New York, N.Y.

A If the loudspeakers are rated as handling 100 watts, it means the manufacturer thinks they should be able to handle at least that much power on typical music. Such ratings are very approximate, however, and there is seldom any problem using a more powerful amp.

If your amp is too powerful, your speakers will distort when you turn it up too high, warning you before damage occurs. (There is a danger, though, if you accidentally turn the amp on full blast.)

If your amp is underpowered for your speakers and for the listening levels you like, *it* will distort long before the speakers do. The high-frequency distortion products produced when this happens may cause tweeter damage in some cases.

If your amplifier is rated only for loads of at least 6 ohms, it *might* be susceptible to damage if you use speakers with lower impedances at high volume levels. Check the amp's instruction manual. If it doesn't say what impedances you can use, ask the manufacturer. Most amps will work fine with typical 4-ohm speakers, even if 8-ohm speakers are specifically recommended. Higher impedances are never a problem, but they will reduce power output.

Wiring a House for Audio

Q *I'm helping a friend with some audio wiring in a house that he is building. We wish to run line-level signals between two amplifiers that are located in different areas of the home. We estimate the run to be 30 to 40 feet through the studs. We've come up with several different approaches: using high-*

quality CATV cable in the walls and converting to phono cables at the faceplates (using double-female CATV "F" connectors on the faceplates and then using "F"-to-phono adaptors); running shielded, twisted-pair cable through the walls, with phono jacks at the faceplates; or, finally, running low-capacitance RCS cables through the walls (if we can find any long enough), with phono jacks at the faceplates. Because we cannot locate faceplates that have double-female phono jacks, we will, for our second and third approaches, have to solder connections to jacks that we mount on the faceplates. (My friend and I are somewhat concerned about the lack of shielding at those solder points.) Can you suggest better, reasonably priced, alternatives to our approaches?—Steve Booth, Fort Collins, Colo.

A My major concern with any such project is high-frequency losses due to capacitive reactance in the cable. If the output impedance of the driving circuitry is low—say, no more than 100 ohms or so—that concern should be satisfied. But you may well see some degradation of highs if your driver's output impedance is higher; I've run into gear whose output impedances were as high as 2 to 3 kilohms.

I'm also concerned with the chance of the cables picking up 60-Hz hum by induction. Again, the lower the output impedance of the driving device, the less likely such hum will be audible—if you keep these lines well clear of AC house wiring. Because you are building the house, you should have control of the wiring layout within the studs and walls.

I recommend that you go with your second approach. Drill out the faceplates, and mount sturdy, female phono jacks to them. (I use Switchcraft jacks for such applications because they have proved to be the most rugged and reliable of those I have used to date.) Because the connectors are held in place only by a nut, be sure to use lock washers and tighten very well so you won't have to remove a plate at some later date to retighten.

If you intend to plug and unplug cables frequently, I suggest you use standard (quarter-inch) phone jacks. They are more reliable under repeated use.

Since you will be using shielded, twisted-pair cables, be sure that you don't connect the shield at the output end of the run; connect it only at the input end. The return for the signal should be carried by the black wire in the pair. The remaining conductor (red, white, or whatever) should carry the signal between the two "hot" terminals. This will help reduce induced hum. (The small amount of exposed conductor at the soldered connections is not likely to pick up hum.)

Do not ground the jacks or cables at either end to the wall boxes that hold the faceplates. Doing so could introduce ground loops, which the single-ended grounding of the shields is designed to eliminate.

Where high-frequency losses are possible, you should use low-capacitance cable, as low as you can find. If you cannot find such cable made with twisted-pair conductors, you will have to employ coaxial cable and use the shield as the return path for the signal. It is even more important to keep coaxial cables well clear of AC wiring.

As long as you are going through all of this, consider running some extra lines for possible future expansion of the system. A

IVAN BERGER

ON THE ROAD, AGAIN

Don't be alarmed—let this Premier do it for you.

This Clarion head unit plays CDs and cassettes, displays maps, and lets you see behind you.

Alpine's DDDrive speakers have molded resin magnets and dual voice coils.

Even if you're not into car stereo, it bears a bit of watching. While much of what's new for the car may be old hat to home-oriented audiophiles, some interesting new technologies show up first in 12-volt systems.

I'll admit that none of the car stereo products I saw at this year's Winter Consumer Electronics Show could be called earthshaking. But three were literally car-shaking: Aura's Bass Shaker and Pro Bass Shaker and Alpine's Bass Engine, all of which vibrate a car's body panels with bass signals. (I assume they're more to let you feel the bass than help you hear it.) Aura lists its two models' frequency range as 20 to 80 Hz, with a peak at about 40 Hz.

The more conventional way to augment bass is with subwoofers, but at least two of those were not quite conventional. Velodyne's DF-10sc and DF-12sc subwoofers use the same servo feedback system as its subwoofers for the home. Both models are said to have –3 dB points below 20 Hz and distortion below 1%. And Phoenix Gold's wildly unconventional Cyclone rotary subwoofer is now past the prototype stage and due for production as you read this. In addition to looking weird (a definite plus, in car stereo circles), it should deliver 90-dB efficiency, from 20 to 80 Hz, in a 3-cubic-foot sealed enclosure.

Alpine's new Dual-gap Direct Drive (DDDrive) speakers have two voice coils, each in its own gap within a single magnet structure; current flows in opposite directions through these coils. This balanced structure, according to Alpine, yields more linear cone motion and avoids eddy-current distortion. The magnet is made of a resin packed with magnetized particles and is injection-molded into a precise shape that concentrates flux in the two gaps. Kenwood's DualMag coaxial speakers use two opposed magnets, placed *inside* the voice coil to concentrate energy in the gap. This is said to increase efficiency and control cone movement better than conventional structures. The speakers are also light in weight. Pioneer's newest speaker advance is the addition of foam to the polypropylene composite used in its IMPP Rigilite cones. The new cones are twice as thick as the ones they replace, but are one-third lighter and are said to be three times as rigid.

Two CES exhibitors had flat-panel car speakers. The Acculine models, from Bohlender-Graebener, are planar-magnetic designs, similar to the company's Radia home theater speakers. They can be mounted in door panels, kick panels, and roof pillars, provided there's a cavity behind them to absorb the rear wave. A new company, OnActive Technologies, showed Top Down Surround speakers. As the name implies, these speakers fit into a car's headliner; frequencies below 200 Hz are handled by a conventional subwoofer, which can be placed anywhere within the car.

Amplifiers for car use have only a car's battery and alternator to draw on, which makes efficiency far more important in car stereo than in home equipment. As a result, switching amplifiers have long been more common in car than in home systems. Sony and Yamaha have tried them, as I recall, and the amps that Bose supplies to car manufacturers are of this general type. A few years ago, Infinity (which made the first home switching amps I know of) began making Class-D switching amps for cars; the second generation of these amps arrives this year. And more are coming from Linear Power, Dr. Crankenstein, and Xtant.

Because cars are full of electrical noise, the trend toward balanced-line connections and high signal voltages (usually about 4 to 8 volts) continues. AudioControl uses both techniques in its new Four.1 in-dash equalizer, and several other AudioControl components have balanced differential input and output. Rock-

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with such name brands as Sony, Clarion and Jensen to offer you exceptional options.

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ford Fosgate's OEQ2 equalizer, which has "warpable" center frequencies, has high-voltage output, too. So do components from Autosound 2000 (one of the first to raise the high-voltage banner), Adcom, Coustic, Phoenix Gold, Sony, Soundstream, and Zapco. You can also get "line drivers," which raise signal voltages, turn unbalanced signals into balanced ones, or both. Among the many manufacturers of these are AudioControl and Anamir Crystal-Line (both pioneers in this area), Navone, and Phoenix Gold.

Now there are even head units with high-voltage output. Among the companies making CD or cassette units delivering 3.5 volts or more are Alpine, Clarion, Kenwood, Pioneer, and Sony. In addition, Blaupunkt, Denon, Eclipse, and Sanyo have models whose output voltages are more modest yet are still above the 2 volts that is now the norm.

Another trend that's gaining ground, albeit more slowly, is the availability of double-DIN head units, twice the height of normal, DIN-sized models. Originally, the only cars I knew of with appropriate-sized radio slots were Japanese, but it wouldn't take much effort to get one into my Merkur Scorpio. With all that panel space, there's room for cassette, CD, wide-spaced controls, and a big, readable display. Trouble is, most such units I've seen have been rather boring. This year, Pioneer and Clarion have breathed new life into the category.

Clarion's MAX2256 is part of a whole multimedia line. It conceals both its tape and CD slots behind a 5-inch active-matrix color display that can be used with a rear-vision camera or a GPS (Global Positioning Satellite) navigation system. There's also a single-DIN multimedia head unit, the VRX8271, whose viewing screen folds into the dash. It has no built-in tape or CD drives but, like the MAX2256, can control a CD changer. You'll want a changer if you go for the GPS navigation system, since it lets you play your local area's map disc as well as music. Clarion also produces two audio-only double-DIN head units, the ADX8255 and ADX5255.

What's new to double-DIN in Pioneer's FH-P85 is ID Logic, which identifies stations and their program formats by comparing received signals to an internal database of North American AM and FM stations. (For more on how that works, see our July 1995 "Equipment Profile" of Pioneer's single-DIN DEH-P815.) The FH-P85 has an accessible CD slot and concealed tape slot (which matches up with my priorities), controls for a CD changer, logical-looking controls, and a 16-band spectrum-analyzer display (which I hope can be shut off while you're driving). There's also a DSP unit with six factory-set ambience simulation modes.

Pioneer also showed the DEH-P725R, which appears identical to the DEH-P815 I tested in my car but has the Radio Data System (RDS) instead of ID Logic. One advantage of RDS is that it picks up real-time data instead of relying on stored information, so it can adjust to radio stations that change their program formats at different times of day. It also can interrupt your music listening to bring you traffic announcements or emergency alerts as they occur. One key disadvantage is that its utility depends on the number of stations within

CODA: Peter W. Mitchell

Peter Mitchell, a consultant, recordist, and uncommonly gifted audio writer, died December 30th, at the age of 53, in Oceanside, California, after a brief illness. An astronomer by graduate training, Mitchell worked on the early data from unmanned moon probes, helping develop the knowledge of the lunar surface necessary for Apollo 11 and subsequent landings. By the late 1960s, however, he found his interest turning increasingly to music and its reproduction. It was not long before he was devoting full time to audio.

Born and reared in rural New Hampshire, Mitchell lived most of his life in New England. He was one of the founders of the Boston Audio Society and served, at different times, as its president and as the editor of its newsletter. In the early 1970s, he worked briefly at both Advent and AudioPulse. Throughout that decade he had a weekly 90-minute program on Boston's WBUR-FM called *Shop Talk*, on which he and co-host Richard Goldwater interviewed guests, discussed audio topics and equipment, and took phone calls, live and undelayed, on the air. *Shop Talk* was the prototype for National Public Radio's popular *Car Talk* program, which also originated at WBUR (and is still produced there).

Mitchell moved from Boston to California in the late 1980s and operated his writing and consulting businesses from Oceanside until his death. He wrote hundreds of articles for *The Boston Phoenix*, *db*, *The Atlantic Monthly*, *Audio*, *High Fidelity*, *Stereo Review*, *Stereophile*, and other publications.

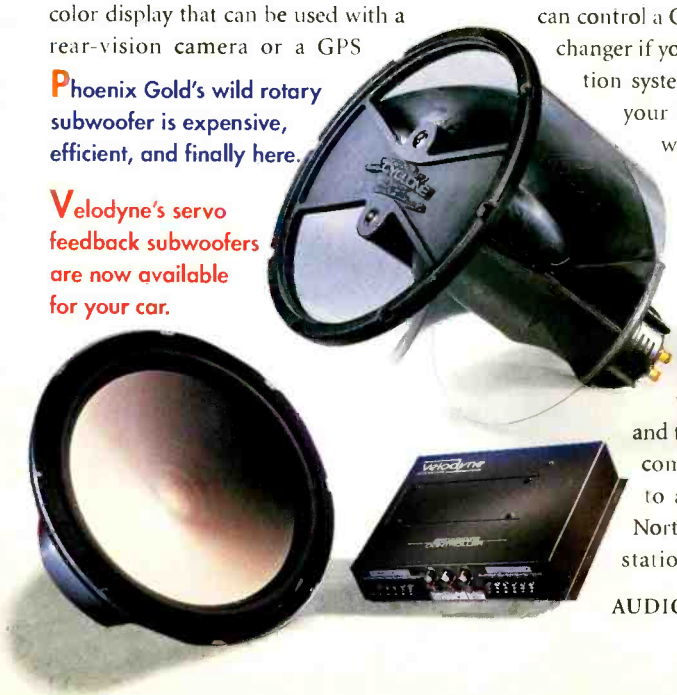
Throughout his life he was a teacher and unselfish mentor, helping many figures in the audio industry get started in the business. In print or in person, his discourse invariably conveyed probity, wide-ranging intelligence, and a solid grasp of technical issues. A dedicated scientist who believed in rigorous investigational method, he nonetheless had little time for the virulent and repetitive arguments that seem so often to divide audiophiles. And though sometimes curmudgeonly, he had no time for the cultivation of enemies.

Peter Mitchell will be missed by all who knew him or followed his writing. He will most particularly be missed by editors of audio magazines, who had come to rely on him as one of the few writers who could make clear and understandable even the most difficult topics.

E. Brad Meyer and Michael Riggs

Phoenix Gold's wild rotary subwoofer is expensive, efficient, and finally here.

Velodyne's servo feedback subwoofers are now available for your car.



reach that include RDS subcodes in their signals.

The number of RDS stations is growing rapidly, thanks to the efforts of Denon and the Consumer Electronics Manufacturers Association, a division of the EIA. As of this writing, 500 FM stations carry or soon will carry RDS signals, bringing RDS to all major U.S. radio markets and some minor ones. In Europe, RDS has become so common that factory-installed car radios routinely include it. Driving across France and Belgium last year in a French Ford, I found that about two-thirds of the stations I picked up used RDS to identify themselves.

However, RDS gives no information about stations that don't carry its signals—which still includes most American FM stations, and every station on the AM band. That's where ID Logic shines. Though the North American RDS standard does provide for radios that use both systems, I don't expect to see them soon. Unless, of course, they also pick up short wave: ID Logic is making far more headway among listeners to that band.

Delco, the only car maker I know of to sell RDS head units in the U.S., is making inroads in the car electronics aftermarket. In addition to its CD-based GPS navigation system, Clarion offers navigation systems based on Delco's Telepath technology ("Roadsigns," May 1995) and on voice commands. The Telepath system, which also works with GPS data, gives directions on an alphanumeric screen instead of showing maps, and uses maps recorded on small, plug-in cards instead of CD-ROMs.

Moreover, Rockford Fosgate is offering a line of head units made by Delco. These in-dash models feature Sequentially Managed Accessory Remote Turn-On (Smart On, for short), which has separate turn-on leads for amplifiers and for other processors. With Smart On, amplifiers are the last components in the audio system to be turned on and the first to be turned off; this prevents other components' turn-on or turn-off noises from reaching the speakers.

A feature I first saw on the Delco-Bose head unit in the ZR-1 Corvette is now available from JVC. "Audio Cruise" reads your car's speedometer and raises your car stereo's volume as your speed increases. This should compensate nicely for speed-induced increases in ambient noise, though it probably won't compensate for noise caused by unusually rough road surfaces or heavy traffic.

Removing the faceplate of several new Pioneer and Premier head units activates a built-in security alarm. The alarm arms itself 30 seconds after the last car door is closed and flashes an LED to warn thieves away. Thieves who do break in will activate a high-frequency warble tone, played through the car's speakers. The tone will be loud enough to drive the intruders off and call attention to what's happening. The alarm disarms itself when you replace the faceplate or turn your ignition on. Optional relays can sound the car's horn, turn on an external siren, or flash parking lights.

Showing the interplay between home and car audio, Rocktron played its Circle Surround system at a high-end surround demo (where it could be compared with Dolby Digital AC-3), then played it again in a simulated car on the show's floor. Both demos impressed me. In my limited listening, Circle Surround seemed to deliver on its promise of full-bandwidth, true-stereo surround channels and adjacent-speaker separation of at least 25 dB. There's also a Rocktron single-ended noise-reduction system, HUSH (introduced to car audio last year in Blaupunkt amps), but Rocktron didn't specify whether it was in the CSA12 decoder for car use, the HTP1 model for home use, or both.

Getting good surround into a car can't come too soon, in my opinion. True, there's almost no in-car video to drive demand for it, but the extra spaciousness imparted by good surround should be even more welcome in a car's cramped acoustics. Using DSP for ambience simulation (the all-too-common "Concert Hall" and "Jazz Club" effects) has never worked for me, because it muddies the front channels too much. Good surround relies on ambience *extraction*, which can avoid that problem. I look forward to trying Circle Surround in my car—and in my house, for that matter.

Circle Surround works well on straight stereo recordings, but Circle Surround encoders are available—and some record producers are now using them. The day I wrote this, in fact, I learned from the liner notes of Telarc's *Surround Sounds* (CD-80447) that this encoder (among others) was used in making it. A

KEN KESSLER

DIAL "A" FOR ALCHEMY

Surprising as it might seem, a hi-fi show is not the best place to assess new products or technologies. Gather news, by all means, but actually judge the stuff? No way: You don't know the sound of the room, and the odds are you don't know the rest of the components surrounding the new kids on the block. I mean, what good is listening to a new amp when you're unfamiliar with the speakers? In some cases, you might even be faced with an arrogant swine who refuses to play anything other than some demo disc you either loathe or have avoided ever hearing at all. (It kind of makes a mockery of my pouch full of fave CDs.)

The DT1•Pro 32: EDR-S consists of eight of these, plus special software.

But still you go, hoping to catch a glimpse of something new. And maybe, just maybe, you'll leave the show with an impression of how it actually sounds. Me? I try not to praise or damn anything on the basis of 10 minutes in a strange room, but there are always exceptions. My nomination for the hottest thing at the Winter Consumer Electronics Show last January was based on a delayed reaction rather than snap judgment: I didn't get to audition it until I got home.

Audio Alchemy's room is always a feast for newshounds. The company is so prolific that in one year it introduces what most companies launch in three. This year was no exception, with sleek new D/A converters and even export-only power amps of the $10,000 persuasion. Yet it was not Audio Alchemy's hardware that made an impression, but a new CD processing system, and I didn't realize it until after the show ended.

Because I was staying at the Mirage, along with other wishful thinkers who still dream that CES exhibits will one day return to this most comfortable of hotels, I was only a floor away from Audio Alchemy's room and dropped by the day before the show began. It was then that I first heard about EDR-S, the Enhanced Digital Resolution System. Having had enough audio alphabet soup in my lifetime to be nonplused by yet another serving, I didn't really pay close attention. But I did hear Peter Madnick say, "Bring along one of your CDs tomorrow."

AUDIO ALCHEMY'S EDR-S PROCESS IS SPECIFICALLY DESIGNED FOR REMASTERING 16-BIT CDs.

Which I did. Madnick told me to pick a track and to place the disc into the CD-ROM drive in a PC I hadn't noticed the day before. The song I picked, "At Last" performed by Lou Rawls, was downloaded onto the hard drive, processed, and then transferred to a recordable CD. For some obscure reason, I was told to pop by again with another CD. I left it there overnight, because I asked to have seven tracks copied, and transferring onto CD-R is done in real time. On the last morning of the show, I collected the second disc and stuffed it into my carry-all, forgetting about it completely until I returned home. Even then I didn't rush to play those discs, because I had plenty of work to catch up on without doing A/B comparisons of commercial releases versus their tweaked counterparts.

In the meantime, I'd been told to expect what would sound "sort of like a 20-bit facsimile of the original CD." As EDR-S wasn't exactly a product, the Alchemists hadn't devoted a huge amount of time to it; they had new models to promote, which was fair enough. But the lavish setup and the amount of manpower needed to hand out freshly minted sample discs to visitors suggested that EDR-S deserved a proper hearing.

After my return from CES, I listened to my newly minted CD-Rs almost by accident. While hooking up some new amplifiers, I noticed the two white-trayed Philips CD-R jewel boxes I had unpacked but ignored. I played the commercial release of Rawls' "At Last," followed by the new transfer, then a few tracks of Howard Tate's *Get It While You Can*, followed again by the Alchemized edition. A guest and I were stunned by the improvements we heard. A week later, I repeated the session with Steve Harris, a colleague. Now, Steve isn't someone who shows glee to the extent of, say, a winning contestant on *Let's Make a Deal*, but this time he wore a smile and an expression that revealed lots of white between pupil and eyelid, both rows of teeth, and his eyebrows heading north. He uttered the kind of "Wow!" that I hadn't heard since I first witnessed someone smoking some excellent stuff back in '71. Two days later, a

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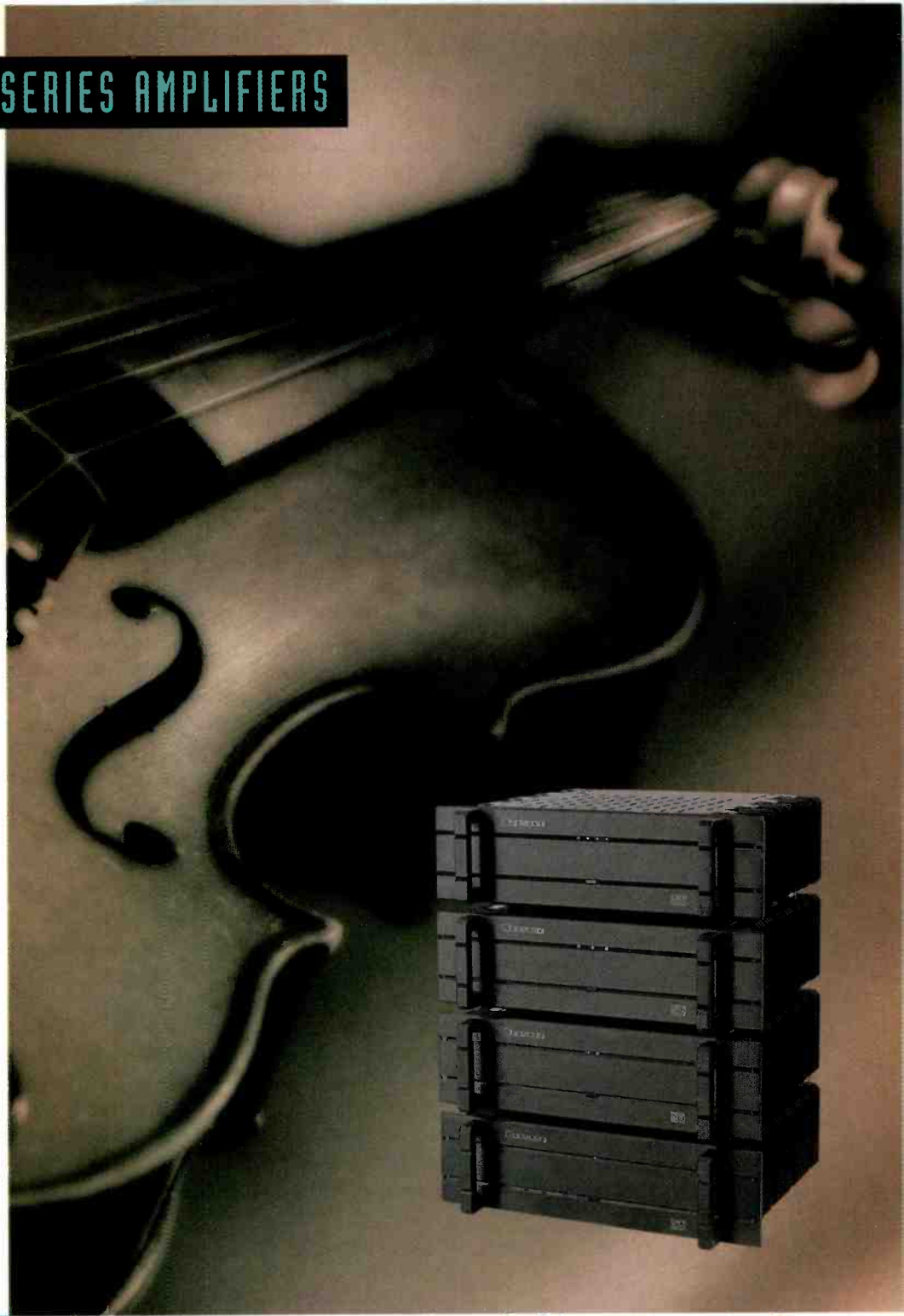

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friend joined the list. Again, astonishment, and so it's been with every person who's heard the two sets of CDs side by side.

The EDR-S process was specifically designed for remastering 16-bit CDs. The system consists of eight Audio Alchemy DTI•Pro 32 processors, each programmed with special software algorithms; seven address specific bands of the signal, while the eighth acts as a super-duper jitter filter. The digital data fed to EDR-S is said to undergo "resolution enhancement processing," hence the name. Audio Alchemy uses a proprietary interface and software to connect the system to a PC (via a 16-bit ISA card, although a PCI-bus version is under development). The PC interface writes digital audio data from either an S/P DIF or I²S input onto the hard drive. What I saw at CES was a prototype; Audio Alchemy expects that the EDR-S system, in its final form, won't require a PC because it can write directly to CD recorders having internal hard drives, which are now beginning to appear.

Audio Alchemy's DTI•Pro 32 provides the core algorithms for EDR-S, using "data interpolation to increase the input data resolution to greater than 16 bits," according to Audio Alchemy. The company states that a single DTI•Pro 32 normally provides a 2-bit increase in resolution, akin to providing 18-bit resolution from a 16-bit source, like a normal CD. Using eight of the Pro 32s, along with the new software, is said to produce further improvements. Audio Alchemy says that whereas a single Pro 32 enhances signal resolution up to 10 kHz, EDR-S works its magic up to 16 kHz. Improved low-frequency resolution is also claimed, as is enhancement in the region from 1 to 3 kHz. Adaptive dithering algorithms are used instead of the Pro 32's triangular probability-density function dither, to "shape the additive dither noise spectrum based on its subjective audibility." [Such noise shaping would be necessary to preserve any benefits of the bit interpolation on CD-R, which, like standard CD, uses 16-bit data words.—*M.R.*]

At the core of the new system is the bit interpolator. It monitors input data and calculates approximations of the additional bits deemed essential to restore the original signal's "harmonic integrity" prior to its quantization to 16-bit. Furthermore, a test algorithm checks whether the bit interpolators are, in fact, enhancing the resolution. When there is insufficient data to correctly generate additional resolution, the bit interpolators are bypassed. Again, this goes beyond the equivalent action of a single Pro 32, in that EDR-S has the computational power to split the input data into multiple bands, resulting in greater resolution enhancement across a wider spectrum.

What I heard from the discs processed with EDR-S sounded refreshingly different enough to inspire me to draw in other victims. There seemed to be more detail, more convincing ambience, more lifelike vocals, deeper bass, and a richer midband. The treble was smoother, devoid of aggression, and free of digital nasties. But although nobody said a single negative thing about the remastered material, one observer noted again and again that the EDR-S version sounded "sweeter," "nicer," and easier to listen to for extended periods. He wondered if this might not be akin to heavy filtering, removing nasties and possibly creating an artificial euphony. But he quickly said, "Ah, who cares—this is terrific!"

The real problem is that Audio Alchemy doesn't yet know quite what to do with EDR-S: Should it sell the system to the professional market, hoping it might end up in the manufacturing process, where it belongs? Although the price isn't finalized, a single DTI•Pro 32 costs about $1,600, so eight of 'em plus the software, interface system, and the rest would leave a lot of change from six figures—a mere pittance for a pressing plant. Or should Audio Alchemy offer EDR-S to over-the-top consumers who would rerecord all of their CDs, just as old-time audio crazies used to copy their LPs onto open-reel tape, preserving the albums? And what about copyright laws? Should customers send their CDs to Audio Alchemy and have them processed for a fee, with the Alchemists keeping or destroying the original disc? Should a royalty be paid to the copyright holder? Or should consumers buy their own EDR-S packages and a stack of CD-Rs?

All I know is that with EDR-S, I heard astonishing gains on tracks I know cold. Had I known what was in store, the carry-all I took to CES would have been overstuffed with a Beatles CD, a Jackie Wilson, some Yardbirds and Kinks, maybe an Ella or two, Aretha's greatest. . . . Get the picture? A

Rotel Report 5

Rotel's RSP-980 provides Dolby® Pro Logic® and THX® certified surround-sound decoding, video switching, and audiophile quality preamp functions for two independent zones.

SYSTEM BUILDING

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The RCC-945 — convenience and performance in a six disc CD changer

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RCC-945 6-disc CD Changer

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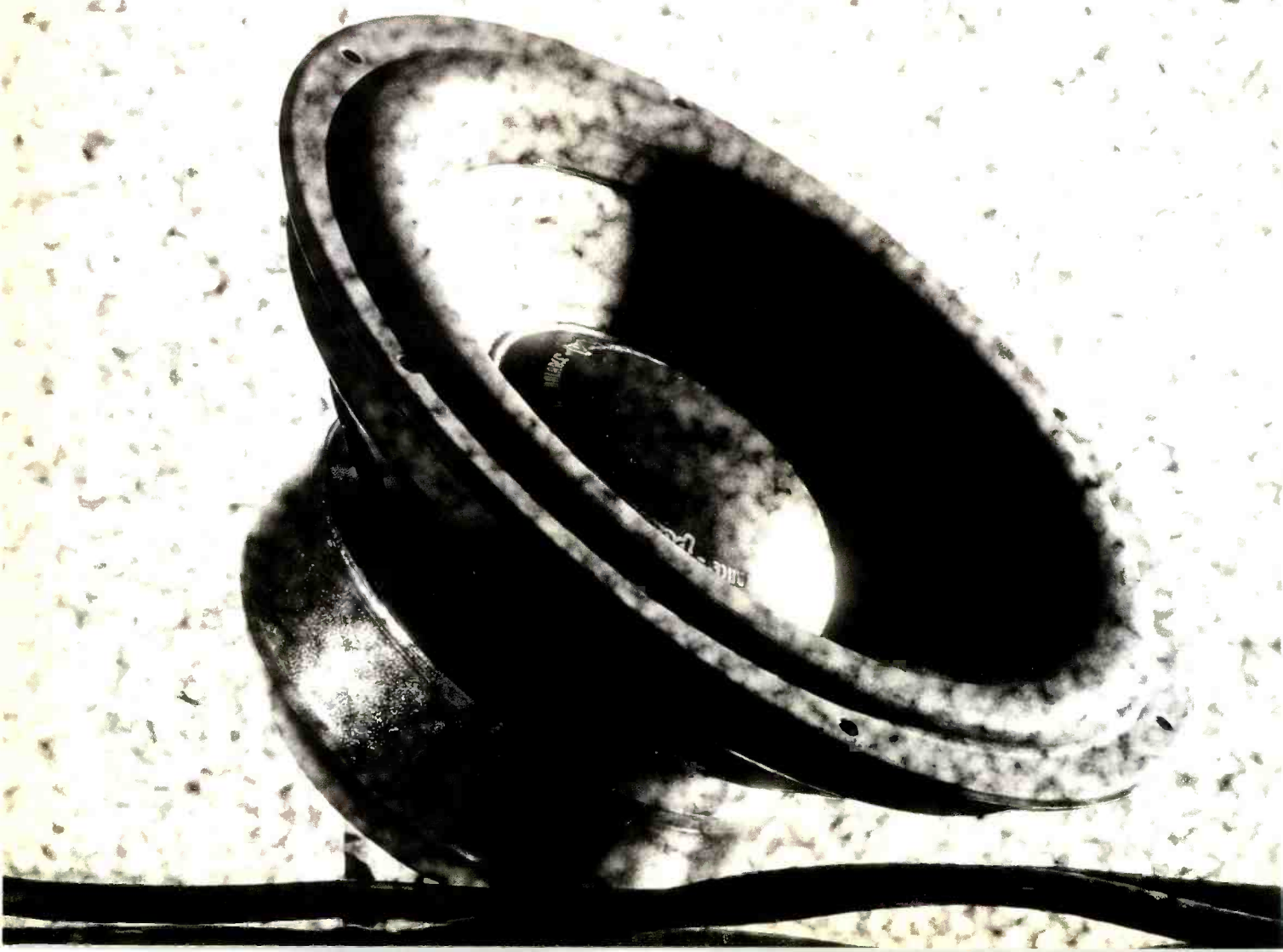


less space

Subwoofer Design

by MATTHEW POLK

The growing popularity of home theater and high-performance car systems has made achievement of high sound pressure levels at very low frequencies far more important than in the past. Otherwise normal people who previously were satisfied with a modest pair of stereo speakers now find themselves wanting plaster-cracking bass capability to go along with their big-screen TV and surround system. The good news is that computer modeling techniques, advanced materials, and more accurate and practical methods of measurement have facilitated dramatic improvements in the design of woofer and subwoofer systems. But with the need to accommodate six or seven loudspeakers in a room for home theater, the perennial question of speaker size versus performance has become more vexing than ever.

HVCD enables the creation of powerful subwoofer systems that are also quite compact.

In the past, traditional woofer designs worked very well for most home applications. Serious practical limitations are encountered in attempting to reproduce the lowest frequencies at very high levels, however. Our efforts at Polk Audio to solve these problems have yielded a subwoofer design technique that, we believe, overcomes many of these previous limitations. It enables us to produce powerful subwoofer systems that are also quite compact.

These gains are achieved by redefining the mathematical tuning ratios for bandpass woofers to exploit very high-mass drivers having unusually powerful motor systems. This technique is combined with a new port configuration that enables efficient reproduction of deep bass at high levels while minimizing turbulence and noise.

At an Audio Engineering Society convention many years ago, the late Harry Olson concluded his description of the accidental invention of the cardioid directional microphone by observing, "If you're not moving, you can't stumble over anything." For me, the same sort of accident occurred while preparing a presentation on (appropriately) subwoofer design techniques for very deep bass reproduction. In the process, I stumbled on the idea that more compact bandpass woofers with more extended low-frequency response and greater dynamic range could be constructed if we were willing to consider driver design parameters well outside normally accepted limits.

Matthew Polk is Polk Audio's co-founder, chairman, and chief designer. The company is located in Baltimore, Maryland.

photo by BILL KOUIRINIS

During the presentation, I discussed the three major types of woofer designs: sealed, ported, and single-vented bandpass. The idea was to show that of the three, the bandpass enclosure had the best relationship of size to performance. As I worked on my notes, however, I realized that in the very low bass range, below 40 Hz, none of these approaches held a clear-cut advantage.

If you ask about producing lots of deep bass, most people assume that it takes a big woofer in a very big box. The question is, how big? Let's say the goal is to reproduce 110 dB SPL at 25 Hz, which is very loud and very deep (though still wimpy by car audio standards). That would require a 15-inch woofer in an 8-cubic-foot sealed cabinet, with about a 200-watt amplifier. But what do you do if 8 cubic feet is too big (about the size of an under-the-counter refrigerator)? Figure 1 shows the relationship of cabinet size to frequency response for various sealed cabinets. To give an idea of the performance sacrificed for a smaller cabinet, the 1.5-cubic-foot cabinet with 9 dB less output at 25 Hz would need an amplifier capable of producing more than 1,600 watts! Even the 4-cubic-foot system would require more than 400 watts.

It is possible to increase the output slightly by using a ported system. As seen in Fig. 2, with the correct 15-inch driver and an appropriate port, the output of the 4-cubic-foot cabinet can be increased significantly above 35 Hz but only slightly at 25 Hz. And this system would still need 350 watts to achieve the goal. However, the real problem lies in the size of the port required—about 7 inches in diameter and 70 inches long! Ultimately, the problem with ported systems is that deep bass response falls off sharply as the outputs of the driver and the port become out of phase with each other at the lowest frequencies and begin canceling rather than adding.

Using a bandpass system solves this problem, as it puts a box in front of the woofer cone, essentially eliminating direct output from the driver. (The term "bandpass" comes from the fact that this arrangement creates a sharp high-frequency rolloff in addition to the normal low-end rolloff. Because the only output from the system is through the port, no cancellation occurs and deep bass response can, in theory, be extended.) Figure 2 also shows the performance of a 4-cubic-foot (total) bandpass system using a 15-inch driver. As you can see, rather than proving the bandpass design clearly superior to the sealed and ported ones, it demonstrates that none of these systems actually has much of an advantage in deep bass reproduction.

I had arrived at this same point very late the night before I was to give my subwoofer presentation. The conclusion felt somehow intuitively wrong, but it was too late and I was too tired to do anything about it. In a happy accident, however, I punched a wrong number into the computer program I was using to generate the system curves and hit the recalc key. The mistake I had made was to increase the moving mass of the driver in my computer model by a factor of ten, from 60 grams to 600 grams. Normally I would have expected this to make the system's efficiency so low that thousands of watts would still produce only a whisper. But before correcting the mistake, I noticed that although the response curve was somewhat erratic, the efficiency was amazingly good considering the extremely high mass. I also noticed that my computer model, which calculates cabinet volume while holding the in-system driver resonance constant, had produced values for the chamber sizes that were so small I was sure there had to be an error. Before falling asleep on my keyboard, I made a few changes to other parameters, trying to get some results that made sense. The calculated cabinet volumes were not a mistake. Neither was the calculated efficiency. I went to bed with the sense of anxious puzzlement that accompanies discovering something without understanding just what it is.

The driver parameters for an HVCD system are well outside those normally considered practical.

The next day, at the conclusion of my presentation, I suggested that it might be possible to substantially extend the deep bass response of a bandpass system without significantly increasing cabinet size or sacrificing too much efficiency. This could be done, I theorized, by using drivers having very high moving mass and very high Bl product. (Bl product is a measure of a driver's motor effi-

ciency, based on the strength of the magnetic field in the voice-coil gap and the length of wire on the coil that is immersed in the field.) I reasoned that this would work only with a bandpass system because its overall efficiency is determined mostly by the acoustic mass of the port, whereas in a direct-radiating design it is determined largely by the moving mass of the driver.

SCALING, SCALING

Theory, of course, is one thing and reality sometimes quite another. I wondered why, if my theory were correct, no one else had taken this approach. The concept of bandpass woofers has been known for at least 50 years, and they are now very popular in subwoofer/satellite systems, where cabinet size versus performance is extremely important. Typically these woofers must blend with small satellites in the 140-Hz range and have flat response down only to about 50 Hz, with rapid rolloff below 40 Hz. I wondered why this design type, so popular for compact and efficient reproduction of mid-bass, wasn't used more often to reproduce deep bass. I wondered also if the reason was in some way related to what I had stumbled over late at night on my computer.

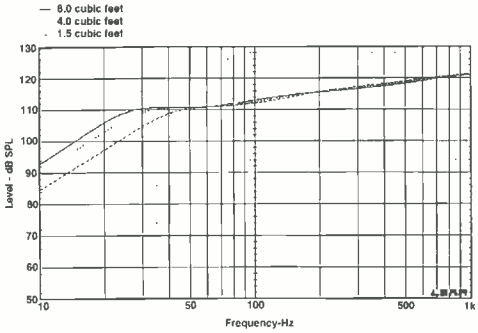


Fig. 1—Output versus frequency of a 15-inch woofer in sealed boxes having volumes of 1.5, 4.0, and 8.0 cubic feet, driven with 200 watts.

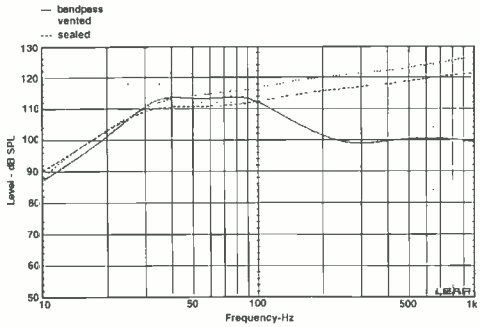


Fig. 2—Comparison of output versus frequency for 4.0-cubic-foot sealed, vented, and bandpass woofer systems, each driven with 200 watts.

One way computer models of loudspeaker performance are created is by representing the speaker's behavior in the form of an equivalent electrical circuit. Then standard techniques of analyzing electrical circuits can be used to predict the system's response quite accurately, particularly at low frequencies. The circuit-element values used in the analysis are calculated from the speaker system's actual mechanical, electrical, and acoustic parameters. Or, if the circuit values required to produce the desired performance are known, the parameters required to build the system can be calculated by the reverse process.

One standard technique for circuit analysis is to "scale" a network, up or down in frequency, to have the same characteristic response over a different frequency range. For example, a circuit representing a loudspeaker system whose response would be 3 dB down at 50 Hz could be scaled to find the circuit values for a system that would be 3 dB down at 25 Hz instead. The new circuit values could be used to calculate the parameters required to build the lower-frequency system. I decided to use this method to translate one of the successful "mid-bass" bandpass woofer designs into a new design having similar characteristics but covering a range centered one octave lower. This, I hoped, might shed some light on why bandpass designs were so rarely used for deep bass reproduction.

The results of this process are shown in Fig. 3 and Table I. The "mid-bass" design, using two 6.5-inch drivers wired in parallel, is 3 dB down at 48 Hz. The actual parameters for this system were used to calculate circuit values for an equivalent circuit that I then scaled down one octave. The new circuit values were then used to calculate parameters for a new system. As shown in the table, the new parameters could, in theory, be used to construct a subwoofer with two 8-inch drivers that would have a –3 dB point of 24 Hz. (Any size driver could be chosen, but a pair of 8-inch drivers would be the practical minimum for reproducing very low frequencies.) The new design is 6 dB less efficient than the original if the two designs are compared in the middle of their ranges, but it is 10 dB more efficient at 30 Hz. Overall efficiency, at 88 dB, is quite acceptable, and the new cabinet, less than 2 cubic feet in volume, is quite small for a woofer that efficiently reproduces frequencies near 20 Hz. Most interesting to me, however, was the fact that the 8-inch woofers called for have very high moving mass—more than 90 grams each—and a very high Bl product of 11.7 webers/meter. This result seemed to confirm my theory that it is possible to use heavy drivers with powerful motors to make relatively small subwoofers with extended deep-bass response.

These results also suggest why loudspeaker engineers had not considered designs of this type. It is a combination of driver parameters well outside those normally considered practical, a lack of

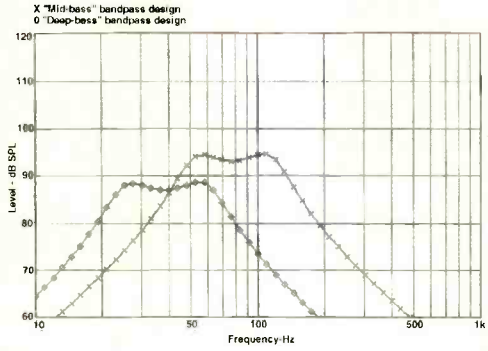


Fig. 3—Response of an actual "mid-bass" bandpass design (crosses) versus that of a theoretical design reaching one octave lower (diamonds). The mid-bass woofer system uses two 6.5-inch drivers, whereas the deep-bass variant uses two 8-inch drivers. The deep-bass design was derived by frequency-scaling of an equivalent electrical circuit representing the mid-bass system's characteristics. Design parameters are listed in Table I.

Table I—*Design parameters for the two bandpass woofer systems whose responses are shown in Fig. 3.*

	Mid-Bass Design	Deep-Bass Design
Woofers	Two, 6.5-inch	Two, 8-inch
Bl Product	6.4 webers/meter	11.7 webers/meter
Moving Mass (Per Driver)	15 grams	92 grams
Free-Air Resonance	45 Hz	18.6 Hz
Sealed-Chamber Volume	0.55 cubic foot	1.0 cubic foot
Vented-Chamber Volume	0.45 cubic foot	0.85 cubic foot
Total Cabinet Volume	1.0 cubic foot	1.85 cubic feet
Port Diameter	3.0 inches	4.5 inches
Port Length	5.0 inches	31.0 inches
Mid-Band Efficiency	93 dB	87 dB
Efficiency at 30 Hz	78 dB	88 dB
–3 dB Point	48 Hz	24 Hz

Table II—*HVCD bandpass-woofer tuning ratios.*

$$Qmc = \frac{Mmd \times fc}{kg \times sec^{-1}} \qquad Qtc = \left(\frac{MAS}{CAT}\right)^{1/2} \times \frac{1}{R0} \qquad Qtp = \left(\frac{MAP2}{CA2}\right)^{1/2} \times \frac{1}{R0}$$

Mmd	Moving mass of driver (kg)
fc	Resonant frequency of driver in sealed chamber (Hz)
MAS	Acoustic mass of driver (kg/meter^4)
CAT	Combined acoustic stiffness of driver suspension and air in sealed chamber (meter^5/newton)
R0	Acoustic resistance of voice coil (newton-seconds/meter^5)
MAP2	Acoustic mass of air in port (kg/meter^4)
CA2	Acoustic stiffness of air in vented chamber (meter^5/newton)

practical technology for fabricating such drivers, and the counterintuitive nature of such an approach that tends to point the efforts of loudspeaker engineers in other directions. For example, a typical 8-inch woofer would have about 20 grams of moving mass and a Bl product of less than 7.0. Drivers with characteristics like those of the 8-inch woofers discussed above are simply not available unless you have the facilities to make your own. Even then, the construction of such drivers presents technical and manufacturing problems that, as recently as just 10 years ago, could not have been overcome in any practical manner.

Fortunately, advances in materials and plastics molding have made it possible to produce heavier cones that are strong enough to withstand the considerable forces involved and rigid enough to avoid catastrophic cone breakup. In addition, improvements in adhesive technology have made it possible to create strong, permanent bonds using hard-to-glue cone and surround materials. Powerful motor structures continue to be expensive and difficult to construct, however, despite the availability of new high-strength magnet materials. The most significant development here has been in the use of computer design and simulation techniques to optimize the efficiency and linearity of powerful motor systems.

It makes sense for heavy drive units to produce deep bass, but it is somewhat counterintuitive that they can also increase bass efficiency. In sealed systems, for example, very heavy drivers are often used to extend low bass response at the expense of efficiency. (This technique is frequently used in high-performance car systems.) In this case, a larger motor assembly won't help because it will increase upper-range efficiency at the expense of reduced output around resonance and decreased low-bass output due to overdamping.

A reflex system gets additional output and efficiency from the port. But its efficiency is ultimately limited at very low frequencies through cancellation of the port output by out-of-phase direct sound from the driver cone. A heavy-cone driver would make things worse by increasing the low bass coming directly from the cone, which would then cancel more of the deep bass output from the port.

In a bandpass system the port is the only radiating element, and the efficiency is controlled mainly by the relationship of the port to the vented chamber. Because no cancellation occurs between port and driver, a very heavy driver with a large motor system can be tuned to give both greater deep bass extension and higher efficiency. In addition, unlike the motion of a driver diaphragm, the

movement of air in a port is not mechanically limited. As a result, the system's maximum deep bass output can be much higher for any given driver size.

Having satisfied myself that I was on the right track, I still had the problem of finding a quantitative method to describe systems making use of these insights. Bandpass systems are among the most difficult to design because they have so many interdependent system parameters. Consequently, I felt that a simple quantitative design procedure would be the only way to determine the ultimate potential of this approach to bandpass woofer design. In seeking such a method, I was looking for a way of mathematically expressing what is different about these systems. It is not simply that the cones are heavy, that the Bl product is high, or that the bass response is very deep for the size of the cabinet. It is the relationship of all these things that separates the new systems from standard bandpass designs. After much trial and error, I found that their performance could be simply characterized by three new tuning ratios: Qmc, Qtc, and Qtp (see Table II).

Ratio Qmc reflects the relationship of the driver's mass to the stiffness of the air in the sealed chamber. It is similar to the mechanical Q used by Thiele and Small but omits the effect of mechanical losses and is normalized to 1 mechanical ohm. Ratio Qtc reflects the relationship of driver mass, cone area, DC resistance, and sealed-box volume. It is very similar to Thiele and Small's "total system" Q (Qt), but as with Qmc, it omits the effect of mechanical losses. Ratio Qtp is the same as Qtc except that the mass of the port and vented-box volume are used; it's sort of a loss-free total Q for the vented chamber. Although Qtc and Qtp are very useful in the design process, Qmc is the ratio that really describes these systems. You might think of it as a system compression ratio; systems with Qmc greater than 5.0 tend to have exceptional performance for their size.

Development of the mathematical description for this new type of woofer system required the construction of numerous prototypes to prove the principle. In the process, we developed a fairly concise method of designing systems using the ratios introduced above. What follows is a summary.

STEP-BY-STEP DESIGN

1. Select the driver's cone size, suspension compliance, mechanical losses, and voice-coil DC resistance. As usual, a larger driver gives greater maximum output but requires a larger cabinet. Suspension compliance (the inverse of stiffness) should be as high as possible to ensure that most of the stiffness in the system will come from the sealed air volume. A practical maximum value for the suspension compliance would be 1 millimeter per new-

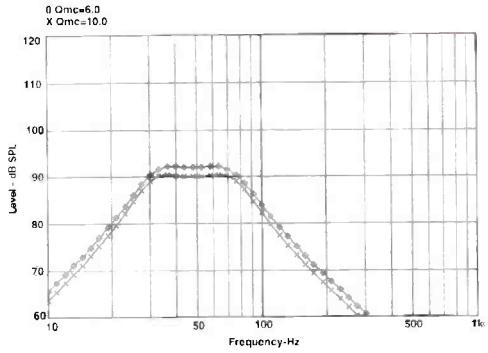


Fig. 4—Responses of alternative bandpass designs covering the same frequency range, one with a Qmc of 6.0 (diamonds), the other with a Qmc of 10.0 (crosses).

Table III—*Design parameters for HVCD subwoofers with Qmc values of 6.0 and 10.0. (Theoretical responses for these systems are shown in Fig. 4.)*

	Qmc = 6.0	Qmc = 10.0
Woofers	Two, 10-inch	Two, 10-inch
fc	48 Hz	48 Hz
fp	48 Hz	48 Hz
Qtc	1.0	1.0
Qtp	1.0	1.0
Qmc	6.0	10.0
Bl Product	13.1 webers/meter	16.5 webers/meter
Moving Mass (Per Driver)	62.5 grams	104 grams
Free-Air Resonance	26.8 Hz	21 Hz
Sealed-Chamber Volume	2.3 cubic feet	1.25 cubic feet
Vented-Chamber Volume	1.6 cubic feet	1.0 cubic foot
Total Cabinet Volume	3.9 cubic feet	2.25 cubic feet
Port Diameter	6.0 inches	6.0 inches
Port Length	16.35 inches	28.25 inches
Mid-Band Efficiency	92 dB	90 dB
Efficiency at 30 Hz	90 dB	89 dB
–3 dB Point	29 Hz	27 Hz

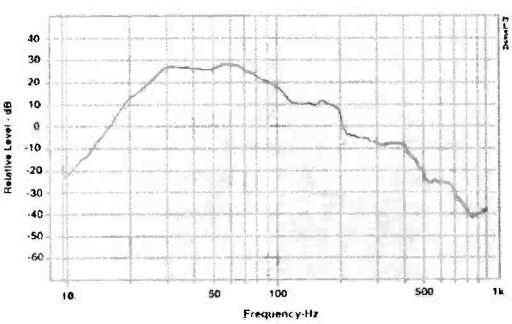


Fig. 5—Actual anechoic response of a subwoofer built to the parameters shown in Table III for Qmc = 10.0 (scale at left does not indicate actual efficiency). This is very close to the theoretical response for the same system, as shown in Fig. 4.

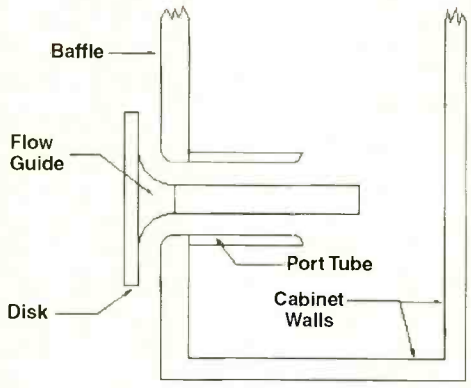


Fig. 6—Cross section of a Power Port. The widening from the middle of the disk outward converts high-velocity airflow in the port tube to low-velocity, low-turbulence flow around the circumference of the disk.

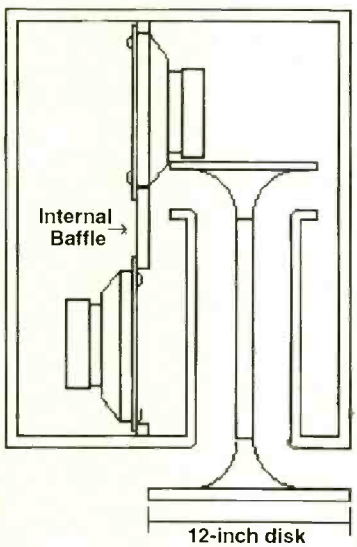


Fig. 7—Cross section of the HVCD subwoofer design that produced the response shown in Fig. 5.

ton, although the exact value is not particularly important. Mechanical losses also have very little effect on these systems as long as they are not too large. Use a value around 6.0 kilograms per second for calculation purposes and don't worry about it.

2. Choose fc, the resonant frequency of the driver in the sealed chamber. This will be roughly at the center of the bandpass response. The maximum bandwidth will be about 1.7 octaves between the 3-dB-down points.

3. Choose fp, the resonant frequency of the port against the vented chamber. For a symmetrical or flat response, fp should be equal to fc. When fp is lower than fc, the system response tilts up at the low end; when fp is higher, the response tilts up at the high end.

4. Choose values for Qtc and Qtp. Setting both Qtc and Qtp equal to 1.0 gives a slightly saddle-shaped response centered on fc, about 1.7 octaves wide (between the –3dB points) and with about 1 dB of ripple. Increasing Qtc gives a narrower bandwidth, whereas increasing Qtp gives a wider bandwidth. Narrower bandwidth typically gives higher efficiency. Increasing either Qtc or Qtp gives a response with more ripple, while decreasing either reduces ripple. For example, making both Qtc and Qtp equal to 2.0 gives about a 1.6-octave bandwidth with more than 5 dB of ripple. With Qtc and Qtp both equal to 0.85, the bandwidth remains 1.6 octaves, but the ripple almost vanishes. The cabinet volume stays the same for all values of Qtc and Qtp as long as they remain equal to one another.

5. Choose Qmc. For any given response, larger values of Qmc mean smaller cabinets and lower efficiency. Large Qmc values also require heavy drivers with powerful motor structures. For systems whose response curves are centered around 60 Hz, Qmc values of about 6.0 produce quite compact systems with good efficiency.

6. Calculate remaining parameters. After the above decisions are made, chamber volumes, port size, Bl product, driver moving mass, and frequency response can be computed.

DESIGN EXAMPLE

I needed a pair of woofers that, together, would produce 120 dB SPL at 30 Hz. Normally this would require two 18-inch woofers in sealed cabinets of about 12 cubic feet each. Using the design principles outlined above, I believed that I could achieve the goal by using one 12-inch or two 10-inch drivers per cabinet. Knowing that the design would probably require very heavy woofers with a high Bl product, I decided to work with two 10-inch drivers per cabinet. That would enable me to distribute the mass between two drivers and to handle more power. Also, if 2-ohm voice coils were used, the drivers could be wired in series, thereby doubling the system's Bl product and achieving a 4-ohm total impedance. I chose a suspension compliance of 0.263 millimeter per newton, which is well within practical limits.

A relatively small Power Port proved capable of better performance than a huge conventional port.

We know that making both Qtc and Qtp equal to 1.0 yields smooth response together with a bandwidth of roughly 1.7 octaves to the –3 dB points and roughly 1.35 octaves to the 0-dB points. If we want flat response at 30 Hz, then the resonance of the driver in the sealed volume (fc), which represents the center of the response curve, should be about 0.675 octave above 30 Hz. By choosing fc and fp equal to 48 Hz, we should get a relatively flat, symmetrical response that is less than 3 dB down at 30 Hz. For Qmc, I chose a value of 6.0 for my first try.

The response for this system is predicted to be about 2.5 dB down at 30 Hz and to deliver 92 dB from 2.83 volts at 1 meter. Total

cabinet volume is just under 4.0 cubic feet, net of space occupied by the drivers and the port. Unfortunately, this was too big for the application, so I decided to try a Qmc of 10.0 to see if the cabinet could be made smaller without losing too much efficiency. Figure 4 and Table III show the effect of increasing the value of Qmc.

With a Qmc of 10.0, the cabinet volume shrinks to about 2.25 cubic feet, net, and the efficiency is still around 90 dB. Response is only about 1 dB down at 30 Hz. If we apply 300 watts to each woofer, this would give almost 115 dB SPL per cabinet. The two together would give 121 dB SPL, thereby achieving the output goal. The drivers would need peak-to-peak excursion capability of about 0.5 inch to achieve this performance. That is fairly demanding for a 10-inch driver, but because this is a bandpass-type system, which naturally filters out harmonic distortion, low-distortion output can be achieved even if the driver excursion is not absolutely linear.

Because of the use of some volume damping, a system constructed according to this design ends up tuned a little lower than indicated by the model. Its measured anechoic response, shown in Fig. 5, was very close to the predicted response. Efficiency also was found to be very close to the predicted value. But testing the system's maximum output revealed a further practical problem. At high levels, huge amounts of noise were generated by the large volumes of air passing through the port. In fact, above about 110 dB SPL at 30 Hz, the noise and the energy loss were so great that they seemed to place an upper limit on how loud the woofers could play. In addition, the port for the prototype system was fairly large, 6 inches across and nearly 30 inches long. We actually tried an even larger port, 9 inches in diameter and 60 inches long! (The greater length was required to get the same acoustic loading with the larger diameter.) That produced much better results and higher maximum output but, obviously, was completely impractical.

A workable solution came in the form of a simple idea from one of our engineers. Noise is generated mainly where high-velocity air exits suddenly from the end of the port into the room. The problem occurs because the air slows too quickly at the exit and becomes turbulent. This causes both noise and loss of energy, which worsen, exponentially, as the airflow increases. The solution lies in finding a way to allow the fast-moving air in the port to slow down gradually as it emerges into the room. One method is to gradually enlarge the tube at its end, flaring it. In practice, however, this helps only if the flare is very, very large. Our solution accomplishes the same thing much more efficiently and compactly.

THE POWER PORT

In this case, a picture really is worth a thousand words. Figure 6 is a cross section of a new type of vent we call the Power Port. The idea is to direct the port tube's high-velocity airflow radially outward from the center of the disk toward the edge. This provides a constantly expanding cross-sectional area for the air to flow through, which reduces velocity as the air flows into the room. The result is that turbulence, noise, and energy loss are greatly reduced. It also eliminates the need to use a very wide port tube, meaning that the size of the entire thing can be dramatically reduced without sacrificing performance. In the design example, a Power Port using a 5½-inch diameter, 14-inch-long port with a 12-inch disk was capable of better performance than the huge 9 x 60-inch port discussed previously. Based on this new port geometry, two of these woofers were able to generate 120 dB SPL at 30 Hz in a 3,500-cubic-foot room with acceptably low distortion. In addition, the new port geometry yielded a 1.5-dB efficiency gain over the standard 6-inch-diameter port and significantly reduced power compression. Figure 7 shows a cross section of the prototype system.

Through luck and persistence, we have developed a design method and a port geometry that can be combined to produce bandpass woofers with exceptional deep-bass performance in cabinets of quite reasonable size. We call this technology High Velocity Compression Drive (HVCD), which comes from the high-velocity air in the port and the high compression from the large drivers in the small sealed chamber. I realize that the math can be daunting and some of the concepts confusing. However, if you would like more information or wish to build a system for yourself that uses these principles, contact Polk Audio. For a small fee to cover our costs, we will be happy to send you a computer program to make the calculations and a single-use license for the patents covering this technology. See "Build Your Own HVCD Subwoofer" for details. A

BUILD YOUR OWN HVCD SUBWOOFER

If you would like to build an HVCD subwoofer for your own use (or would simply like more detail on how the system works), Polk Audio will supply the basic resources necessary to get you started. Call 800/638-7276 and ask for Dave Lytwynec at extension 208 or Ken Swauger at extension 891. For a small fee to cover the company's costs, they will send you a MathCad or generic spreadsheet file that will do the necessary calculations, a single-use license for the technology, and information on where you can buy appropriate drivers and other components.

Mark Isham

THE AUDIO INTERVIEW

by John Diliberto

EVERY GENERATION HAS ITS LEADING FILM COMPOSERS. IN THE PAST, THE MANTLE HAS BEEN WORN BY ELMER BERNSTEIN, JERRY GOLDSMITH, AND JOHN WILLIAMS. IN THE 1990S, ONE OF THE TOP COMPOSERS IS MARK ISHAM.

ISHAM IS A TRUMPETER AND A SYNTHESIST WHOSE SOLO CAREER INCLUDES THE ALBUMS *blue sun* [REVIEWED IN THE FEBRUARY ISSUE OF *Audio*], *Vapor Drawings*, *Castalia*, AND HIS EPONYMOUS GRAMMY-WINNER.

WHETHER HE'S PLAYING WITH ART ROCKER DAVID SYLVIAN OR POP STARS LIKE THE ROLLING STONES OR BRUCE SPRINGSTEEN, ISHAM'S TRUMPET SOUND IS INSTANTLY RECOGNIZABLE. HE'S EQUALLY DISTINGUISHED FOR HIS SYNTHESIZER WORK.

BUT ISHAM IS BEST KNOWN AS A FILM COMPOSER. HIS FIRST CREDIT WAS *Never Cry Wolf*, IN 1984. SINCE THEN HE'S SCORED MORE THAN 30 FILMS, INCLUDING *Quiz Show*, *Miami Rhapsody*, *A River Runs Through It*, *Romeo Is Bleeding*, AND *Nell*.

ISHAM IS THE PROTOTYPICAL MODERN FILM COMPOSER. HIS COMPOSITIONS EMANATE MORE FROM VARIOUS SYNTHESIZERS THAN FROM PIANO, PAPER, AND PEN. ALTHOUGH MOST OF ISHAM'S SCORES USE ORCHESTRAS, HIS VISION IS REALIZED BEFORE ANOTHER MUSICIAN EVEN PLAYS A NOTE.

IN HIS BEVERLY HILLS HOME AND STUDIO, MARK ISHAM TALKED ABOUT THE ART OF THE MODERN FILM COMPOSER. *J.D.*

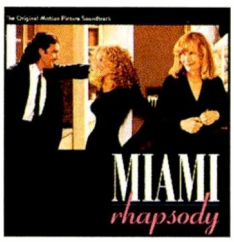
Photograph: ©William Claxton

a composer runs through it

poser runs through it

poser runs through it

miami rhapsody



You have recorded jazz scores, symphonic orchestral scores, and electronic scores. For one movie you're playing a trumpet blues and on another, Middle Eastern fusion. What's it like, as a composer and a musician with your own identity, to be a chameleon?

Well, it's something that I've been doing for about 12 years now. When I first started, there was only a certain type of film that I felt I could do. I felt I had my own voice as a composer and musician. If I couldn't see how that voice fit into a film, I was very uncomfortable getting involved. And in those days I actually used to turn down films, not because I didn't like the film but because I really wasn't sure that I could contribute in my own way, using the sounds and the voice that I was comfortable with. But over the years I've really started to challenge myself in that regard. I've tried to widen my area of expression with the musical vocabulary. A lot of that has been actually studying different styles and learning about orchestral writing, in particular.

My agent and I undertook a project about five years ago to break into orchestral scoring, mainly because a lot of interesting films were being made and I wasn't being considered to score them. I was regarded as this "jazz synthesizer guy," and a lot of the people making really high-quality films wanted orchestral scores. So we set up this project to get me involved in writing for orchestra, to learn about it and get known more as somebody who could do both. And it's paid off because now I find I don't have that stigma attached to me anymore. I think I'm considered to be someone who can handle a wide variety of styles.

Was the film* Billy Bathgate *the turning point in terms of going for the orchestral scores?

Absolutely! I'd done a few odds and ends before then, but that was the first one where it was just orchestra. At the time, it was the most traditional thing that I had ever written.

losing isaiah

It seems to me that you have almost single-handedly brought back the jazz soundtrack.

I wish I had. You know, it's still a very touchy area for a lot of people. I'm working on a film right now where I mentioned the "J" word early on, and I could literally see the producer's face turn pale. The prospect of getting a jazz score was a scary thing as far as he was concerned.

Jazz is my oldest, real true love. I was brought up in a classical household, so when I discovered jazz, it was my personal discovery. And whenever I have an opportunity to work in that medium, I really relish it.

Most film scoring is underscoring, amplifying a mood. But when I saw* Miami Rhapsody, *I had the feeling that the score could've just been music that happened to be on the radio, for instance, as opposed to being integral to the mood of the scene.

the browning version

Jazz is my real true love, so whenever I have an opportunity to work in the medium, I really relish it.

You're right. The style of *Miami Rhapsody* was quite different, and it became that way because of what we call the "temp score." That's the score that they put on before they hire a composer. The purpose of a temp score is to help the director get a sense of how the music is going to fit in the film as well as to see what styles of music are right for it and, therefore, who should be hired to do it. They need to hear if they want a guy who specializes in orchestral music, synthesizer music, or whatever.

On *Miami Rhapsody*, they had put in Duke Ellington and Oscar Peterson, these fantastic records, and had established this style of not really scoring the picture but accompanying it with great music. One of their options would have been to simply get permission to use all these recordings and make a great compilation score. But the director, David Frankel, wanted a touch of the actual scoring phenomenon to occur. He wanted things to change at a certain point, to stop correctly instead of just fading out. Also, he had put such high-quality, high-class recordings in there, it was going to be very expensive to get permission to use all of them. So they came to a compromise. I think they got the rights to use three or four recordings and then hired me.

quiz show

It was quite a challenge at first because I was up against the masters. I was trying to put in music that had the same interest and quality and also trying to score the picture. But once I got into the flow of it, it was a lot of fun. We actually used a couple of Duke Ellington compositions, which I then arranged, and I wrote some original material.

the moderns

When you're doing a symphonic score, you don't write the score out on paper first. You have all this electronic and computer gear here, and you initially score the film by creating your own orchestra with synthesizers and digital samples.

Yeah! I think one of the great benefits that orchestral simulation can have is that the director can get a pretty decent sense of what the score's going to be long before anybody spends a dime.

In the old days, what could you do? You could plunk out a few things at the piano, maybe get a couple of virtuoso pianists in to do a piano reduction of the score. But there was no way you could ever really give the director an idea of what you had in mind. You had to wait for that downbeat on the first day of recording, and I'm

sure that more often than anybody cares to remember, the director turned around and said, "Oh, my God! This isn't right at all." Then they'd be in the most impossible position, all geared up to spend hundreds of thousands of dollars, and, potentially, none of it was right. I can't imagine a worse professional nightmare to be in.

a river runs through it

I continue to invest in devices that help enhance the reality of the orchestral simulation. One of the reasons is that directors and producers can come here, and I just push a button: The video rolls, a pretty decent simulation of what the score's going to be unfolds, and they can listen to it as many times as they want. They can comment and go back and have me redo the whole thing if they want to.

It's saved my life countless times. I've definitely had people come over and say that what I'd done was completely wrong. Even after doing this for more than 10 years, you strike out occasionally. But I'd much rather know three weeks before the deadline than on the day of the downbeat.

Do you sit down and compose to the picture or does the director just say, we want this mood and that mood?

From day one with *Never Cry Wolf*, the only thing that I could think of to get started was to just run the picture and start playing along and see if any relationships caught my fancy. I just start programming a few sounds and textures until I see a relationship where the sounds really fit the visual texture. It isn't too different in acoustic music writing, either. I'm a technological child with a synthesizer background, so I use synthesizers and modern technology to write. I'm not a pencil-and-paper composer.

I noticed that you don't have a piano in this room.

That's right, so I have to know this system. If I'm writing an orchestral score, I get the computer to boot up my fake orchestra and start with that.

Do you ever wind up using it?

No, not on a final. I get pressured to sometimes, but I've always been a firm believer that acoustic instruments should be represented by themselves. Even though simulations are getting better and better, it's still very hard to really fool people. I think in background subordinate roles that you can fool people. But certainly for any leading emotional line, you can't beat an instrument that's evolved over hundreds of years.

With one of your film scores,* Timecop, *I know that fans of yours were shocked because it was not electronic.

Well, yeah, but that was not necessarily my choice. Film composers work for other people. Peter Hyams, the director, said, "Look, I want to stick to the genre. I want a big, bombastic orchestral score." And I said, "Okay, we can do that."

That score sounded almost like effects instead of music.

Again, that was direction from the director. He said to me, "I don't want any continuous motion in the music. I don't want any predictability. It's got to be jagged." That was the word he used constantly, "jagged," and he wanted to hit everything. By that I mean, every time a knife thrust forward, I did something to reflect it. Creating a sound like that is the hardest aspect for me of film scoring.

On a film like *A River Runs Through It*, there was a lot of music and it was a huge challenge to do. That film asked the music to take on a certain profoundness, a poetic quality. One might assume that this might be the hardest to get. But to me, to sit down and just take an afternoon and work out a beautiful melody is a joyous event, and there's a great deal of artistic momentum you can build up. But to just write something that exactly fits a knife hit, the thrusts, the kicks, and the punches. . .You can't start a melody; you can't continue a melody. There's no real aesthetic form that you can get into. It becomes, like you said, a sound-effects type of job where you're literally cutting and pasting blocks of emotions into one another. You hope that nothing ever repeats itself too much so that you can keep the jagged mass crawling forward. And it's very time consuming and is the hardest aspect of the job for me.

romeo is bleeding

You did* Little Man Tate, *which Jody Foster directed, and that was again a jazz score. Her film* Nell *was not a jazz score.

cool world

Nell was most definitely not a jazz score. It was a big orchestral score with some electronics but not done at all in an electronic way. I think the untrained ear wouldn't even know the electronics are there. They're a surrealistic tinge around the outside of the orchestra, almost like Brian Eno's electronics. Instead of just reverb and the orchestra and the sound of a concert hall, there's this other layer on the background of the orchestra that raises it 20 feet off the ground, if you will. Because the film is a bit of a mystical mystery and gets very philosophical. There are long moments in the film that to me were very surreal. I wanted that extra strangeness, and electronics can do that, if they're used the right way.

How did you hook up with Robert Redford?

I asked Bob that when he hired me for *A River Runs Through It* because I was curious myself. He said he had seen *Never Cry Wolf* when it came out and thought, "This guy could be pretty interesting. Keep tabs on him, and maybe something will happen." Sure enough, he actually interviewed me for *The Milagro Beanfield War*, although Dave Grusin composed the score for that.

Bob likes having a team that he works with regularly, and if the Hollywood rumor mill is to be believed, he and Dave had a falling out. So he hired someone else to score *A River Runs Through It* but didn't like the result. He was left with the film pretty much done, but he had no score. I think just on a wild whim he thought maybe that was the time to see what could happen with me. Sure enough, it fit into my schedule. Hopefully I'm now part of Bob's team.

I imagine you would have fit it in your schedule even if it didn't fit in your schedule.

That's not the sort of film you turn down.

You mentioned the situation of having a film score rejected.

Yeah, I've been thrown out and replaced.

What were the circumstances?

To me, composition is only 50% of the skills needed for a successful film composer. The ability to truly communicate with people is perhaps even more important. You have to understand and accept the collaborative process that filmmaking is, where you fit in, who the bosses are, and whose vision you have to follow. You have to duplicate and then replicate and then turn around and instill that same vision in the people who work for you. And you have to make sure that it completely works all the way through the end, all the way through the recording process, and that the vision the director is giving you is truly realized. This is only partially a composition job; it really is an exercise in communicating.

I've found that the only times that scores are thrown out is not because the music has been badly written, but because you haven't really duplicated what the director wants. You haven't found the musical language that replicates that vision. It was Elmer Bernstein who wrote the rejected score for *A River Runs Through It*. Bernstein is a great composer. He writes great music, so it certainly wasn't a matter of his being a bad composer.

When I've had scores thrown out, it was the same thing. I just didn't get it. It's not that I wrote bad music, but that I didn't write the music that they wanted. A

Mark Isham Discography/Filmography (Partial)

Film Music (1984)
Windham Hill WD 1041
Includes *Never Cry Wolf*, directed by Carroll Ballard; *Mrs. Soffel*, directed by Gillian Armstrong; and *The Life and Times of Harvey Milk*, directed by Robert Epstein

The Hitcher (1986)
Silva America SSD 1002
Robert Harmon, director

The Beast (1988)
A&M CD 3919
Kevin Reynolds, director

The Moderns (1988)
Virgin Movie Music 90922-2
Alan Rudolph, director

Love at Large (1990)
Virgin 91359-2
Alan Rudolph, director

Billy Bathgate (1991)
Milan 35611-2
Robert Benton, director

Little Man Tate (1991)
Varèse Sarabande VSD 53343
Jody Foster, director

A River Runs Through It (1992)
Milan 35631-2
Robert Redford, director

Cool World (1992)
Varèse Sarabande VSD 5382
Ralph Bakshi, director

Of Mice and Men (1992)
Varèse Sarabande VSD-5371
Gary Sinise, director

Fire in the Sky (1993)
Varèse Sarabande VSD 5417
Robert Lieberman, director

The Browning Version (1994)
Milan 35680-2
Mike Figgis, director

Nell (1994)
Fox 11023-2
Michael Apted, director

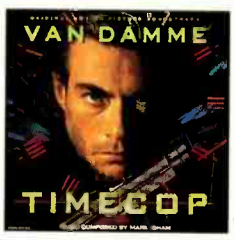
Quiz Show (1994)
Hollywood HR-62000-2
Robert Redford, director

Romeo Is Bleeding (1994)
Verve 314 521 231-2
Peter Medak, director

Timecop (1994)
Varèse Sarabande VSD 5532
Peter Hyams, director

Losing Isaiah (1995)
Columbia 67087
Stephen Gyllenhaal, director

Miami Rhapsody (1995)
Hollywood HR-62004-2
David Frankel, director



timecop

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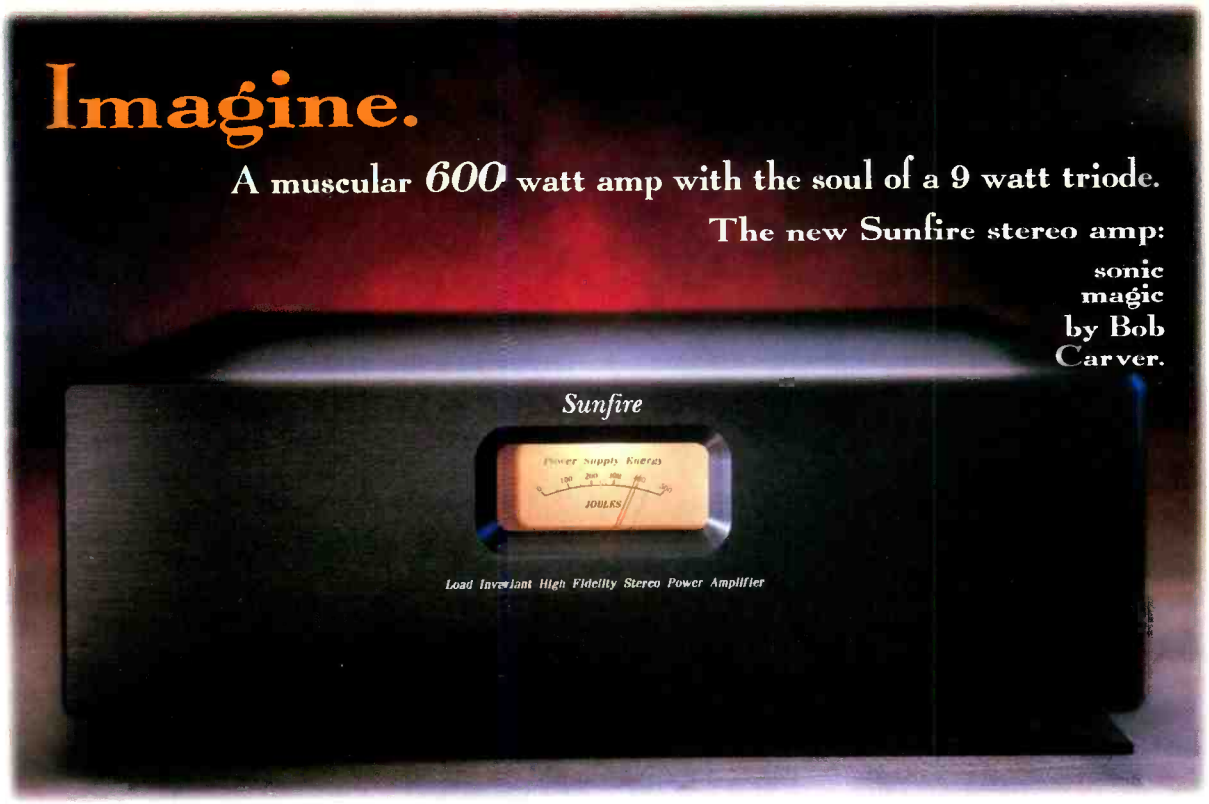
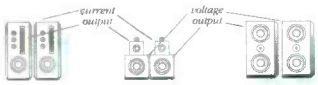
The new Sunfire stereo amp: sonic magic by Bob Carver.



It's not a 9 watt triode of course, and we wouldn't want it to be, but it does share a very important characteristic with one. It incorporates the current-source (high output impedance) property of a triode—the very property that is *the* dominant factor (perhaps ninety percent) of the sonic magic that makes listening to the classic vacuum tube amplifier so much fun. So when you choose our current-source output connections for your system, you'll have a sumptuous high end, and a midrange that positively glows. At the same time, the new **Sunfire Amplifier,** with its uncanny tracking downconverter, has the ability to raise goose bumps with its awesome power. Using 12 herculean International Rectifier Hexfets, it can drive *any* load to *any* rationally usable current or voltage level.



Choice of Outputs.

You can connect most speakers to the voltage-source output, with its near zero impedance, to experience the powerful dynamics and tight bass you've always wanted more of. Or let's say you own electrostatic, planar magnetic or ribbon speakers, then connecting the higher impedance current-source output can coax forth a sensuous, delicately detailed musical voice associated with low-powered classic tube amplifiers. Or if you're able to biwire, you may just arrive at the best possible interface: voltage output to woofer for incredible bass whack, current output to midrange and treble for a huge three-dimensional soundstage with detail retrieval so stunning that you will often hear musicians *breathing!* Each choice will reveal the delicate musical soul that complements this amp's astonishing muscle and control. And each will lead to a multilayered soundstage so deep and wide it will take your breath away.

Performance that's difficult to believe.

The basis for all this is designer Bob Carver's versatility. He's worked successfully for over 20 years with both tube and solid state designs, and he understands the intrinsic subtleties of each. For the new Sunfire, he insisted on an enormous 138 ampere peak-to-peak output current capability with 600 watts rms per channel continuously into 4 ohms and 2400 watts rms into 1 ohm on a time-limited basis*. Courtesy of 24 massive Motorola triple-diffused ouput devices, each capable of 20 amperes without taxing current reserves. Imagine all that in a single amp. Or better yet, visit a **Sunfire** dealer. That's where you'll hear for yourself how Bob Carver's **Sunfire Amplifier** makes it all come together.

Sunfire

...from the mind & soul of Bob Carver

Price $2,175

*F.T.C.: 300 watts continuous per channel, both channels driven into 8 ohms from 20 hz to 20 khz with no more than 0.5% THD

"If you are getting ready to spend more than $2,175 on an amplifier--don't-- at least not until you've given the Sunfire a listen. Highly recommended in the $2000 to $25,000 price class"

The Sensible Sound
Issue Number 54
SPRING 1995

For additional information on Sunfire, and especially the uncanny tracking downconverter, use the reader service card or write to Sunfire Corporation, PO Box 1589, Snohomish, WA 98290 • (206) 335-4748

CIRCLE NO. 18 ON READER SERVICE CARD

EQUIPMENT PROFILE

EDWARD J. FOSTER

LEXICON DC-1/THX A/V PREAMP/PROCESSOR

Lexicon's quarter-century history in digital audio doesn't seem long, until you realize that in 1971 the CD hadn't yet been launched and wouldn't be for more than a decade! How fast things change! How rapidly technology advances! (How old I'm getting!)

Lexicon and digital processing have been inseparably linked throughout the company's history, even back when gilded ears sneered at the supposed "missing audio" between samples. (Today, of course, almost everyone has come to admit that digital audio's near-perfect response uniformity, wide dynamic range, and low distortion outweigh its limitations—which, for the most part, are its absolute constraints in those very same characteristics).

The Lexicon DC-1/Basic provides all the functions of a "minimalist" line-stage preamplifier plus on-board D/A conversion for digital sources, video switching, an adjustable subwoofer crossover, and dual-zone operation. Like the Lexicon CP series of processors it replaces, however, the DC-1 also provides extensive, fully digital surround capabilities. First among these is the company's highly regarded, patented implementation of Dolby Pro Logic decoding, but most of the other processing options are directed at enhancement of two-channel music recordings. Two are ambience extraction modes: "Panorama," which is primarily for recordings made in a real acoustical environment, and "Music Logic," which is designed for a wide range of recordings, including studio-produced pop and rock. And there are four ambience simulation modes, labeled "Nightclub," "Concert Hall," "Church," and "Cathedral."

The DC-1 is also available in two other versions. The DC-1/THX adds Lucasfilm's Home THX Cinema and Lexicon's Logic 7 elaborations of Pro Logic decoding, a "Music Surround" mode, bass and treble controls, and true loudness compensation. As with the surround processing, all filter and equalization functions are performed digitally. At the top of the heap is the DC-1/AC-3, which includes all of the above plus Dolby Digital (AC-3) decoding (to which Home THX processing can be applied if desired), a "late-night" compression circuit, and a spectral-balance control. The basic version of the DC-1 can be upgraded to the THX version, which can, in turn, be upgraded to the AC-3 version, via plug-in modules in both cases. And until the end of August, you can even trade in Lexicon CP-series processors for credit on a new DC-1/AC-3. (Trade-in credit depends on the specific model and its condition but can range as high as $3,000 for a CP-3 Plus, which is two-thirds the price of the new Dolby Digital model.)

The model reviewed here is the THX version. Like the others, it has eight input selection choices, which actually control eight analog audio, four digital audio, and five video inputs. You can assign any digital-audio or video input to any selector button during setup, to customize the DC-1/THX's configuration. Three of the video inputs have S-video as well as composite-video connectors; the video outputs (one for a monitor, another for recording) also have both connections—as they must, since composite- and S-video signals are routed independently.

Stereo analog outputs are provided for recording and for feeding an auxiliary music system in another part of your home. These outputs can deliver only signals orig-

Dimensions: 17⅜ in. W x 3⅝ in. H x 11½ in. D (44 cm x 9.2 cm x 29.2 cm); with rack-mounting brackets, 19 in. W x 3½ in. H (48.3 cm x 8.9 cm).
Weight: 10½ lbs. (4.8 kg).
Price: DC-1/Basic, $1,995; DC-1/THX, $2,995; DC-1/AC-3, $4,500.
Company Address: 100 Beaver St., Waltham, Mass. 02154; 617/736-0300; lexicon@compuserve.com
For literature, circle No. 90

Photos: Michael Groen

inating at the eight analog inputs, but independent signal selection lets you hear and view one program while recording another or routing it to the second room. The same source feeds both the recording deck and the second zone, but the "Zone 2" output is adjustable in level whereas the recorder output is not. To prevent feedback when recording, the "Tape" and "VCR1" inputs are normally blocked from the "REC/Zone2" selector, but this can be changed during setup.

The gain of the analog input amplifier is adjustable, automatically or manually (using on-screen menus and "meters"), to match signal level to the conversion window of the 16-bit delta-sigma A/D converters. This enables you to optimize dynamic range over a wide range of analog input levels. It also lets you choose between digitized analog signals or raw digital signals from sources (such as most laserdiscs) that provide both. It's worth noting that the DC-1/THX's digital-audio "receiver" (input circuit) is followed by a 256f_s jitter-reduction circuit to minimize digital timing error. (In the DC-1/AC-3, the Dolby Digital decoder is connected here, with its six output bitstreams feeding the main signal processor.)

After signal processing, the digital audio bitstreams (as many as eight of them, depending on the processing mode) are converted back to analog by 20-bit delta-sigma D/A converters. These analog signals feed independent output-level control modules on their way to stereo pairs of front, side, and rear outputs, a center output, and a subwoofer output. The DC-1/THX creates the subwoofer output by summing the three front channels with the surround channels and by following the summation with a 24-dB/octave, Linkwitz-Riley low-pass filter.

LINEARITY ERROR IS SO LOW, THE PLOT MUST BE SEEN TO BE BELIEVED.

The DC-1/THX's four digital audio inputs—two coaxial, two optical (Toslink)—accept S/P DIF signals, the type delivered by consumer products. Except for the S-video and Toslink connections, all of the unit's signal jacks are gold-plated RCA types. On the rear panel with all these connectors are a miniature phone jack ("IR In"), to receive control impulses from an external infrared receiver, and a five-pin DIN connector ("PWR CTL"), to convey control signals to external devices. The control signals (which can be set to +5 or +12 volts by an internal jumper) are present on pin 3 whenever the DC-1/THX is active. The DC-1/THX can also be programmed to present a control signal at pin 5, to trigger such devices as motorized projection screens.

Although the DC-1/THX provides front-panel control of power, volume, and muting and direct access to the eight analog inputs as well as a way to program or bypass the ambience and surround modes, it's far easier to operate the unit from its remote. The menus the DC-1/THX can display on your TV screen show the control options in greater depth than is possible on the front panel's two-line display; on-screen, you can see most (if not all) of the choices at a glance.

As usual in complex products, menus are nested, in this case starting with four choices in the main menu. (The menu structure is easily grasped, thanks to the two-page "Quick Reference Guide" supplied.) The first option, "Display Adjust," permits you to toggle the front-panel display on and off and to adjust its contrast. It enables you to change the position of the on-screen menus and how long they stay on screen. It also lets you switch the display output from NTSC to PAL or SECAM video for use in foreign countries.

The second menu option, "Equalization," is used to adjust bass and treble levels and to activate loudness compensation. The amount of bass boost added by the loudness compensation varies with the volume setting, as is psychoacoustically correct.

The "Setup" menu enables virtually complete customization of the DC-1/THX. It has five submenus. The first of these, "Input CONFIG," lets you choose—independently for each analog audio source—whether the input amplifier gain is adjusted automatically or manually. (In "Manual," you can vary gain from –18 to +12 dB, to fit the A/D converter's window, using on-screen meters as a guide.) "Input CONFIG" also lets you rename inputs, associate a surround or ambience mode with an input, and associate any digital input connection and any video input with the input you're configuring. (For sources with both digital and analog outputs, using a

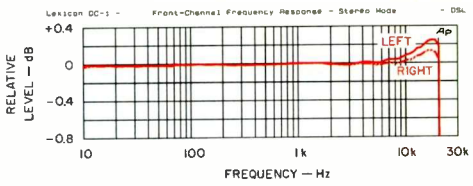


Fig. 1—Frequency response, stereo mode. Note expanded vertical scale.

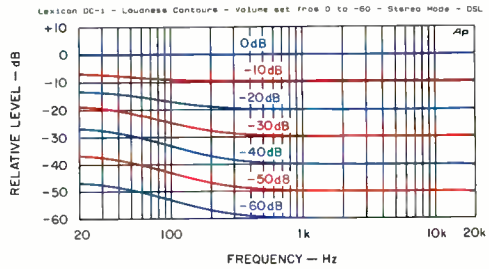


Fig. 2—Loudness contour.

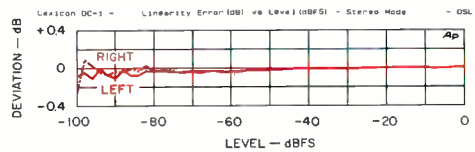


Fig. 3—Deviation from linearity. Note expanded vertical scale.

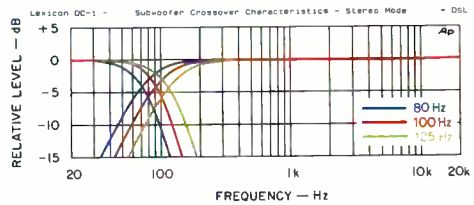


Fig. 4—Subwoofer crossover characteristics.

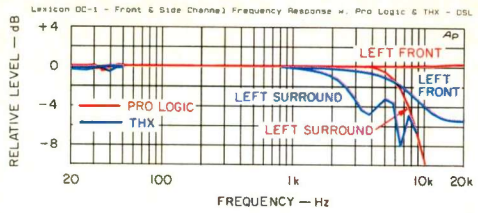


Fig. 5—Frequency response with surround processing.

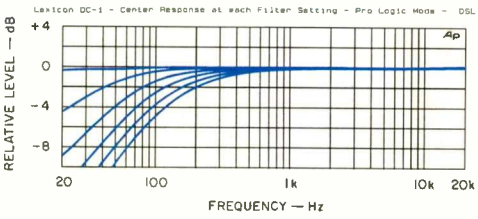


Fig. 6—Center-channel frequency and filter response.

digital input rather than analog bypasses both the source's D/A converter and the DC-1/THX's input amplifier and A/D converter, giving you a pure digital link between the source and the DC-1/THX's processing circuits.) And, as mentioned above, you can choose whether or not to block a given input from feeding the recording output, which will prevent feedback. Finally, you can select whether the trigger signal carried on pin 5 of the "PWR CTL" jack will be enabled when the input is chosen.

Another "Setup" submenu, "Speaker CONFIG," sets the system and its crossovers to match your speaker layout. With this menu, you can activate 12-dB/octave high-pass filtering in the front channels, select filter cutoff frequency (80, 100, or 125 Hz), and tell the DC-1/THX whether you are using a large or small center-channel speaker (or none at all). If you set the DC-1/THX for a small center speaker, center-channel bass is split off below a designated frequency. "Speaker CONFIG" sets the DC-1/THX to match your surround speakers, with options for standard, dipole, or no speakers at the sides and for one, two, or no speakers at the rear. When dipole side speakers are used (as recommended for Home THX), the DC-1/THX mutes the rear speakers whenever THX processing is used. And for any side speakers, you have a choice of high-pass filtering the signals fed to them (at 80, 100, or 125 Hz) or turning the filter off. Rear speakers, if any, receive decorrelated or stereo signals (depending on the source) unless you've told the DC-1/THX there is only one rear speaker, in which case the rear outputs are summed to mono and appear at the left rear output jack. The high-pass filters for the rear speakers work at the same frequencies as those for the side speakers and are also defeatable. "Speaker CONFIG" is also used to select the subwoofer channel's crossover point (80, 100, or 125 Hz). You can defeat the low-pass filter if your subwoofer has an internal crossover, but Lexicon recommends against this.

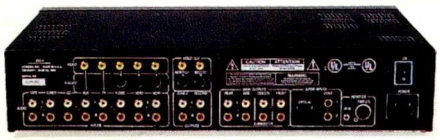
With the next "Setup" submenu, "Output Levels," you can customize muting (to drop volume by 10, 20, 30, or 40 dB or silence the output completely) and power-on volume (which can be the last level used or a fixed level from –80 to +12 dB). It also lets you opt to use the DC-1/THX's own noise generator or an external noise source for balancing the outputs, which is achieved by adjusting each channel's level over a range of –10 to +10 dB, in 0.5-dB steps.

The "Listener Position" submenu under "Setup" sets the rear- and center-channel delays and lets you calibrate the "Panorama" effect. Rear delay, adjustable from 15 to 30 milliseconds in 1-millisecond steps, is for surround modes that don't have their own surround-channel delay settings. Center delay, adjustable from –5 to +9.5 milliseconds, in 0.5-millisecond steps, corrects for any difference between the path lengths from your ears to your center speaker and from your ears to your main speakers.

"Panorama," a feature of Lexicon processors for some years now, is designed to extract ambience from recordings and to move sound outward from the speakers, adding a sense of spaciousness. It works by delaying, inverting, and crossfeeding signals between the two front channels in order to cancel sound from the left speaker as it reaches the right ear (and vice versa), so that each ear receives sound almost entirely from the speaker nearer to it. "Panorama" must be calibrated in your home, because its effectiveness is highly dependent on the main loudspeakers' positions, the room, and the listening position. The DC-1/THX has a special internal noise generator for this calibration, and detailed "Panorama" setup procedures are provided in the excellent owner's manual.

The final "Setup" submenu, "Lock Settings," does more than let you protect the choices you've made: It lets you set the DC-1/THX's display to show any name or message, up to 20 characters long, at turn-on.

The "Effect Adjust" menu enables you to modify the parameters of the DC-1/THX's seven music modes ("Panorama," "Nightclub," "Concert Hall," "Church," "Cathedral," "Music Surround," and "Music Logic"), five movie modes ("TV Matrix," "Logic 7," "Mono Logic," "Pro Logic," and "THX Cinema"), and two stereo modes ("Party" and "Two Channel"). Although the purpose of many of these should be obvious from their names, a few bear explanation. The owner's manual states that the "TV Matrix" effect adds surround "for television viewing of monaural, stereo and stereo synthesized programs." The "Logic 7" mode is said to reproduce "musical material with maximum separation at all



REMARKABLY, THE DC-1/THX MEASURED NEARLY AS WELL IN DOLBY PRO LOGIC AS IN STRAIGHT STEREO.

times, whether or not directional material is being steered," and to use "intelligent steering to extract wide bandwidth stereo surround channels." And if your system has both side and rear speaker pairs, Lexicon says this mode can steer signals between the side and rear surround speakers on either side of the room. "Logic 7" is the only Dolby Surround mode that can use all eight of the DC-1/THX's channels. The "Mono Logic" effect, designed for monaural soundtracks, "sends music and sound ef-

MEASURED DATA

All data taken from analog input to analog output

Maximum Gain, Stereo Mode: 9.83 dB.

Output at Clipping, Stereo Mode: 6.79 V.

Output at Clipping, Pro Logic Mode: Main channels, 6.55 V; center channel, 9.02 V; surround channel, more than 6.83 V.

Input Clipping: 0.556 to 8.88 V.

Frequency Response, Stereo Mode: 20 Hz to 20 kHz, +0.25, –0.03 dB.

Frequency Response, Pro Logic Mode: Main, 20 Hz to 20 kHz, +0.22, –0.32 dB; center (wide mode), 20 Hz to 20 kHz, +0.08, –0.32 dB; surround, below 20 Hz to 7 kHz, +0, –3 dB.

Tone-Control Range: Bass, ±5.5 dB at 50 Hz; treble, +5.9, –5.8 dB at 10 kHz.

Loudness Contour: With volume at –40 dB or lower, +13 dB at 20 Hz.

THD + N at 2 V Out, Stereo Mode: 0.0062%, 30 Hz to 20 kHz.

THD + N at 2 V Out, Pro Logic Mode: Main, 0.1%, 20 Hz to 20 kHz; center, 0.05%, 20 Hz to 20 kHz; surround, 0.003%, 85 Hz to 7 kHz.

THD + N vs. Level: –100 to 0 dBFS, –85.3 dBFS; –100 to –10 dBFS, –91.8 dBFS.

Linearity Error, –90 to 0 dBFS: Less than 0.1 dB.

A-Weighted Noise, Stereo Mode: –94.7 dBFS.

A-Weighted Noise, Pro Logic Mode: Main, –94.9 dBFS; center, –95.2 dBFS; surround, –97.7 dBFS.

Dynamic Range: Unweighted, 92.1 dB; A-weighted, 95.0 dB.

Quantization Noise: –91.6 dBFS.

Subwoofer Crossover: –3 dB at 64, 84, or 103 Hz; –6 dB at 80, 102, or 129 Hz; slope, 24 dB/octave.

Separation at 1 kHz, Pro Logic Mode: Right main to left main, 84.4 dB; main to surround, 84.6 dB or better; center to surround, better than 60 dB; main to center, 84.2 dB; center to main, 49.7 dB or better; surround to main, 44.9 dB or better.

Impedance: Input, 81 kilohms; output, 100 ohms.

fects to the sides and rear through a room simulator mode while keeping the dialog in the center." The "Party" effect just passes unprocessed stereo signals to all speakers in your system, "for background music or for maximum acoustical output." And "Two Channel" is simply Lexi-speak for stereo.

Even more impressive than the sheer number of the DC-1/THX's effects are the ways you can customize them. Exactly what can be done depends on the specific effect. For example, Lexicon's "Church" and "Cathedral" modes not only offer a choice of hall sizes but also let you adjust midrange reverberation time and its ratio to bass reverb time. You can adjust the delay between the direct sound and the onset of reverberation and set the point where high-frequency rolloff (which mimics air absorption) cuts in. You can activate or defeat a "Speech Detect" circuit "that distinguishes monaural speech from other inputs. . .[and] turns down the effect to make speech clearer." Finally, you can control center-channel, sub-bass boost, and effect levels.

Measurements

I confined bench tests to the analog audio inputs, reasoning that exploring these in depth would fill my plate and that performance from the digital inputs would have to be at least as good. Except for Dolby Pro Logic and Home THX measurements, I did all testing in stereo mode since effects are best judged by ear rather than by instrument. (The left and right channels behaved so similarly that the reported results are mostly for the left channel, which was usually the poorer of the two.)

For the stereo tests, I set up the DC-1/THX for a system with no subwoofers and no center, side, or rear speakers. I did most of the testing using the default ("0") setting for input amplifier gain. With this setting, the A/D converter reached clipping (which I define as 1% THD) with a 2.2-volt input; with volume fully advanced, gain to the main outputs was 9.83 dB. This corresponds to an output of 6.8 volts, far more than adequate. By varying input amplifier gain manually, I could move the clipping point up to 8.88 volts or increase the DC-1/THX's overall gain so that clipping occurred at 556 millivolts. Obviously, the A/D window can be optimized for any input signal the DC-1/THX is likely to encounter.

Frequency response in stereo (Fig. 1) is excellent, pretty much flat from below 10 Hz to just above 20 kHz; the channel balance is almost perfect. I used a greatly expanded (sensitive) vertical scale here, so you can see the minor anomalies that do exist.

Figure 2 shows a family of response curves taken with the loudness contour engaged. As you can see, as volume is lowered, relative bass response starts to rise. With the –10 dB setting, response is up 2.7 dB at 20 Hz; it rises to its maximum, +13 dB at 20 Hz, with volume settings of –40 dB and below. This is the way loudness contours *should* function, but few do. Note also that the DC-1/THX's volume control is very precisely calibrated; when you drop the setting by an indicated 10 dB, gain decreases by precisely that amount.

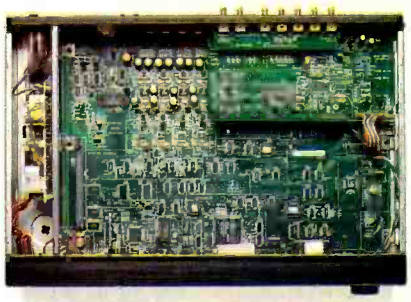
The curves for the DC-1/THX's tone-control action (not shown) were classic and extraordinarily symmetrical. There wasn't much boost or cut, only about ±6 dB at 20 Hz on the bass and at 20 kHz on the treble, but since I don't like excessive boost or cut, I find this range perfectly adequate. And I liked the fact that both controls had "shelving" characteristics, i.e., the boost and cut stayed constant (within a dB or less) from 10 to 100 Hz in the bass and from 5 to 20 kHz in the treble.

I measured total harmonic distortion plus noise (THD + N) for analog input and output, which passes signals through the A/D and D/A converters. In stereo, the Lexicon's THD + N versus frequency, at 0 dBFS, was less than 0.0062% from 30 Hz to 20 kHz. There was a small "kickup," to about 0.0107%, around 25 Hz. At 1 kHz, THD + N versus level started out at –85.3 dBFS at 0 dBFS, quickly dropped to –91.8 dBFS at –10 dBFS, and remained there down to –100 dBFS.

Linearity error, which is related to THD + N versus level, is shown in Fig. 3. I am presenting this graph not because the wiggles are significant, but because the linearity error is so low, it has to be seen to be believed. Note the extremely sensitive vertical scale I've used, which allows you to see that the maximum error is less than 0.1 dB from 0 to –90 dBFS! Mind you, this is through *both* the A/D and D/A converters, not just the D/A alone.

Subwoofer crossover characteristics are shown in Fig. 4. During setup, you can in-

dependently choose the high-pass frequency to the main front speakers and the low-pass frequency to the subwoofer. I plotted response separately for each setting and grouped them in pairs for each crossover frequency. (In other words, I paired main-channel high-pass set at 80 Hz with subwoofer low-pass set at 80 Hz, etc. Just remember, you can mix and match freely with the DC-1/THX and not use the particular combinations I did.) Suffice it to say, the –6 dB points of the subwoofer low-pass filter correspond well with their nominal frequencies (see "Measured Data"), and the slope reaches 24 dB/octave.



THE DC-1/THX'S SURROUND WAS THE CLEANEST AND MOST REALISTIC I'VE HEARD.

Since this is a digital system, I measured its A-weighted noise referenced to 0 dBFS rather than to a specific output voltage. This seemed to make a lot more sense, because the noise level varied with volume setting but maintained a fairly constant relationship to the 0-dBFS benchmark. I concluded that the DC-1/THX's noise floor was established by its converters, not by its analog input and output electronics. Third-octave spectrum analysis (not shown) confirmed the issue, as the noise within the audio band was essentially "white" and free of power-line-related components. The A-weighted noise—including the A/D *and* the D/A converters!—measured –94.7 dBFS in stereo, which I consider outstanding. Quantization noise (which fully exercises both converters) was equally impressive, and dynamic range was excellent.

One of the DC-1/THX's most remarkable aspects is that its performance on the test bench was nearly as good in Dolby Pro Logic mode as in simple stereo! And the A-weighted noise was, if anything, lower in Pro Logic mode than in stereo. (The differences were too small to be meaningful, however, and may have been due to slight differences in bandwidth. That's especially true for the surround channel.)

The Lexicon's THD + N in Dolby Pro Logic was remarkably low, especially in the surround channel. In fact, THD + N was generally better than the results in "Measured Data" indicate. Over most of the frequency range, for example, THD + N in the main channels was less than 0.05% and in the center channel was usually less than 0.01%! Clearly, Lexicon's digital approach to Pro Logic decoding performs exceedingly well in this regard.

With Dolby Pro Logic and Home THX processing, frequency response (Fig. 5) is likewise exceptionally good. This figure shows response curves taken with Pro Logic alone and with THX re-equalization and side-channel timbre matching. Figure 6 shows the center channel's response with Pro Logic processing, "straight" and with each choice of high-pass filter (35, 60, 90, 115, and 145 Hz).

Steady-state channel separation (at 1 kHz) with Pro Logic processing ranged from a low of about 45 dB (between surround and main channels) to approximately 85 dB (between main and surround, main and center, and the two main channels themselves). For the record, input impedance was unusually high and output impedance very low, so the Lexicon should interface well with any component.

Use and Listening Tests

I set up the Lexicon DC-1/THX in my listening room and then in my home theater. But despite hours of listening spread out over many days, I can't say that I've explored every nuance of this unusually flexible product.

For music, I was particularly intrigued by the DC-1/THX's "Panorama" option. Although the idea of delaying, inverting, and crossfeeding signals to cancel sound from the left speaker as it reaches the right ear (and vice versa) isn't new, it has always fascinated me. Because this technique should, in theory, work best on recordings made using a simple microphone setup, I used DATs that I recorded myself with several such setups. Most of these tapes were of solo piano, but I also included a piano quartet and a tape of the Berkeley Chamber Orchestra with soprano Leslie Culver Casson.

Not surprisingly, I found that "Panorama" processing worked best with speakers that image well. And it produced a greater sense of ambience, making the sound much more spacious and giving it greater "wrap." However, on solo piano music, the wrap-around made me feel as if I were inside the instrument rather than having it on a stage in front of me. I found this somewhat disconcerting, but a pianist friend (the soloist on some of my recordings) consistently preferred "Panorama" to straight stereo, describing it as "fuller," "more resonant," and "more focused." This may be because I listen from the audience, she from the piano bench.

I was more comfortable using "Panorama" with the quartet and chamber orchestra recordings, although even here I felt I was sacrificing image precision for the greater sense of ambience. Casson's voice was more amorphous with "Panorama" processing than without it. On the other hand, the processing helped me "hear through" the strings (too prominent, on this recording) to the piano. So the overall musical effect was arguably better with the processed signal.

Of course, I listened to more than my own recordings and to more of the DC-1/THX's processing options than "Panorama." As usual, the factory settings for most of the music surround effects struck me as too aggressive: "Concert Hall" sounded more like a church, "Church" like a cathedral, and "Cathedral" like Carlsbad Cavern. Fortunately, you can revamp Lexicon's settings to your heart's content. It wasn't long before I had "Concert Hall" sounding pretty much the way I think a concert hall should sound—mainly by reducing "Hall Size" and "Effect Level" settings, taking "Liveness" down a tad, and (for some recordings) raising "Center Level" slightly to tighten the focus. (These are not meant to be guidelines for your experimentation, merely a recitation of what I liked.)

Continued on page 52

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EQUIPMENT **PROFILE**

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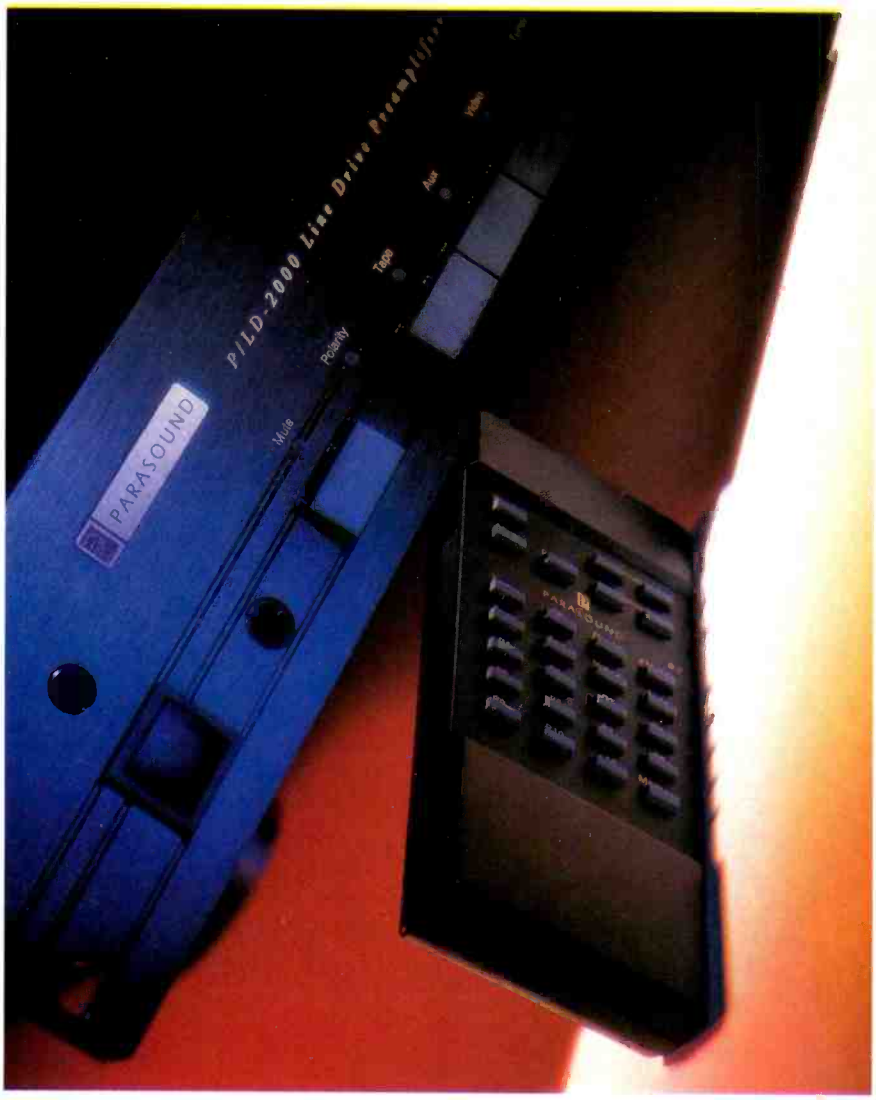
PARASOUND P/LD-2000 PREAMPLIFIER



The P/LD-2000, the top model in Parasound's preamp line, was designed by the talented John Curl. Six unbalanced high-level inputs are accommodated, one of them a "Direct" input with a choice of balanced or unbalanced connections. This input, especially in its unbalanced mode, has a shorter, less complicated signal path and therefore is the preferred input for the most serious listening. The P/LD-2000 has one balanced and two unbalanced outputs. One of the unbalanced outputs has fixed polarity; the polarity of the other (and of the balanced output connector) is switchable.

The supplied remote duplicates all front-panel functions except balance; it also has a switch for output polarity (not found on the front panel) and controls for other Parasound components. Remote volume control is handled by a servomotor that powers a four-gang Alps potentiometer.

The front panel carries a remote-control sensor; a headphone jack; pushbuttons for power, muting, and source selection (with "Direct" set apart from the other five inputs); and knobs for volume and balance. Just above each pushbutton is an LED indicator, while another LED shows the status of the polarity switch. An LED on the volume knob indicates the knob's position; this LED also blinks while the power-on delay circuit is operating and when the muting is switched on.

On the rear panel are the input and output connectors, a jack for an infrared repeater system, and an IEC AC power cord socket. Balanced or unbalanced "Direct" input is chosen via a pair of toggle switches set between the input jacks the switches select. Small diagrams show the pin numbers and associated signal polarities for the balanced input and output XLR connectors; it's a nice touch.

PARASOUND'S P/LD-2000 IS BIG FOR A PREAMP, YET ITS INTERIOR IS CRAMMED WITH CIRCUITRY.

The P/LD-2000 is a dual-mono design, whose two channels share only a power cord and a power transformer. Surprisingly, although the Parasound is rather large for a preamp, its interior is crammed with circuitry. A large board, taking up about 60% of the interior, carries the circuitry for the power supply, signal-switching control, and volume-control motor drive. Most of the remaining space is taken up by the signal circuitry, on two stacked p.c. boards that also hold the signal-switching relays and the phono connectors (the XLR jacks connect to the boards via plugs). Two large heat

Dimensions: 19 in. W x 3½ in. H x 15¾ in. D (48.3 cm x 8.9 cm x 40 cm); with feet, 4⅛ in. H (10.5 cm).
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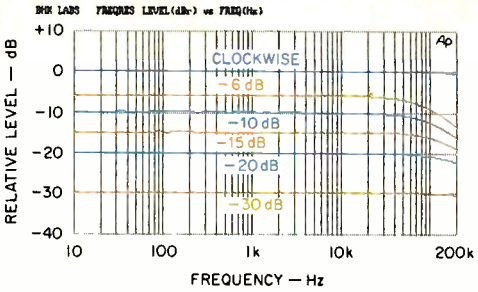

Fig. 1—Frequency response vs. volume setting.

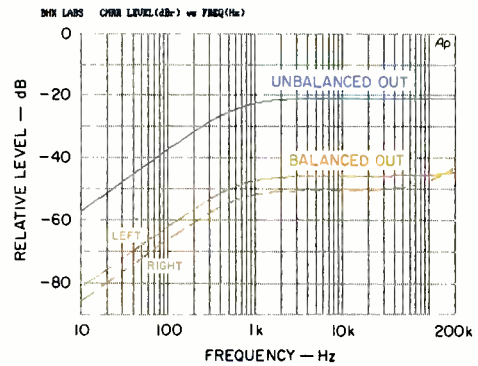

Fig. 2—Common-mode rejection ratio.

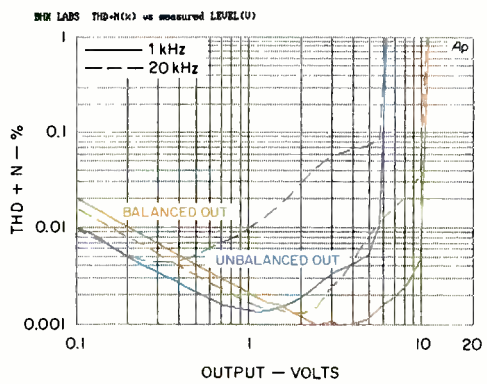

Fig. 3—THD + N vs. output level.

sinks on each of these boards carry the output transistors for the two signal output phases. Four shielded cables per channel connect the signal boards, at the rear of the preamp, to the volume- and balance-control subassembly, at the front.

Quantities of film bypass capacitors were in evidence. The overall parts quality of the P/LD-2000 appeared to be of suitably high order. Construction quality was adequate and appropriate but not particularly elegant.

Circuit Highlights

The signal path for each of the five regular unbalanced inputs passes through a separate switching relay. The collected output of these relays feeds one input to the "Direct" switching relay. The other input to this relay comes from a three-pole, two-position toggle switch that selects between the balanced and unbalanced "Direct" input jacks.

From here on, everything is fully balanced, including the volume and balance controls. This is the preferred—but not the usual—way to handle balanced signals. Both signal phases out of the "Direct" switching relay pass into these controls; if an unbalanced source is selected, the negative signal phase is grounded through a 100-ohm resistor.

The outputs of the volume and balance control feed the line amplifier section, whose input stage is a complementary cascode differential circuit using J-FETs and bipolar transistors. These devices have fat, low-resistance signal paths for low noise. Each output phase of this stage is direct-coupled into a complementary common-emitter second stage. The second stage's outputs are directly coupled into the output stages, which are MOS-FET devices acting as source followers. Overall balanced negative feedback is taken back to the input stage's J-FET source circuitry. A servo circuit, consisting of three op-amps per channel, is designed to maintain low differential DC offset between output phases and between each phase and ground. A low-impedance, 6-dB attenuator is switched into the output circuit when the "Direct" input is set to balanced mode. This achieves identical overall gain for both all-balanced and all-unbalanced operation.

Measurements

With unbalanced input and output, the P/LD-2000's gain averaged 20.2 dB for the two channels, yielding a sensitivity of 48.7 millivolts. With balanced input and output, gain was 0.6 dB higher and sensitivity a few millivolts lower. When I used the unbalanced "Direct" input and balanced output, gain was 26 dB and sensitivity was 25.1 millivolts. Under all these conditions, the channels matched within 0.1 dB. But when I used the balanced input with unbalanced output, the difference between channels increased a little, and the degree of that difference changed with output polarity. For normal polarity, gain was 14.49 dB in the left channel and 14.53 in the right, which translates to sensitivity measurements of 94.3 and 93.8 millivolts, respectively. With polarity inverted, the gain was just slightly higher and the difference between channels was a little greater, 0.4 dB. When I measured from the AUX unbalanced inputs to the tape outputs, gain was –0.4 dB and sensitivity was 521 millivolts (the tape outputs cannot be fed from the "Direct" inputs).

Overall polarity was noninverting under all input/output conditions unless inverted polarity was selected.

Frequency response varied with the volume control's setting, as seen in Fig. 1. The results were essentially the same for all input/output conditions. With the volume control turned down by 6 dB, its worst-case position, bandwidth is reduced to about 90 kHz, corresponding to rise and fall times of about 4 microseconds. With the volume control fully up, the circuit was extremely fast: Its rise time was about 200 nanoseconds, corresponding to a bandwidth of some 1.75 MHz! These results are for instrument loading (100 kilohms plus 400 pF); IHF loading (10 kilohms plus 1,000 pF) reduced the response at 200 kHz by 1 dB, for rise and fall times of some 800 nanoseconds and a bandwidth of about 430 kHz. Low-frequency response was quite extended, and 10-Hz square waves had no tilt.

Common-mode rejection ratio (CMRR) is shown in Fig. 2. The behavior of the two channels, essentially identical with unbalanced output, differs in the balanced output mode. Output polarity had a negligible effect here.

Figure 3 shows total harmonic distortion plus noise (THD + N) versus level, with balanced input and 600-ohm loading. Performance of the two channels matched closely, so only left-channel data is presented. You can see that the level attainable before clipping is higher with balanced output than with unbalanced output; this is an effect of the output attenuation circuit mentioned earlier. You can also see that high-frequency distortion is lower in the balanced output mode. (This also held true

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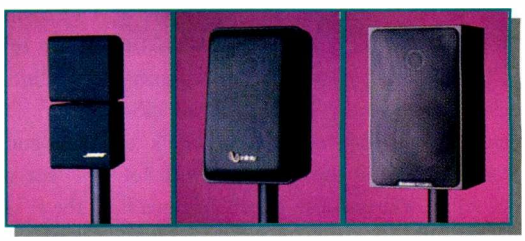

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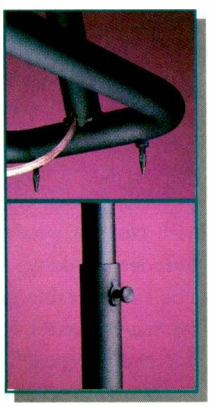

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for unbalanced input.) Distortion with balanced input is down in the noise, 0.001% or less, at output levels up to 1 volt. Clipping points were slightly higher with instrument or IHF loading.

Although the P/LD-2000 is a dual-mono design, there is opportunity for crosstalk in

FULLY BALANCED DESIGN, AS USED HERE, IS THE PREFERRED WAY TO HANDLE BALANCED SIGNALS.

the balance and volume-control circuitry, where both channels' signal paths are close together. I therefore measured crosstalk for most input/output combinations, with volume at maximum and at –20 dB. In general, with the volume control fully up, crosstalk was –100 dB or better at frequencies up to 20 kHz. With the volume control 20 dB down (more typical of normal use), crosstalk varied for the different input/output conditions and measurement directions. Even so, it was still better than –80 dB at 20 kHz for the worst-case condition, unbalanced input and output.

I tested the preamp's output noise for the various input/output conditions at minimum and maximum volume settings and at the worst-case setting (usually about –6 dB). Unbalanced inputs were terminated with 1 kilohm, whereas balanced inputs were terminated with 600 ohms per phase. The two channels' noise performance matched very closely. Output noise levels in the frequency range of 400 Hz to 20 kHz were very low, 5 to 10 microvolts for volume full up or down and 15 to 35 microvolts for the worst-case volume setting. The IHF signal-to-noise ratio was 89 dB for balanced input and output or for unbalanced input and output. For balanced input and unbalanced output, S/N was 93 dB; it was 86 dB for unbalanced in and balanced out.

The P/LD-2000 preamp's input impedance at 1 kHz was slightly higher in the right channel than in the left. For the balanced "Direct" inputs, impedance was 57.3 kilohms in the left channel and 58 kilohms in the right. For the unbalanced "Direct" inputs, it was 28 and 29.9 kilohms for left and right; at the unbalanced AUX inputs, the results were 22.5 and 22.9 kilohms. Output impedance varied considerably for the various input/output conditions, ranging from a low of about 150 ohms (for balanced input and unbalanced output) to a high of 600 ohms (for unbalanced input and balanced output).

The DC offset was less than 1 millivolt in the right channel under all conditions. For the left channel, it varied with condition: For the unbalanced "Direct" inputs it was –3 millivolts with normal polarity and +4.1 millivolts with inverted polarity. For the balanced "Direct" inputs, offset measured –1.5 millivolts with normal polarity and +2.3 millivolts with inverted polarity. The AC line draw was about 200 milliamperes.

Use and Listening Tests

For my first serious sonic evaluation of the P/LD-2000, I hooked up this preamplifier to the output of a Sonic Frontiers SFD-2 MKII D/A converter, which I fed through a Genesis Digital Lens anti-jitter device. The sound was very alive and detailed with the P/LD-2000 in the system and conveyed an excellent sense of recordings' acoustic space. On the other hand, some CDs that sound a bit edgy and irritating sounded a bit more so with the P/LD-2000. Overall, however, the more I used the Parasound, the more I liked it.

Other signal sources likewise sounded very fine with the P/LD-2000. Vinyl records (for which I use a Vendetta Research SCP-2C moving-coil phono preamp, also designed by John Curl) sounded particularly good.

Functionally, the Parasound preamp performed without a hitch except for the remote, which worked poorly in my lab but was fine in my listening room. It would be nice to have the balance-control function available on the remote, however.

The P/LD-2000 delivers a fine combination of performance and versatility. It's a very good-sounding preamplifier that should appeal particularly to those who need to combine balanced and unbalanced connections. A

LEXICON, *continued from page 46*

On the whole, I found Lexicon's ambience processing to be in a class by itself. It was far more realistic than the ersatz processing prevalent in home theater products that are just trying to get extra mileage out of their DSPs. Lexicon's reverb was dense and full, and it decayed naturally. It didn't twing and twang like an electronic spring or collapse into a grainy quagmire. I'm sure Lexicon's professional systems are even better (most recording studios use them), but this one's got to be of at least semi-professional caliber.

I also found the "Mono Logic" mode far more useful than I would have imagined. According to the manual, it "takes a monaural soundtrack and sends music and sound effects to the sides and rear through a room simulator mode while keeping the dialog in the center." I must say I cast a jaundiced eye on that statement. Distinguishing between dialog and sound effects in a monaural track is, shall we say, problematic. But, whatever the DC-1/THX does, it seems to work.

I recently got the *Victory at Sea* series on videotape. This 26-part series appeared on television in the early '50s, won many awards, and, obviously, was recorded in mono. While the "Mono Logic" mode did not turn this sow's ear into a silk purse, it did provide a greater sense of envelopment. I was far more engaged in the action when "Mono Logic" was on than when it was off. It's a form of pseudo-stereo, and such systems usually leave me cold. But, for whatever reason, Lexicon's processing is far more believable than any I can remember hearing heretofore.

Finally, there's the DC-1/THX as a Pro Logic decoder. It was outstanding, especially with THX enhancement. It was the cleanest decoder I've heard and, arguably, the most realistic. Its ability to re-create a sense of height as well as width, depth, and surround was uncanny. I've referred to the "morale-boosting" scene in *Crimson Tide* before, and I turn to it again, this time not so much for the sound of raindrops on Gene Hackman's umbrella (which are still not as distinct as with Dolby Digital) but for the sound of thunder breaking overhead and to the sides. Unbelievably good. Over and over as I watched movies, I said to myself: "This. . .is. . .*really. . .good!*" A

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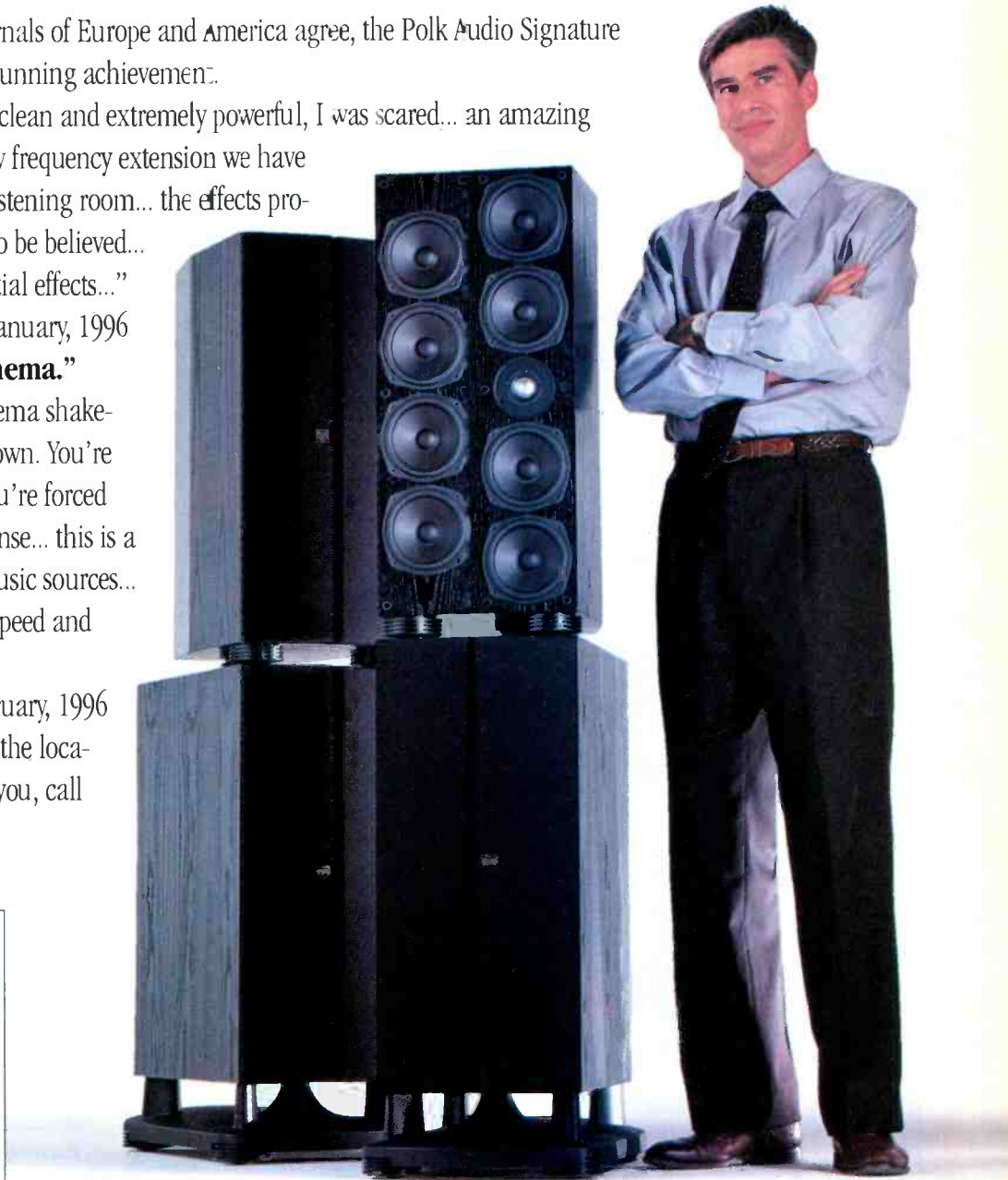

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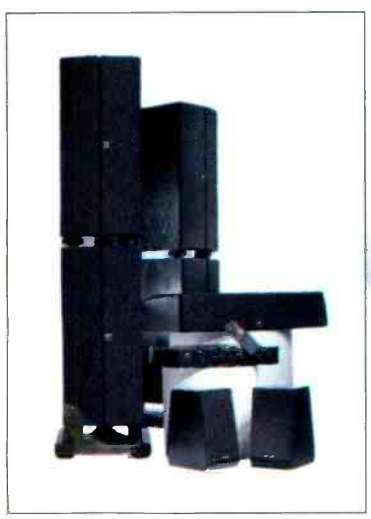

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EQUIPMENT PROFILE

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PLATINUM AUDIO DUO SPEAKER

What do Leo Fender, James Jamerson, and Jim Martini have in common? They are all heroes of Phil Jones, Platinum Audio's founder and chief designer. You may know about Leo Fender, of Fender Musical Instruments fame, who in the '50s popularized the electric bass guitar and manufactured such classics as the Telecaster, the Stratocaster, and the Precision Bass. But who the heck are the other two? James Jamerson was Motown's great house bass man who played on The Supremes' "Stop! In the Name of Love" and Marvin Gaye's "Ain't That Peculiar," among many other megahits. Jim Martini is much better known as James B. Lansing, who worked for Western Electric and later founded JBL Sound.

While growing up in London, Jones learned to play bass guitar. Lusting after a Fender Precision Bass but unable to afford one, he built his own copy—fretless, because he didn't know how to determine fret placement. At 15, he played in several rock bands and was heavily influenced by Jamerson's bass work. Later, after constructing his own '60s-style "high-end" audio system from old Western Electric/James B. Lansing components, Jones started a company that rented public-address systems (using all his own speaker designs) and went on to build and operate his own recording studio in the early '80s.

In 1987, Jones and a partner founded speaker company Acoustic Energy (not to be confused with the Energy brand of speakers from Canada's Audio Products International). He subsequently moved to the United States and worked for Boston Acoustics before starting Platinum Audio, Ltd., in 1994.

The Duo is third down in Platinum Audio's Listening Room (LR) series of loudspeakers, priced from $2,498 to $5,995 per pair. The Duo is relatively small and was designed to be placed on a stand. Among the design goals were high accuracy and extended bass response so that the Duo, despite its size, would be suitable as a full-range system in medium-size or small rooms. The Duo has two woofers and one tweeter, designed and manufactured by Platinum Audio. The drivers are arrayed vertically, with the tweeter between the two woofers—i.e., in a D'Appolito configuration. Although you would think this is a two-way system, it can be considered a two-and-a-half-way: Both woofers operate in

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Rated Sensitivity: 86 dB at 1 watt/1 meter.
Rated Impedance: 4 ohms, nominal.
Recommended Amplifier Power: 100 to 250 watts per channel.
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Photos: Michael Groen

parallel at low frequencies, whereas only the top woofer operates up to the 2.5-kHz crossover.

The Duo's cabinet is nearly three times higher than it is wide. This gives it a tall, thin look, quite unlike other stand-mounted speakers. My review samples' tops and bottoms were made of glossy, piano-black acrylic; the sides and rear were finished in semigloss ebony veneer. (High-gloss finishes should be available later this year.)

On the Duo's rear is a 12 x 6-inch, cast-aluminum plate that contains the flared openings of two port tubes. Also here is a set of gold-plated, double-banana input connectors, which can handle cable up to 0.2 inch in diameter (AWG No. 6). This speaker can be bi-wired; straps are provided for use if you choose not to do this. A large part of the backplate looks like a finned heat-sink assembly, similar to what you find on many power amplifiers. Despite appearances, there is no amplifier inside; the assembly dissipates heat from the crossover's resistors. (Platinum Audio says a future speaker may contain an amplifier.)

PLATINUM AUDIO'S DUOS HAVE SUPERB LOOKS AND HIGH PERFORMANCE THAT BELIES THEIR SMALL SIZE.

The rigid backplate also serves to strengthen the Duo's rear panel. The cabinet itself is strengthened by an inch-thick internal shelf, which divides the cabinet into two unequal chambers. A large hole in the shelf allows the chambers to communicate acoustically so that the vented box operates properly. The two port tubes, each 1¾ inches in diameter and 6 inches long, are molded into the cast backplate and tune the cabinet to approximately 40 Hz. The flaring of the tubes is intended to minimize air turbulence and wind noise. All interior cabinet surfaces are covered with damping pads, made of a proprietary material, to help minimize panel resonances.

The Duo's long-throw, 5-inch woofers incorporate an aluminum cone and a conical aluminum dustcap that Platinum Audio calls a phase plug. The metal diaphragm acts as a heat sink for the voice coil and is designed to allow pure rigid-piston operation throughout the woofers' operating range. The surround is butyl rubber.

The speaker's 1-inch tweeter has a one-piece aluminum dome and voice-coil form, held with a butyl rubber surround. The voice coil is cooled with magnetic fluid. The front of the dome is covered with a plastic lens assembly, which is said to improve the tweeter's frequency response and dispersion. The rear of the tweeter is covered by a disc made of a high-mass, carbon-loaded elastomer. The disc, 2½ inches in diameter and about ⅜ inch thick, is said to provide mechanical damping and to absorb undesirable "micro resonances" in the magnet structure.

The crossover network contains 13 components: three resistors, six capacitors, and four inductors (two small ferrite-core devices in the tweeter circuit and two iron-laminate-core devices in the woofer circuit). The network is attached to a piece of fiberboard, mounted to the rear (inside) of the cast backplate, and is hand-wired, point to point (no p.c. board). The resistors are on the opposite side of the fiberboard, against the cast metal backplate, to provide heat dissipation. Electrically, the crossover provides a 6-dB/octave rolloff for the lower woofer (commencing at about 250 Hz), a 12-dB/octave low-pass for the upper woofer (at 2.5 kHz), and a sharp, 30-dB/octave high-pass for the tweeter (at 2.5 kHz). A series resistor-capacitor network is used in parallel with the lower woofer for impedance compensation.

The Duo's grille, made from expanded metal and covered with thin, black foam, fits into grooves along the speaker cabinet's front edge. Platinum Audio states in the owner's manual that "The speaker has a user non-removable grille which is engineered to be essential to the sound of the speaker. . . .Removal of this grille by anyone other than authorized service personnel risks voiding the warranty." And a warning sheet, included in the Duo's packaging, states in large, bold type: "At-

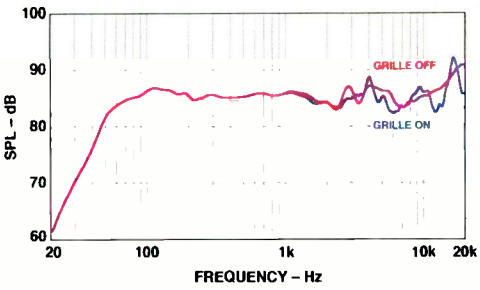


Fig. 1—On-axis frequency response.

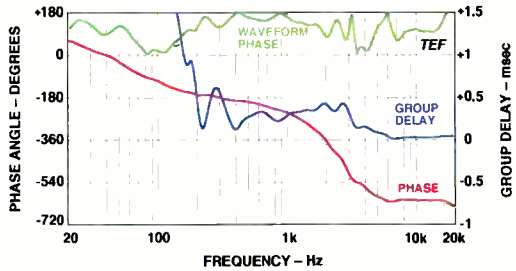


Fig. 2—On-axis phase response, group delay, and waveform phase.

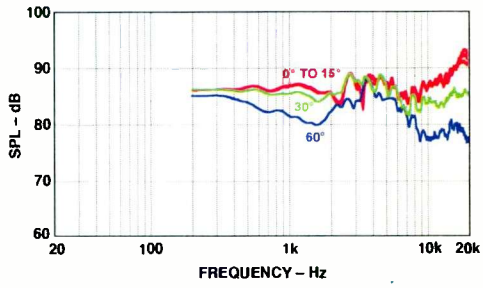


Fig. 3—Horizontal off-axis frequency responses.

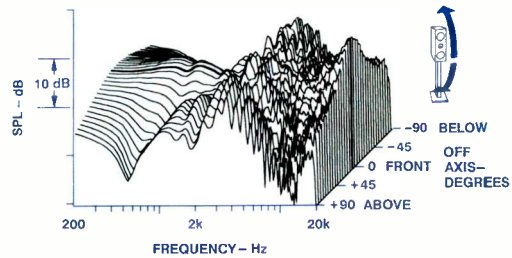
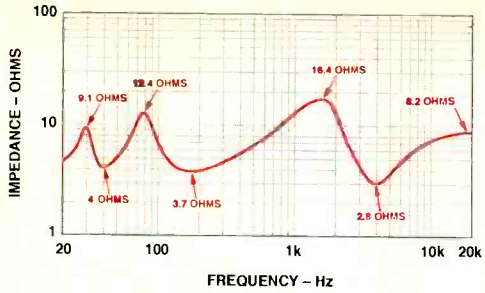
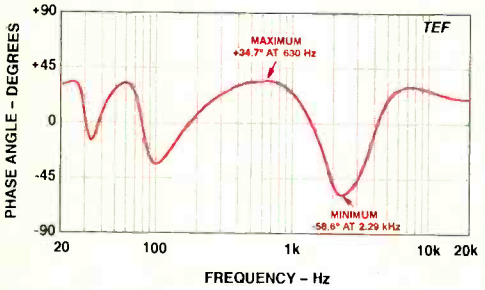


Fig. 4—Vertical off-axis frequency responses.



A



B

Fig. 5—Impedance magnitude (A) and phase (B).

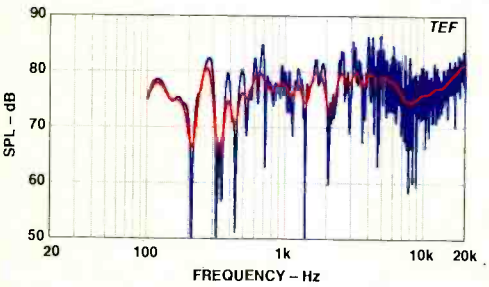


Fig. 6—Three-meter room response.

tention, grilles are non-removable. Please refer to owner's manual."

Measurements

Despite Platinum Audio's warnings, I tested anechoic frequency response with and without the grille, as I usually do. The Duo's grilles came off quite easily (easier than those on some speakers whose grilles *were* designed to be removed!), uncovering a rather handsome front panel. As you can see in Fig. 1, the grille causes significant roughness in the Duo's response above 2.5 kHz. Below 10 kHz, the deviations average about +2, –3 dB; at higher frequencies, the deviations increase to +3, –5 dB. Based on these measurements, it was clear that listening would have to be the final arbiter of whether or not the grille should be removed.

The response without the grille is, overall, fairly flat and extended. There are no major peaks or dips, and the only anomalies are a moderate roughness above 2 kHz and a rise above 10 kHz. If you exclude the region above 14 kHz, the curve fits a tight, 4-dB window (+1, –3 dB referenced to 1 kHz) above 55 Hz. Between 80 Hz and 1.7 kHz, the response is exceptionally flat and smooth and fits a very tight, 2-dB window. Above 14 kHz, the response rises an additional 4 dB, reaching a peak of about +5 dB at 20 kHz. Above 20 kHz (not shown), the response dropped rapidly.

Averaged from 250 Hz to 4 kHz, the Duo's sensitivity measured 85.0 dB for an input of 2.83 volts rms (2 watts into the rated 4-ohm impedance). This level, equivalent to 82 dB for a 1-watt input (2.0 volts rms into 4 ohms), is 4 dB below Platinum Audio's rating of 86 dB. If this speaker's sensitivity is actually based on an input of 2.83 volts rms instead of 1 watt (a common confusion between a company's engineering and marketing personnel), then its measured sensitivity is really just 1 dB below the manufacturer's rating.

Figure 2 shows the Duo's phase and group-delay responses, referenced to the tweeter's arrival time, as well as waveform phase, which indicates whether waveshapes will be preserved in specific frequency ranges. (Waveshapes will be preserved over ranges where the curve stays near 0° or 180°; they will be inverted when the curve is near 180°, however.) Such preservation is the exception rather than the rule in conventional speakers. The phase curve is well behaved but has two slopes: a gradual decrease to 1 kHz and then a steeper rolloff between 1 and 6 kHz. The group-delay curve indicates an offset of about 0.25 millisecond, with the woofer delayed relative to the tweeter.

THE DUO'S WOOFERS HAD A HEALTHY MAXIMUM EXCURSION CAPABILITY AND OVERLOADED QUITE GRACEFULLY.

Figure 3 compares the speaker's horizontal on- and off-axis frequency responses; the curves were taken at selected angles and were not smoothed. (The Duo's grille was removed for this test.) The curves taken at 0°, 5°, 10°, and 15° are in the main horizontal listening window. The 30° and 60° responses represent the spectrum of energy that goes toward a listening room's side walls. This far-off-axis energy contributes to the room's reverberant field; if it deviates substantially from the response of the frontal radiation, it may cause frequency-dependent horizontal image shifts. Because of the Duo's lateral symmetry, its left and right off-axis responses are also symmetrical.

In Fig. 3, the curves from 0° to 15° essentially lie on top of each other, indicating excellently uniform response within the main listening window. The 30° off-axis curve is quite similar to the 0° to 15° curves except for some rolloff above 10 kHz. The 60° curve exhibits greater directivity above and below the upper crossover range, from about 2 to 6 kHz. All of the curves roughly converge through this crossover range, indicating a decrease of directivity here.

The Duo's unsmoothed, vertical off-axis responses are shown in Fig. 4. (The bold curve near the middle of the graph, somewhat obscured by adjacent curves, is on-axis response.) The most prominent feature is the wide and broad response through the upper crossover range. Above and below it, as in the horizontal responses, the speaker is significantly more directional.

Also evident in Fig. 4 through the upper crossover range are off-axis response peaks, sometimes higher than the on-axis response. This indicates that the upper woofer and the tweeter are somewhat out of phase acoustically at crossover. I confirmed this moderate out-of-phase condition by retesting on-axis response (not shown), this time with the tweeter's polarity reversed. The output dropped only by about 4 to 5 dB in two narrow ranges, at 2 and 3 kHz. At the exact 2.5-kHz crossover frequency, the level did not change, which indicates that the upper woofer and the tweeter are 90° out of phase.

(The lower woofer's output is about 20 dB down at this frequency.) If the upper woofer and the tweeter were in phase through this crossover region, a very desirable condition that would minimize lobing, a sharp reduction in level would have been evident when the tweeter's polarity was reversed.

At low frequencies, the Duo's impedance magnitude (Fig. 5A) exhibits the classic characteristic of a vented box: two peaks, with a dip between them. The dip to 4 ohms at 40 Hz indicates the approximate location of box tuning. The impedance rise between 1 and 2 kHz is just below the speaker's upper crossover. The minimum impedance is a significantly low 2.8 ohms at 4 kHz; the maximum of 16.4 ohms occurs at 1.7 kHz. The max/min impedance variation is thus a fairly high ratio of 5.9 to 1 (16.4 divided by 2.8). Cable series resistance would have to be limited to a maximum of only 0.039 ohm to keep cable-drop effects from causing response peaks and dips greater than 0.1 dB. For a typical run of about 10 feet, 12-gauge (or larger diameter), low-inductance cable would be necessary to meet that goal.

RIGHT OUT OF THE BOX, THE DUOS' CONSTRUCTION AND DISTINCTIVE DESIGN IMPRESSED ME.

The Duo's impedance phase, shown in Fig. 5B, is fairly energetic. It reaches a maximum of about 35° at 630 Hz and a minimum of nearly 59° at about 2.3 kHz. The Duo will likely be a fairly difficult load for an amplifier because of its low impedance and varying phase.

When exercised by a high-level sine-wave sweep, the Duo's cabinet was quite vibration-free except for slight activity from 470 to 480 Hz. In this range I heard a slight buzzing sound. The 5-inch woofers had a healthy maximum excursion capability of about 0.6 inch, peak to peak, and overloaded quite gracefully. I noted a moderate amount of dynamic offset at sine-wave levels above 12 volts rms. The Duo's vented box worked quite well, reducing cone excursion at box resonance by approximately two-thirds. (I determined this by experimentally closing the ports.) Minimum woofer excursion occurred at 40 Hz, the speaker's system resonance.

Figure 6 shows the Duo's 3-meter room responses, with both raw and sixth-octave-smoothed data. The grille was off, and I positioned the speaker on a Platinum Audio PS-1 stand. (With this 24-inch stand, the Duo's tweeter is 36 inches from the floor, the approximate height of a seated listener's ears.) If you exclude dips in the floor-bounce region below 450 Hz, the smoothed curve is fairly well behaved and fits a fairly tight, 7.5-dB window. With the dips included, this curve fits a somewhat looser, 15-dB window. Below 450 Hz are significant dips at 205 and 320 Hz and a peak at 275 Hz. Prominent at higher frequencies are a moderate peak-and-dip combination straddling 2 kHz and a broad dip at 8 kHz that is followed by a rising response to 20 kHz.

Figure 7 shows the speaker's E_1 (41.2-Hz) harmonic distortion. At full (100-watt) power, the second harmonic reaches a moderate 6.9%, the third harmonic rises to only 4.1%, and the fourth is a quite low 1.4%. Higher harmonics were below the floor of my test setup. At 1 meter in free space and with a 100-watt input, the Duo generated a very usable 93 dB SPL at 41.2 Hz. It sounded quite clean at this frequency, in part because the test tone coincided with the vented-box tuning, where woofer-cone displacement is minimized.

In Fig. 8, the A_2 (110-Hz) harmonic distortion, the second harmonic reaches a significant 17.4% at full power, the third rises to a moderate 2.7%, and the fourth reaches only 1.6%. At full power at 110 Hz, the Duo sounded somewhat harsh. The A_4 (440-Hz) harmonic distortion was below the floor of my measuring gear.

The Duo's intermodulation (IM) distortion, which I tested with tones

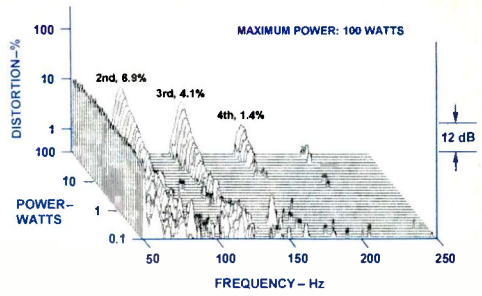


Fig. 7—Harmonic distortion for E_1 (41.2 Hz).

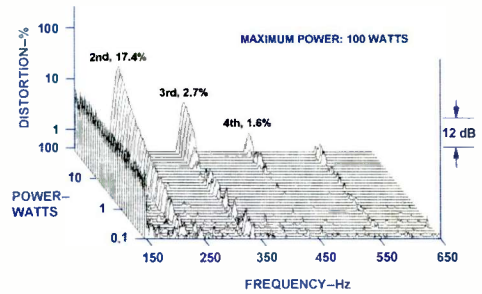


Fig. 8—Harmonic distortion for A_2 (110 Hz).

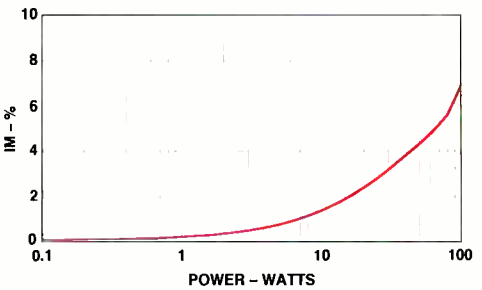


Fig. 9—IM distortion for A_4 (440 Hz) and E_1 (41.2 Hz).

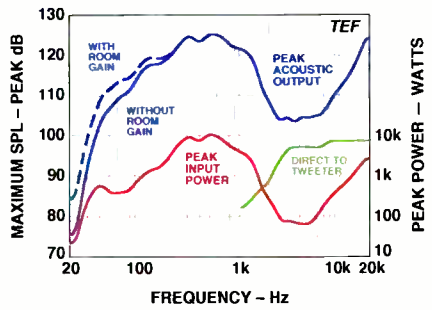


Fig. 10—Peak input power and sound output.

Both woofers work together up to 250 Hz; above that, the lower one rolls off.

of 440 Hz (A_4) and 41.2 Hz (E_1) of equal power, is shown in Fig. 9. Below 10 watts, the distortion is very low, 1.2% or less. At higher frequencies, the distortion rises only to a moderate 6.7%.

Figure 10 shows the speaker's short-term peak-power input and output capabilities. (The tone bursts that I use in this test are now on *Test CD for Sound Reinforcement Systems*, available for $45 from Synergetic Audio Concepts; 800/796-2831. I highly recommend it.) Peak input power was calculated by assuming that the measured peak voltage was applied across the rated 4-ohm impedance.

In Fig. 10, the peak input power starts low (22 watts at 20 Hz), rises rapidly to a substantial crest (550 watts at the 40-Hz box resonance), falls somewhat (to 350 watts at 55 Hz), and rises quickly above 80 Hz to a very high maximum (9.9 kilowatts at 500 Hz). Then, however, the peak input power falls swiftly and reaches its minimum of only 60 watts at 4.6 kHz, slightly above the upper crossover. At higher frequencies, power handling rises again quickly, reaching about 2.4 kilowatts at 20 kHz.

In Fig. 10, note the dramatic decrease in peak power handling (and resultant peak acoustic output) between 1 and 10 kHz. Most speakers I have tested have had very high input capability (4 to 8 kilowatts) and output capability at these frequencies; the Duo's performance is severely limited by distortion at the low end of its tweeter's operating range.

Also shown in Fig. 10 is maximum input power when I connected the tweeter directly to the test amplifier, bypassing the system's crossover. Doing so increased the tweeter's peak input power handling at 4.6 kHz from a meager 60 watts to a whopping 5,400 peak watts (a 90-times increase, about 19.5 dB)! Investigation revealed that the severe limitation in the Duo's power handling was due to core saturation of the two shunt inductors in the tweeter's portion of the crossover.

As you can see in Fig. 10, the Duo's maximum peak output with room gain starts at about 84 dB SPL at 20 Hz and then rises very rapidly: It crosses 100 dB at 32 Hz, 110 dB at 44 Hz, and 120 dB at 200 Hz. After rising to a high maximum of 125 dB at 550 Hz, it falls quickly, reaching a low in the range of 103 to 104 dB between 2.5 and 7 kHz. At higher frequencies, the output significantly recovers, rising to 124 dB at 20 kHz. In the low frequencies, the Duo's maximum output places this speaker in the middle range of all systems I have tested. If you take the Duo's size into consideration, this is a very good showing.

THE SOUND WAS SMOOTH AND WELL BALANCED, WITH LOUD, CLEAN BASS MATCHING THAT OF SOME LARGER SYSTEMS.

Use and Listening Tests

Right out of the box, the Duos impressed me with their appearance (the shiny end pieces and the finned backplate), their construction, and their distinctively tall and narrow design. The PS-1 stands, with their two cylindrical support poles and wide base, also looked distinctive.

Platinum Audio recommends that the PS-1 stands' supports be filled with lead shot or a combination of shot and sand. Without such filling, the support poles ring like a bell when hit with a hard object and may be prone to sympathetic vibration that radiates noise. You'll have to supply your own filling, although the stands do come with adjustable spikes.

The Duos can be bolted to the stands or placed on rubber feet or optional metal cones, which then rest on the stands. Platinum Audio recommends using the cone feet, which are said to enhance "the speed and resolution" of the speaker. For safety, the company recommends that you bolt the speakers to the stands if you have children or if the speakers are in high-traffic areas, for greater resistance to tipping. I chose the cones; with these, the Duos were only moderately resistant to toppling.

The eight-page owner's manual (which also covers other Platinum Audio LR-series speakers) is fairly comprehensive. It discusses speaker setup, stands, wiring (single, bi-wire, and biamplification configurations), break-in and warm-up, amplifiers, and system care. In the booklet, Platinum Audio recommends that when you place the Duos on stands, the speakers should be positioned 6 to 10 feet apart, a minimum of 4 feet from the walls beside and behind them, and aimed in toward the listener.

I placed the Duos in my usual locations, aimed in toward my listening position and far from walls. I listened at a point equidistant from the speakers, 10 feet away, with the speakers placed 8 feet apart. Components in my system were Onkyo and Rotel CD players, Krell's KRC preamp and KSA250 amp, Transparent Audio cabling, and B&W 801 Matrix Series 3 speakers.

The Duos sounded smooth and well balanced. Their bass level and cleanliness competed quite well with the output of much larger speakers. Overall, the Duos did justice to a wide range of music, from pipe organ to rock to chamber groups. I listened with the grilles on and with them off. Although the differences were subtle, I had a slight preference for the sound with the grilles off.

Classical choral music had a good sense of realism with the Duos. The source of the sound seemed to be positioned higher than

On the Duo's rear panel are two flared ports and a heat sink.

with other speakers, such as the B&W 801s that I used for comparison. This is a direct result of the Duo's upper woofer being above its tweeter rather than under it. The Duos' tonal balance sounded lighter than the 801s', tilted slightly to the treble and with somewhat less bass. The Duos also slightly emphasized vocal sibilants.

On music having high-level bass, the Duos did quite well, sounding strong and clean down to below 40 Hz. The Duos' bass dynamics and impact were demonstrated to their fullest on tracks 6 and 7 of Spies' *By Way of the World* (Telarc CD-83305, one of my favorite demo CDs). The kick drum on track 6 still sounded clean and dynamic at levels of 95 to 100 dB SPL. However, the B&Ws had a definite edge in the wallop and gut-thump department. On classical pipe organ, the Duos also performed quite well,

PERCUSSION AND COMPLEX ORCHESTRAL SOUNDS WERE QUITE OPEN, CLEAN, AND CLEAR.

but I heard some modulation of higher frequencies by low pedal notes at loud levels.

On classical symphonic music, such as Stravinsky's *Petrouchka* and *Le Sacre du Printemps* (Chesky CD 42), the Duos did particularly well on the complex orchestrations and percussion. They sounded quite open, clean, and clear. On the downside, pop and country vocals played at high to very high volume levels (90 to 95 dBA or greater) had a tendency to sound harsh and somewhat restricted.

After I had tested the Duo's peak capabilities (Fig. 10), I repeated the high-level listening tests while monitoring the voltage across the tweeter. The sound became harsh only at inputs above ±10 to ±15 volts, which occurred when the Duos were played *very loud* on music having appreciable treble content. With typical classical music, played loud, the tweeter voltage barely registered above ±2 volts on my oscilloscope.

With band-limited pink noise, the Duos generated no usable output in the 20- and 25-Hz third-octave bands, some usable output at 32 Hz, and fairly strong and clean output from 40 Hz up. Port wind noise was significant at and near the 40-Hz box resonance. With wideband pink noise, the Duos did very well on the stand-up/sit-down test; I noted very little tonal change when I stood up. Although octave-to-octave spectral balance on pink noise was quite acceptable, I heard a slight upward tilt and some tonality.

On well-recorded female vocal, such as soprano Custer LaRue's *The True Lover's Farewell* (Dorian DOR 90213), the Duos sounded clean and open, quite like the B&Ws except for a slight emphasis of sibilants. On some tracks I preferred the Duos over the B&Ws. It was only when I turned up the Duos to uncomfortably loud levels that LaRue's voice started sounding harsh.

The Platinum Audio Duos offer superb looks, small size, and high performance coupled with real bass capability. Their relatively high price does put them in direct competition with larger speaker systems, however. Consider the Duos seriously if their excellent combination of attributes suits your needs. A

When you've got questions about Audio and Video,

see a specialist

Q I seem to be inundated with important sounding specs and ratings when I go shopping for audio equipment. What good are all these numbers and specs?

A Not much good for anything really. They tend to cloud the issue from what's really important; what you experience when you really listen to the equipment. Specs are helpful in the overall decision making process but they should be the secondary criterion from which you buy. Shop at a store that will allow you to sit down and listen to the equipment. Make more than one visit if need be. So if a salesperson seems intent on impressing you with numbers, be wary. What you hear and how much you enjoy it means more than all the numbers in the world! For example, the average adult can't hear .1% distortion anyway, so what difference does it make if the product has .01% or .001% distortion. None. Buy your unit from a dealer who will "educate your ears" by experiencing the sound. Let the dealers educate your mind with information on specs and numbers - but don't rely upon them as an end unto themselves. Trust your ears.

–Richard Myers
Stereo Showcase
Grand Rapids, Michigan

stereo showcase

Q What does the word "stereo imaging" mean and does my system do it?

A The word stereo comes from the greek word that refers to something as being "three dimensional" or "life like." Back in the early days of hi-fi when the term was coined, it referred to the ability of stereo speakers to actually form a soundstage that projected an actual "image" of the performers; an image you can sense just by listening. Every stereo system should have this ability. You should be able to close your eyes and actually sense the location of the various musicians. If you can't sense this image, check that the wiring of your speakers goes from positive to positive and negative to negative. You may have one wire reversed or out of phase. If not, you may need to reposition your speakers to get the desired effect. Keep in mind that most standard box speakers need to stand upright in order to take advantage of their vertical array so they image properly.

–Robert Cole
World Wide Stereo
Montgomeryville, Pennsylvania

WORLD WIDE STEREO

Each month, Audio Magazine's feature "See a Specialist" showcases some of 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 will offer solutions to problems that can best be handled by a specialty audio/video retailer.

If you would like to submit questions to dealers in your area please write to :
See a Specialist, c/o Audio Magazine, 1633 Broadway, NY, NY 10019

Q What are my options concerning outdoor speakers and where should they be placed for the best sound?

A For a covered patio, a weather-*resistant* pair of flush mounted or bracketed speakers under the roof of the patio works well. For under an eave, to cover the yard or pool, use weather-*proof* speakers that can be exposed to the elements. If sound at the spa is important, place speakers as close to the spa as possible because of the noise of the spa. Speakers made to look like rocks can be discreetly hidden in the landscaping. Installing speakers at the back of the yard facing toward the house allows you to play them louder without bothering your neighbors and also creates a buffer zone for ambiant traffic noise. In each case, all speakers have to be wired to a stereo system.

–Michael Gallant
Hillcrest High Fidelity
Dallas, Texas

Hillcrest High Fidelity

Q How can I improve the quality of my cable TV signal?

A Your cable signal may be decent, but your methods of distribution may not be. The signal level coming into your home must be maintained at all television locations. Adding a splitter to accommodate several television sets from the main cable line will satisfy the impedance of the signal. However, as the signal passes through the splitter, signal losses occur. Problems often result when several small splitters are used and amplifiers are added at the sets. This will only amplify noise, making the picture worse. Using a good quality RF amplifier at the input side of one large splitter will make for a clean, strong signal to all of your television locations.

–Carl Grocki
Audio Spectrum
Winston-Salem, North Carolina

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EQUIPMENT **PROFILE**

EDWARD J. FOSTER

TECHNICS SE-A1000 AMP AND SU-C1000 PREAMP

When most audiophiles think of "separate" components, they think of high-power amplifiers, esoteric preamps, and big bucks. Technics sees matters a bit differently. The SE-A1000 amp and SU-C1000 preamp don't break the bank, and we're not talking amplifier power output in the 250-watt/channel class. But we are talking separates, even if these two products are designed to mate with each other better than they do with other amps and preamps. And I suppose the SU-C1000 can be considered "esoteric" in that it's battery-powered and because it handles both MM and MC phono cartridges (rather a rarity these days).

WHAT'S NOVEL ABOUT THE SU-C1000 PREAMP IS ITS BATTERY-OPERATED POWER SUPPLY.

In addition to phono, the SU-C1000 accommodates five high-level sources, including two tape decks. There are fixed-level recording outputs for each deck and one main output. Connections are made through conventional unbalanced RCA jacks. One unswitched and two switched outlets are provided for convenience. The two-wire power cord is removable.

The novelty lies in the SU-C1000's battery operation, intended to provide hum- and ripple-free power to the circuitry. This preamp comes with a nickel-cadmium battery pack that slips into a front-panel tray. It takes about 10 hours to charge the battery initially; during that time the SU-C1000 must be operated from the power line. When the battery is fully charged, a "Charge" LED goes out and a "Level" LED goes on. At this point, you can switch to battery power by tapping the "BATT Operation" button at the right of the tray; a "BATT" LED glows red to confirm. After eight hours of battery operation, the "Level" LED changes from green to orange, and if the preamp is turned off, the battery recharges. (An orange glow when the battery should already be charged indicates that the battery is deteriorating; other light conditions indicate that the battery has reached the end of its useful life.) The SU-C1000 won't operate unless it's plugged in, even if you're running it on its battery.

Instead of the usual array of pushbuttons, the SU-C1000 has a rotary knob for source selection. The source is indicated by one of six red LEDs above the battery tray, not by labels on or around the knob. A "Tape Monitor" button between the selector and the tray cycles through three possibilities: "Tape 1," "Tape 2/DCC," and "Source" (the two monitor conditions are indicated by orange LEDs, "Source" by a red LED).

Above the preamp's small tone-control knobs are a red "Muting" LED and a button for "Tone Defeat." The "Volume"

AMP

Rated Power Output: 70 watts/channel at 0.01% THD + N, from 20 Hz to 20 kHz, into 8 ohms.
Dimensions: 17 in. W x 5⅜ in. H x 13¼ in. D (43 cm x 13.6 cm x 33.6 cm).
Weight: 21.6 lbs. (9.8 kg).
Price: $730.

PREAMP

Dimensions: 17 in. W x 2¾ in. H x 12⅛ in. D (43 cm x 6.8 cm x 30.7 cm).
Weight: 7.3 lbs. (3.3 kg).
Price: $530.

Company Address: One Panasonic Way, Secaucus, N.J. 07094; 201/348-9090.
For literature, circle No. 93

Photos: Michael Groen

knob, at the right, is motorized so that it can be remote controlled. Nearby is a small "Balance" knob, with the "Phono Selector" (MM/MC) button just above it. The balance and tone controls have center detents and, like "Tape Monitor," are operable only from the front panel. Everything else can be operated by the remote (including "Mute," which cannot be switched from the panel). The remote also

BOTH THE SU-C1000 AND SE-A1000 DID QUITE WELL ON MY TEST BENCH.

can control certain Technics cassette decks (including DCC machines), CD players, and tuners.

The SU-C1000 preamp's bottom plate is a multilayer "Technics Hybrid Diecast Panel," resting on large insulator pads, to damp vibration.

The companion SE-A1000 amp is rated at 70 watts per channel into 8 ohms. It's rather good-looking, with dual power meters dominating the front panel. Since the meters actually read voltage, their power indications (0.001 to 200 watts) are valid only for 8-ohm loads. An on/off button and two status LEDs, "Power" and "Operation," are near the headphone jack. Two buttons activate the two sets of speaker binding posts on the rear panel; red LEDs indicate which speakers are operating. There's a cooling fan, but it's unlikely to turn on during typical use.

On the technical front, the SE-A1000 amp uses "R-Core" power transformers, which are claimed to minimize noise-generating magnetic-flux leakage. The transformer cores are quasi-toroidal (i.e., more rectangular than round) but have a rounded cross section "so flux density is even inside the core." Also used in the amp are "Master" series capacitors, said to deliver "improved bass solidity and smooth midrange" from "an improved electrolyte and aluminum foil construction." These capacitors have a three-layer casing, of "resin sandwiched between aluminum, providing excellent vibration resistance."

The SE-A1000 uses a "MOS Class AA" amp circuit, apparently a bias-tracking system designed to combine high efficiency with aspects of Class-A performance. This circuit combines a MOS-FET voltage-amplifying transistor with a bipolar-transistor current-drive amp to obtain "the linearity. . .of MOS FET with little voltage loss." The two different amplifier circuits are "linked by a Special Class AA Bridge Connection to create a power amplifier with virtually ideal characteristics."

Sounds wonderful, doesn't it? Well, the claims, while probably defensible, don't tell the whole story. The preamp's base may be cast from the magic material, but the chassis is plain old bent sheet metal—and not too thick at that. And I'm not convinced that making the cross section of the amplifier transformer's core roundish is nearly as important as making the core *geometry* round (i.e., toroidal).

The only "Master" series capacitors I found in either unit were the power-supply filter caps in the amp, a pair of 10,000-microfarad, 63-volt units. The "MOS Class AA" output stage with its "Special Class AA Bridge Connection" proved to be a pair of hybrid modules, one per channel, affixed to a common heat sink. The heat sink seems pretty adequate; that's good, since the fan's orientation will probably prevent it from noticeably improving airflow, even when it does turn on (which it didn't, during my bench tests or during my listening sessions).

I doubt I would have taken Technics to the woodshed over these matters had I not been annoyed to find that what appeared to be gold-plated RCA jacks were gold only as far as the eye could see. The outer shell (the ground connection) seemed to be gold-flashed, but the center sleeve (the signal connection) was base metal. I'm a firm believer (based on my experience designing for the military) that you

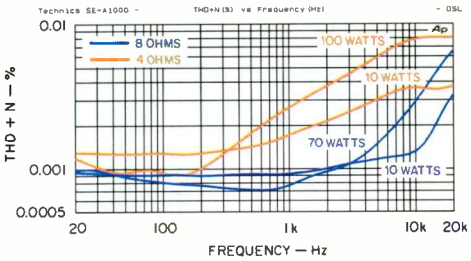

Fig. 1—Amp's THD + N vs. frequency.

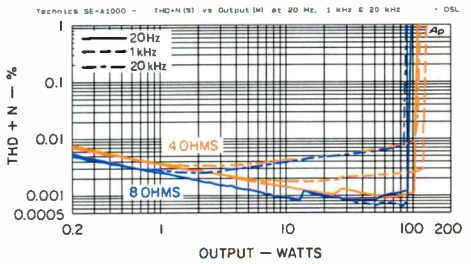

Fig. 2—Amp's THD + N vs. output.

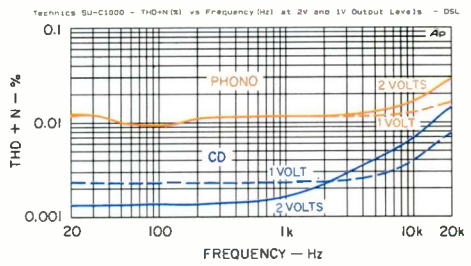

Fig. 3—Preamp's THD + N vs. frequency.

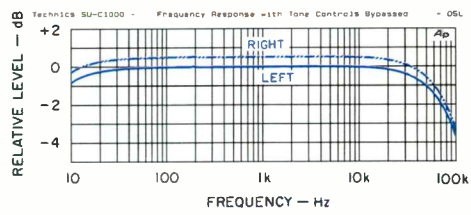

Fig. 4—Preamp's frequency response.

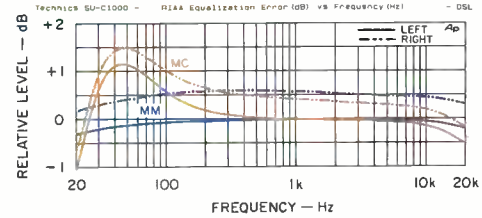

Fig. 5—RIAA equalization error.

Rear panel of the SU-C1000 preamp.

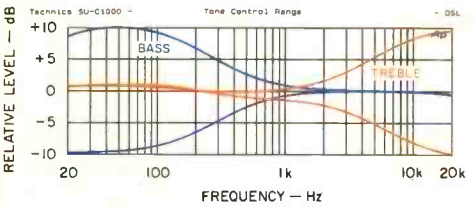

Fig. 6—Tone-control response.

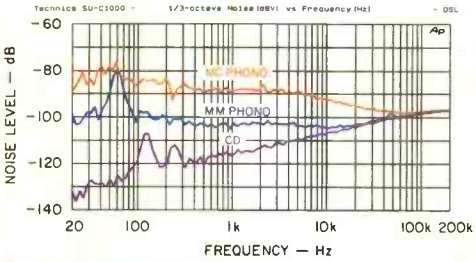

Fig. 7—Preamp's noise spectra.

mate base metal with base metal and gold with gold. You don't mix!

The amp's speaker connectors appear to be multiway binding posts on standard centers that will accept single or dual banana plugs. There's no inner sleeve to make a connection, however, so banana plugs can't be used. For that matter, there isn't even a center hole to accept a bare wire. In my book, these connectors are more suited to a not-very-expensive receiver than to a separate power amp, even an amp of modest wattage.

Measurements

So did my disappointment with the SE-A1000's and SU-C1000's construction affect the test results? Not so you could tell. In fact, both products did quite well in my lab, especially the SE-A1000 amp, which more than met its output spec and generated negligible distortion (see "Measured Data"). The clipping point with 8-ohm loads was within a gnat's whisker of 100 watts (pretty darned good for a "70-watt" amp), and dynamic headroom came in at nearly 1.8 dB, far better than the manufacturer's 0.3-dB spec.

Technics doesn't specify power with 4-ohm loads, but my review sample managed 130 watts per channel (continuous) at clipping and 190 watts per channel with the IHF tone-burst signal. Distortion was less than or equal to 0.01% across the board, at a continuous 100 watts per channel into 4-ohm loads. (See Figs. 1 and 2. Performance of the amp's two channels was, for the most part, pretty well matched, so I've presented only the left-channel plots.)

The SE-A1000's damping factor was adequately high and its output impedance reasonably low, although the output coil raised reactance to almost 0.2 ohm at 20 kHz. Frequency response (not shown) was almost perfectly flat to 10 kHz and was 3 dB down at 73 kHz. The response and the gain of the two channels were virtually identical. Worst-case channel separation was better than 72 dB out to 10 kHz and was 80 dB or better below 4 kHz. The A-weighted noise was admirably low. Spectral analysis revealed minor amounts of hum at all power-line harmonics through the fourth. On the whole, these harmonics were at or below –110 dBW and should be inaudible.

THE AMPLIFIER'S CLIPPING POINT WAS NEARLY 100 WATTS, PRETTY GOOD FOR A 70-WATT AMP.

For my tests of the SU-C1000 preamp, I used its battery supply. In my first test, I was surprised to find that this preamp clipped when delivering just over 2.2 volts! That's more than adequate to drive the SE-A1000 to its limits (it clipped at just under 1 volt in). However, the SU-C1000's output capability could be marginal if it's used with a high-power amplifier having average gain. Many such amplifiers require 1.5 volts or more to reach rated power; if they have decent headroom, they will need higher voltage than the SU-C1000 can deliver to reach their full potential. I expect this preamp's limited drive capability is related to its being designed for battery operation; the need to conserve battery power probably led to a decision to lower the circuits' supply voltages.

Because I view this pair of products as an integrated amplifier on two chassis, I measured the SU-C1000's THD + N at 1 volt out (adequate to drive the SE-A1000 to clipping) as well as at the 2 volts specified by the EIA/IHF standard. As you can see from Fig. 3, maximum distortion at 1 volt out is barely half that generated at 2 volts. (For the most part, you should ignore the flattish portions of the curves, which relate more to noise than to distortion.) The figure shows data taken on the left channel; that taken on the right was similar. The THD + N for the MC phono input was dominated by noise and thus had little useful information.

Figure 4 shows the SU-C1000's frequency response and channel balance. (I used a high-level input, defeated the tone controls, and set volume according to the IHF/EIA standard.) Response is essentially flat to above 10 kHz and is down 0.22 dB at 20 kHz. The combined response of the SU-C1000 and SE-A1000 would be down about 0.5 dB at 20 kHz. The preamp's channel balance could have been better.

Figure 5 shows the SU-C1000's RIAA equalization error (phono response, if you will), with a magnified vertical scale. The channel imbalance persists, but there's virtually no additional response error from the MM input. (The 0.3-dB error at 20 kHz includes the line section's 0.22-dB rolloff at that frequency.) The MC phono response is up almost 1.2 dB at 45 Hz and down by a bit more than a decibel at 20 Hz.

Figure 6 shows the maximum range of the tone controls and the preamp's response with the controls active but set to their detents. (The detents, by the way, are none too solid; you have to "feel" carefully to find them.) Activating the tone controls tilts the basic response up slightly in the bass (+0.88 dB) and down a tad more in the treble (–0.67 dB), so it's best to leave the controls bypassed unless you really want to use them. When you do, you'll find that both controls have shelving characteristics,

with a maximum spread of roughly ±10 dB at the frequency extremes.

I ran third-octave noise spectra for the SU-C1000's high-level, MM phono, and MC phono inputs (Fig. 7). Even though I used the battery supply, there are power-line harmonics at 120 and 240 Hz in the curve for the high-level input. These noise components are fairly small, but their presence suggests that power-supply ripple isn't completely eliminated in the SU-C1000. (I noted that the circuit ground seemed to be tied to chassis ground at several points on the main circuit board. If this is the case, hum may have been picked up by the resultant ground loops.) The curves for MM and MC phono noise, while greater in level overall, do not have similar ripple components. The MM phono spectrum does have a 60-Hz component, but it could have been caused by the input termination.

The preamp's IHF sensitivity (see "Measured Data") was typical and its input impedance pretty much on target, though the shunt capacitance on the MM phono input was a bit on the high side. Input overload points were adequate, and the recording outputs should be fine. I'd have liked a lower source impedance on the recording output, even though the value Technics uses (just over 2 kilohms) is not unusual in Japanese equipment. The source impedance at the main outputs was nice and low. Channel separation should be more than sufficient, but it certainly set no records.

MEASURED DATA

AMP

Output Power at Clipping (1% THD at 1 kHz): 8-ohm loads, 98 watts/channel (19.9 dBW); 4-ohm loads, 130 watts/channel (21.1 dBW).

Dynamic Output Power: 8-ohm loads, 105 watts/channel (20.2 dBW); 4-ohm loads, 190 watts/channel (22.8 dBW).

Dynamic Headroom re 8-Ohm Rating: +1.76 dB.

THD + N, 20 Hz to 20 kHz: 8-ohm loads, less than 0.0066% at rated output and less than 0.0033% at 10 watts/channel; 4-ohm loads, less than 0.0101% at 100 watts/channel and less than 0.0037% at 10 watts/channel.

Damping Factor re 8-Ohm Loads: 175 at 50 Hz.

Output Impedance: 47 milliohms at 1 kHz, 195 milliohms at 20 kHz.

Frequency Response: 20 Hz to 20 kHz, +0, –0.3 dB; –3 dB below 10 Hz and at 73 kHz.

Sensitivity: 92.4 mV for 0 dBW (1 watt) out and 773 mV for rated output.

A-Weighted Noise: Left, –99.3 dBW; right, –98.8 dBW.

Input Impedance: 41 kilohms.

Channel Separation, 100 Hz to 10 kHz: Greater than 72 dB.

Channel Balance: ±0.01 dB.

PREAMP

Output Voltage at Clipping (1% THD at 1 kHz): 2.21 V.

THD + N, 20 Hz to 20 kHz: CD input, less than 0.0149% at 2 V out and less than 0.0078% at 1 V; MM phono input, less than 0.029% at 2 V out and less than 0.0163% at 1 V.

Output Impedance: 200 ohms.

Frequency Response: Tone controls bypassed, 20 Hz to 20 kHz, +0, –0.22 dB (–3 dB below 10 Hz and at 84.7 kHz); tone controls at detent, 20 Hz to 20 kHz, +0.88, –0.67 dB.

Tone-Control Range: Bass, +9.2, –8.6 dB at 100 Hz; treble, +8.3, –8.1 dB at 10 kHz.

RIAA Equalization Error, 20 Hz to 20 kHz: MM phono, +0, –0.3 dB; MC phono, +1.16, –1.05 dB.

Sensitivity, 0.5 V Output: CD input, 97 mV; MM phono input, 1.6 mV; MC phono input, 0.13 mV.

A-Weighted S/N re 0.5 V Output: CD input, 91.8 dB; MM phono input, 84.3 dB; MC phono input, 70.5 dB.

Input Impedance: CD input, 48 kilohms; MM phono input, 46 kilohms + 350 pF; MC phono input, 130 ohms.

Input Overload, 1% THD at 1 kHz: CD input, more than 10 V; MM phono input, 150 mV; MC phono input, 13.1 mV.

Channel Separation, 100 Hz to 10 kHz: Greater than 43.8 dB.

Channel Balance: ±0.25 dB.

Record Output Level: CD input, 0.48 V for 500 mV in; MM phono input, 0.29 V for 5 mV in at 1 kHz; MC phono input, 0.33 V for 0.5 mV in at 1 kHz.

Record Output Impedance: 2.14 kilohms.

Use and Listening Tests

What we have here is a basically competent integrated amplifier on two chassis. Why a manufacturer would want to go through the expense of making two chassis, two power supplies, and so forth is an open question. Certainly, an integrated 70-watt amplifier of comparable performance could be designed, and neither the SE-A1000 nor the SU-C1000 has such overwhelming virtues that it's likely to be mated outside the family. The SU-C1000's limited output capability makes its use with more powerful amplifiers problematic, and the SE-A1000's 70-watt/channel rating makes it an unlikely choice to mate with another maker's preamp.

HYBRID OUTPUT STAGES IN THIS POWER CLASS CAN PERFORM SUPERBLY, IF THEY'RE AS GOOD AS THE SE-A1000'S.

Together, however, the SU-C1000 preamplifier and SE-A1000 amplifier did just fine. They sounded quite good for products of this price class, and they tested unusually well—especially the SE-A1000. This simply goes to show that, in this power class, hybrid output stages can function superbly if they're as well designed as this amp's obviously are. And, believe me, the output stages are where it's at.

I'm certainly not convinced that the SE-A1000's performance can be attributed to magic filter capacitors or rounded transformer cores. And I'd rather have seen money spent on better connectors and circuit boards than on output meters and the circuitry to drive them. But I've given up second-guessing marketing departments. Besides, the meters do look classy, and though not a fantastic bargain, this Technics pair does deliver basically good performance and high-end looks for rather less than high-end prices. A

AURICLE

ANTHONY H. CORDESMAN

CLASSÉ AUDIO CP-60 PREAMPLIFIER

Because today's preamps are commonly so good, at least in their line-level stages, it's tempting to write reviews that just say "Here's another good one." Yet there are differences in features, ergonomics, phono-stage performance, and sonic nuances that call for comment—not to mention the occasional preamp that makes the leap from very good to excellent.

Classé Audio's CP-60 makes that leap. It offers some unusual and useful features. Its optional phono stage should please the most demanding LP buff. Its sound is outstanding. And this $3,695 preamp's slim chassis, available in black or silver, makes it the first Classé preamp that looks as good as it sounds.

Classé Audio does not bother specifying distortion, sharing with most other high-end manufacturers the belief that measurable distortions have long been reduced to the point where "specsmanship" is meaningless. Frequency response is specified at 20 Hz to 20 kHz, ±0.1 dB, with a bandwidth of 1 Hz to 150 kHz between –3 dB points at maximum output. Rated sensitivity is 120 millivolts for the line input, gain is 18 dB, and signal-to-noise ratio is 95 dB. The line stage's input impedance is given as 50 kilohms and the output impedance as 1 ohm.

Unlike some other preamps, the CP-60 has front-panel and remote-control layouts that are clear and easy to memorize. What's more, the selected input, the volume- and balance-control settings, and other status information are indicated in the front panel's LED display.

With buttons on the front panel or remote, you can select from two balanced inputs ("BAL1" and "BAL2") and from four unbalanced inputs ("REG1" through "REG4"), in addition to tape and surround loops. Other controls on the panel and the remote are for balance, polarity, muting, volume (continuously adjustable), and gain (a choice of 12 or 18 dB at the line stage). The volume and balance controls offer a wide range of settings and fine adjustments (60 steps for the volume control, 15 steps for balance). Since these controls' settings are shown in the LED display, you can easily replicate your favorites. I found the balance-control display particularly valuable in adjusting for the best imaging, soundstage width, and depth for favorite recordings.

The CP-60 uses the same basic circuitry as previous Classé preamplifiers. Its refinements were based on extended listening to the effects of new components, circuitry, and operating-voltage adjustments.

A versatile inboard phono preamp is available for an additional $495. Classé says that in moving-magnet mode it has 35 dB of gain and a signal-to-noise ratio greater than 85 dB. The moving-coil mode, selected by jumpers, adds another 20 to 40 dB of gain (factory-set at 22 dB, but you can change resistors to alter it). Even so, it maintains almost the same S/N. Loading is automatically adjusted to match any moving-coil cartridge.

The CP-60's phono preamp is far better than the phono stages I have heard in previous Classé products, rivaling the best outboard phono preamps. It delivered exceptional dynamics, fine detail, and very low noise, even when I used moving-coil cartridges having very low output.

Photo: Michael Groen

Company Address: 9414 Cote de Liesse Rd., Lachine, Quebec, Canada H8T 1A1; 514/636-6384.
For literature, circle No. 94

And I heard no subtractive or additive colorations when I switched from phono to line stage, something all too rare in even the best high-end equipment.

Nuance is the name of the game in the high end, particularly with components as neutral as today's best preamps. Consequently, exactly what you hear from the CP-60 will depend greatly on how its characteristics interact with those of the other components in your system. With that in mind, I believe you will find the CP-60 exceptional enough to reinforce the strengths of most high-end systems. It may not please those who are looking for some magic coloration or a "new sound," but it is likely to please even the most demanding audiophiles who seek purity and neutrality.

In my system, the CP-60 proved remarkably free of frequency coloration, in both phono and line-stage modes. It was neutral from top to bottom, even when used with speakers having extended bass and treble response. Bass control and detail were very good. The transition from bass to lower midrange was excellent and very dynamic.

The midrange was neutral, with an excellent sense of life; tube lovers may find its energy and sweetness remarkably familiar. I have still not found the sweetness and air in solid-state preamps that I hear from tubes, but the CP-60 came very close—and its upper-frequency detail was slightly better than that of most tube preamps. You win some, you lose some.

The CP-60's overall dynamics gave it exceptional life without artificial expansion or energy. This preamp's extremely low apparent noise floor made music seem to rise out of near total silence rather than from a slight electronic haze. Excellent! The CP-60's low noise (even in MC phono mode), excellent overall frequency response, and outstanding dynamics gave it exceptional transparency.

Some preamps have a wider or deeper soundstage, more depth, or more apparent precision of imaging than the CP-60. However, the Classé preamp reproduced almost exactly what I expected to hear from the soundstage on my own amateur recordings, on DAT tapes where I was present at the performance, and on acoustic music with which I have a great deal of familiarity. In short, I found the soundstage accurate rather than euphonic. The CP-60 resolved soundstage information at very low signal levels unusually well and gave the soundstage natural life.

I experienced a few minor system interface problems with the CP-60. The phono ground connection was awkward, making it harder to connect my tonearm's ground wire than it should have been. You may have to experiment extensively with different ways of grounding your cartridge, tonearm, or turntable to get the best results from MC cartridges at extremely high gain settings. And unless you follow the instruction manual carefully, the CP-60 may throw you a curve by muting when you switch in and out of the surround processor loop.

The CP-60 stands out even among today's preamps. It offers excellent phono performance, transparency, and dynamics. If you are looking for neutrality rather than some special coloration, you'll find Classé Audio's CP-60 to be a reference-quality preamplifier. And its versatile features are likely to suit demanding audiophiles as well as demanding reviewers. A

AURICLE

ANTHONY H. CORDESMAN

VAC RENAISSANCE SEVENTY/SEVENTY AMP AND CPA1 MK II PREAMP

Photo: Michael Groen

Not being an anachrophile, I have no feelings of nostalgia about tube equipment. I have heard plenty of excellent, mediocre, and terrible examples of both tube and solid-state gear. Neither am I swayed by the fashion for Class-A or triode design; too often, such designs are used to justify absurd prices.

Nevertheless, I must admit that the Valve Amplification Company CPA1 Mk II preamp and Renaissance Seventy/Seventy dual-mono amp, which use triodes and Class-A circuitry, are superb. They are expensive, but not outrageous: $9,900 for the amp and $4,890 for the preamp. (The CPA1 Mk II preamp is also available without a phono stage, as the CLA1 Mk II, for $3,690.) Both units are classic, deliberately retro-style black with gold front panels.

Company Address: 807 Bacon St., Durham, N.C. 27703; 919/596-1107.
For literature, circle No. 95

The CPA1 preamp has only the essential controls on its front panel. Separate volume controls for each channel enable you to adjust both volume and balance. Other switches let you select from one phono and six line inputs, one tube-buffered tape loop, and muting.

In addition to the inputs and tape output, the CPA1's rear panel has two sets of RCA main output jacks, for biamping or using the optional balanced output ($200). The separate, 22-pound power supply has active regulation.

Removing the CPA1's black tube cage reveals additional switches on the top surface of the chassis. Switches for the line stage let you select three levels of gain: –0.75 dB (with passive, triode-buffered operation) and active gain levels of +9 and +18.5 dB. The phono stage has selectable gain (39, 55, or 65 dB), impedance (100 ohms to 47 kilohms), and capacitance (0 to 220 picofarads). Phono overload varies with gain, but there is more than enough headroom for any cartridge I know of.

The CPA1's tube complement is six E83CC/12AX7s, two E88CC/6DJ8s, and two E82CC/12AU7s. The instructions describe fine-tuning the CPA1's sound with different brands of tubes and make suggestions about the resulting nuances in sound. I keep a stock of tubes around for precisely this purpose; different brands of tubes really do sound different.

The preamp's manual warns that phono and line-stage noise vary according to the individual tubes used and tells which are most sensitive to microphonics and noise. (Noise should be addressed this frankly in every tube preamp's manual.)

The instructions correctly state that the CPA1 has greater transparency, a better soundstage, and more dynamics when used in its passive-buffered mode. However, it then had so little gain that it could barely drive some power amplifiers (including VAC's own amp, the Renaissance Seventy/Seventy) with some signal sources, even when I set the controls for full volume.

The preamp's signal polarity varies with input and operating mode. The line stage is noninverting in passive mode but inverting when gain is used. The phono stage inverts

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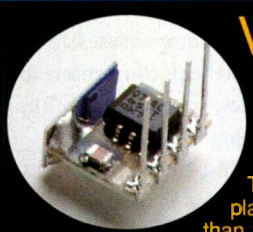

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the signal it delivers to the line stage's input. The tape output has the same polarity as the line-stage input.

The Renaissance Seventy/Seventy is rated at 65 watts per channel. Its input stage, which uses two 6SN7/5692 twin triodes per channel in a modified Williamson circuit, provides direct-coupled, balanced input amplification as well as phase splitting. The output sections have four 300B triodes per channel; thus, the Seventy/Seventy's output tubes can operate at 450 volts DC rather than the 1,000 to 1,500 volts of some amps using other tubes. Such moderate rail voltage improves reliability and allows use of a better output transformer. Each 300B has its own heater power supply and independent self-biasing network; no adjustment of any kind is needed to maintain amplifier balance, and the idling current of each tube self-corrects for gross tube mismatches and drift that occurs with age. This output circuitry is said to operate in pure push-pull Class A within the linear portion of the 300B's transfer function. It also provides considerable dynamic headroom.

VAC ARGUES STRONGLY THAT PUSH-PULL AMPS HAVE INHERENT SONIC ADVANTAGES.

Unlike many of today's high-end Class-A amps, the Seventy/Seventy is a push-pull design. VAC argues strongly that push-pull designs "cancel distortions naturally, without reliance on negative feedback," whereas single-ended amps "produce either large frequency-response aberrations or high asymmetrical amounts of second-harmonic distortion, creating a false sense of richness." I have mixed feelings about this argument, having heard superb sound from relatively low-powered single-ended triode amps when they were driving speakers of appropriate sensitivity and impedance. Yet some of the most colored high-end sound per dollar I have ever heard has come from single-ended triode amps. In far too many cases, single-ended designs lack honest bass and have rolled-off highs, softened transient details, and an inability to deliver high volume.

Setting up the amp requires careful attention to the instructions as well as careful tuning of the feedback control, which means adjusting listening levels and considerable auditioning. The Seventy/Seventy's front panel holds two rotary switches that select any of six global-feedback levels, from 0 to 7.5 dB. Feedback is tuned by ear for the setting that sounds best for a given speaker load. A less conspicuous switch, between the output tubes on the top of the chassis, offers selectable coupling between the audio ground and the chassis: In "DC" mode, the audio and chassis grounds are tied directly; in "AF" mode, DC is blocked; and in "RF" mode, only radio-frequency energy is bled to the chassis. Since grounding patterns vary, you should experiment to see which setting sounds best in your system.

The sound of both the CPA1 preamp and the Renaissance Seventy/Seventy amp is eminently musical. But they achieve this in different ways.

Most preamps, tube or transistor, differ in nuance rather than basic sound character. The CPA1 Mk II, however, has such distinctive timbre, depth, and soundstaging that VAC seems to have deliberately "voiced" it to improve the musicality of most recordings. The result may not be strictly neutral, but it is remarkably pleasant (which raises interesting questions about the comparatively dry sound of most other preamps). The CPA1 sounds warmer than most preamps, tube or transistor, with an exceptionally rich lower midrange and highs that are sweet to the point of being slightly soft. Yet its upper midrange and treble are too detailed, too dynamic, and too filled with transient and low-level information to be dismissed merely as having that "classic tube sound."

The VAC preamp seems to have a slight rise in its mid-bass and upper bass, emitting a little more energy than is really on the recording. It has good bass extension and very good bass dynamics, but transients in the deep bass and mid-bass are not quite as quick and detailed as in the rest of the spectrum, especially in the active modes.

The CPA1 tends to add depth and width to recordings, thus improving musicality, expanding the apparent size of the listening room, and correcting for the lack of depth in many recordings. (On rare occasions, however, the CPA1's soundstage can create a slight hole in the middle.)

Dynamics of the CPA1 are very quick and live, but there seems to be less energy in the upper octaves. As a result, dynamic passages are unusually sweet, with notably less "in-your-face" energy on close-miked recordings.

The phono stage gives a needed extra bit of life and musicality to those all-too-common LPs that contain great performances but are mediocre recordings. However, this is not the quietest phono circuit ever made. I would recommend you use a moving-coil cartridge having fairly high output, such as the AudioQuest 7000 Fe5. You might even prefer a moving-magnet cartridge or a high-output moving-coil cartridge like the Sumiko SHO, unless you are able to listen through a bit of tube noise. There is also a trace of noise in the line stage. The CPA1 does a very good job of reproducing low-level information, even in phono mode, but the very soft presence of tube noise may remind you that a preamp is in the system.

Summing up the CPA1, I find that its mix of frequency characteristics, dynamics, transient response, detail, and soundstaging complement each other in ways that make up for the weaknesses of many recordings. This "voicing" makes most digital recordings more musical. Far too many modern recordings are made with too many microphones, are miked too closely, or contain more upper-octave information than is natural. The CPA-1 compensates for these weaknesses. It also helps compensate for the lack of dynamics, soundstage width, and life in many analog recordings.

Having said this, I do not intend to go further into the issue of whether the CPA1 is "musical" at the expense of "accuracy." Music is an aesthetic experience, and any

reproduction of music relies on an accumulation of illusions rather than on the transmittal of some form of absolute truth. Do yourself a favor: Go and listen to the CPA1, and decide on its merits for yourself.

The Renaissance Seventy/Seventy's timbre has slightly less upper-octave energy than I feel is accurate. But the combination of this timbre and the amp's excellent musical dynamics and highly detailed upper-octave transients produce a frequency balance that beautifully complements many of my recordings. The amplifier sounded musically correct on a wide range of acoustic recordings of solo voice and instruments; this is a key test of whether an amp provides a realistic illusion of a live performance. The Seventy/Seventy emphasizes sweetness, transient detail, and clarity, delivering an exceptional amount of unusually listenable midrange detail. This is not an amplifier whose upper midrange makes Bach's complexities wearing or induces "Wagner fatigue" (before the composer achieves that all on his own).

The Seventy/Seventy is dynamic enough to render upper-octave transients extremely clearly, with excellent bite and excitement. The upper reaches of soprano voice, the violin, and percussion come alive.

Like all tube amps I've heard, the VAC cannot provide the deep bass power and extension of, for example, Krell's KSA-300S or Classé Audio's CA-400. The Seventy/Seventy's mid-bass also has a slight touch of warmth and lacks the tight transient response of the best solid-state amps. Overall, however, the bass is intensely musical and involving. Bass dynamics are very good, and the transition to the midrange is warm and natural, with no leanness.

THE RENAISSANCE SEVENTY/SEVENTY REMINDED ME OF JUST HOW GOOD TUBE AMPS CAN BE.

The amp's soundstage is not exaggerated yet has exceptional depth and width. It is very open and lifelike but not larger than life. Hall sounds and character come through as detailed as the recording permits.

Not surprisingly, the Seventy/Seventy does not have the dynamics of much higher-powered amplifiers, though it seems to have considerable headroom. As a result, it lacks the power to reach the deafening levels with many high-end speakers that some rock fans seem addicted to. Yet it does produce excellent dynamics with full-scale orchestral music, opera, and big-band jazz and with rock that does not rely on sheer sonic mass. A medium-powered amplifier like the Seventy/Seventy is perfectly capable of driving Thiel CS7 or B&W 801 Matrix Series 3 speakers to the maximum volume I want to hear.

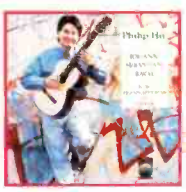
The Renaissance Seventy/Seventy is very quiet and has a minimum of tube noise. Its reproduction of low-level passages is as outstanding as its handling of louder passages, with the music emerging out of near-total silence. It has enough power to drive most top speakers to any sane level and proved totally reliable through months of listening, attributes not found in many Class-A triode amps. The Seventy/Seventy produced the best overall sound I have yet heard from my aforementioned Thiels and B&Ws, my Apogee Studio Grands, and a friend's Quad ESL electrostatics. It performed equally well with a range of tube and solid-state preamps and with AudioQuest, Discovery, and Wireworld speaker cables. The amp not only provided excellent performance, it did so consistently with a wide range of components.

One test of a product is how hard it is for me to send it back, and the Renaissance Seventy/Seventy was not an amplifier I gladly gave up. It reminded me of just how good tube amplifiers can be. Every amplifier design involves trade-offs, but the design choices VAC made in the Seventy/Seventy combine to produce a striking degree of musical synergy that gives new life to recordings and immerses you in the music.

Both the VAC CPA1 Mk II preamplifier and Renaissance Seventy/Seventy amplifier are outstanding. The CPA1 is more euphonic, perhaps more different in sound, but still intensely musical. The Seventy/Seventy is accurate and musical and is one of the most outstanding tube amps I've ever auditioned. These components make a superb pair, but their sound is sufficiently different that they deserve to be auditioned separately. A

CLASSICAL RECORDINGS

Illustration: Marina Sagona



Bach: New Transcriptions for Guitar

Philip Hii
GSP RECORDINGS
GSP 1012CD, CD; 51:30
Sound: A–, Performance: A+

There are no Olympic competitions for music, thank goodness, but if there were, a few young musicians would be setting dizzying world records (no pun intended) for instrumental virtuosity. Among them would be classical guitarist Philip Hii, who taught himself to play while growing up in Malaysia and now teaches and performs from a home base in Texas. His *Johann Sebastian Bach: New Transcriptions for Guitar* is an almost mind-numbing achievement in dexterity and musicality.

Bach did not, of course, write for the guitar, and there is even some question whether he actually wrote for lute, despite the well-known suites. Hence the guitarist, like anyone else playing a contemporary instrument, must turn to transcriptions. These rarely fit easily on the guitar and often result in performance compromises. Many versions are available for most of Bach's works, differing mainly in key transposition, fingering, and the positions where various passages are played. Hii has opted to make his own transcriptions (published by GSP), employing a novel approach that starts with a presumption of what Bach *might* have done with the guitar's challenges and an assumption that Bach, despite the guitar's limitations, would want his pieces performed up to tempo and charged with their inherent emotional content. Thus, Hii has taken liberties here and there, streamlining internal harmonies where necessary while maintaining the essence of the compositions. The results are stunning.

For this album, Hii has turned some of Bach's most endearing solo works into guitar showcases. Hii's muscular arpeggios ripple through such masterpieces as the Chromatic Fantasy and Fugue, BWV 903, and Sonata in E Minor, BWV 1023, whose dissonances sound as fresh and intellectually satisfying today as they must have three centuries ago. Less commonly heard in guitar programs are two more meditative hymns, the somber "Nun Komm' der Heiden Heiland," BWV 659, and the lilting "Ich ruf' zu dir, Herr Jesu Christ," BWV 639.

But the show stoppers are Toccata and Fugue, BWV 656, and Prelude, Fugue, and Allegro, BWV 998. The Toccata, by virtue of its difficulty, is rarely tackled on a six-string. Hii's stellar arrangement and reading rousingly capture the propulsive

MOZART

Piano Concertos (No. 9 in E-Flat Major, K. 271, and No. 27 in B-Flat Major, K. 595)

Nicola Frisardi, piano; Mozarteum Orchester Salzburg, Gérard Korsten
CHESKY CD136, CD; DDD; 64:05
Sound: A, Performance: A–

This pairing of an early Mozart concerto and the final one is an excellent introduction to the master's works in the genre. The balance of form and drama in the concertos distinguishes them from any of Mozart's other instrumental music. For example, there's the immediate entrance of the piano at the beginning of the Concerto in E Flat and the rich harmonies heard in the Concerto in B Flat.

Chesky's initial European recording (and its first digital orchestral recording) was made in the historic Mozarteum Great Hall in Salzburg. This hall's rich acoustics have been preserved via purist miking, direct to two-track. Proper balance between piano and orchestra is even more vital for Mozart than most other composers, and it's spot-on here. Though this is not an "original instruments" orchestra, the chamber-like quality of the music is elegantly portrayed. *John Sunier*

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rhythmic drive and the wide dynamic range required for this piece; it is spine-chilling. About two phrases into this performance, you almost forget it's being played on a guitar, not a keyboard.

If there is a piece of sonic ecstasy in the universe, it must be BWV 998. The Prelude spins a delightfully magical melodic web. Taken at a much faster pace than usual, it sets up the almost painful suspensions and passing tones of the deliberate and bittersweet Fugue. All these are then swept away in the racing finale of the Allegro, here played at a tempo that would make the most brazen heavy-metal speed demon proud. It's an experience that left me breathless and exuberant.

If there is a minor flaw, it's in the sound, which appears to have been recorded analog. The sound of Hii's guitar is full and warm and not drowned in excess reverb, but tape hiss occasionally peeps through the silence between movements as the music pots down. It's not especially distracting unless you crank up the volume, which the excitement of Hii's pyrotechnics invites you to do.

Fortunately for music lovers, there can never be a definitive Bach, but Philip Hii's *New Transcriptions for Guitar* must certainly join the ranks of the great performances and will undoubtedly give up-and-coming contenders an exciting goal to strive for. Do yourself a favor: Don't miss this album. (Available from GSP Recordings, 514 Bryant St., San Francisco, Cal. 94107.) *Michael Wright*

Oiseau Bleu

Songs by Massenet, Delage, Beydts, and Gounod

Darynn Zimmer, soprano; Gaït Sirguey, piano; Solisti New York, Ransom Wilson

NEW ALBION NA078CD, CD; 53:56

Sound: A–, Performance: A

The overriding virtue of this CD is its concept: a beautifully integrated experience in sound and print of French songs ranging from Romantic to modern. Darynn Zimmer projects them all tellingly; her voice is not particularly voluptuous, but it is flexible and sharply focused and her style polished. Though the recording is clean and appealing overall, a slight phasiness in the vocal pickup and instability of its position in the soundstage preclude a straight-A rating. *Robert Long*

Three French Song Cycles

Three major French song cycles fill this debut disc by the limpid-voiced mezzo Vesselina Kasarova, about whom I expect we will hear a great deal in the future. Her balance between exquisite control and compelling impulsiveness is just right in this music. Pinchas Steinberg matches both her attention to detail and her passion. The recording venue, like the orchestra, presumably was supplied by French Radio. The microphone placement is too close to suggest real concert acoustics, but it does let you hear clearly the details that the performers handle so expertly. The resulting pickup is enveloped in a spacious reverberance that is quite attractive, if not very specific. French texts and English translations are supplied. *Robert Long*

Berlioz: *Les Nuits d'Été;*
Ravel: *Shéhérazade;*
Chausson: *Poème de l'Amour et de la Mer*

Vesselina Kasarova, mezzo-soprano; ORF Symphony, Pinchas Steinberg

RCA VICTOR RED SEAL 68008

CD; DDD; 73:47

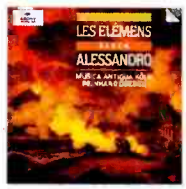
Sound: A, Performance: A+

Rebel: Les Elémens; Telemann: Sonata in E Minor for Septet; Gluck: *Alessandro*

Musica Antiqua Köln, Reinhard Goebel

ARCHIV 445 824, CD; DDD; 62:50

Sound: A, Performance: A+



Some pleasant, relaxing baroque music to begin the day, I thought while slipping this CD into my transport. Did I ever get a surprise! Even Haydn's "Surprise" Symphony is a wimp compared to Jean-Féry Rebel's "Les Elémens" Orchestral Suite; his opening "Chaos" movement took my breath away with its startling tone-painting. The other nine movements of this orchestral suite are less chaotic but freshly vivacious.

Rebel was an important member of the "24 Violins of the King" in the early 18th century. He is thought to have known about Vivaldi's "The Four Seasons," but he goes far beyond the animal sounds, storms, and similar effects that late baroque composers liked to throw into their stage music.

Georg Philipp Telemann's infrequently heard Sonata for Septet pays homage to François Couperin. Christoph Willibald Gluck's work did not have the acceptance that his other two surviving ballet scores had. *Alessandro*, subtitled "The Loves of Alexander and Roxana," was composed for the Dauphin of France. The goal was to change public opinion about his planned marriage to Marie Antoinette of Austria. The seven movements all have a heroic cast and were composed for large crowd scenes. The lengthy concluding Chaconne, which sounds like a Handel finale, provides fitting music for the ceremonial state occasion. Deutsche Grammophon achieves great sonic clarity and low-level detail in this Archiv recording. *John Sunier*

Tchaikovsky: Violin Concerto in D; Sibelius: Violin Concerto in D Minor

Leila Josefowicz, violin; Academy of St. Martin in the Fields, Neville Marriner

PHILIPS 446 131, CD; DDD; 65:15

Sound: A+, Performance: A+

When I hear of a child prodigy, I usually imagine a cute little Mozart entertaining royalty or a human pretzel performing gymnastic routines worthy of the Olympics. Neither stereotype fits the extraordinary Leila Josefowicz, who, at 17, makes her recording debut with the Tchaikovsky and the Sibelius violin concertos—works that she has been playing for years.

Like many prodigies, Josefowicz has studied with the best and has already performed with the world's great orchestras; unlike the typical performer of her age, she plays with remarkable emotional maturity. This is especially evident in the slow movement of the Tchaikovsky, where her huge sound and impeccable intonation are supported by a well-grounded interpretation. The Sibelius is equally thought out and intelligently played, with enough emotion to give the phrases power but not so much as to obscure them with syrup.

Neville Marriner and the Academy of St. Martin in the Fields give their usual excellent performance, but the audio quality is especially notable because of the recording of the solo violin. For each concerto, Josefowicz uses a

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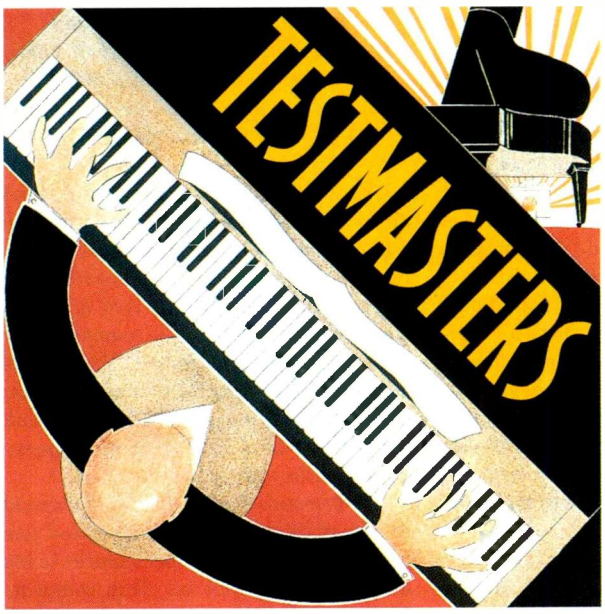

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different instrument. She plays the 1708 "Ruby" Strad for the Tchaikovsky and the 1739 "Ebersolt" Guarnerius del Gesù for the Sibelius; hearing the shift of tonal qualities is fascinating.

It takes audacity for a young artist to make a debut album with two works that have been recorded by every violin master of this century. Yet the rare combination of virtuoso fireworks and stylistic maturity makes this a debut album that is difficult to beat. If Leila Josefowicz continues her music career as she has begun it, hers will become a household name. *Patrick Kavanaugh*

Debussy: *Rodrigue et Chimène*

Chorus and Orchestra of the Lyon Opera, Kent Nagano
ERATO 4509-98508
Two CDs; DDD; 1:49:44
Sound: A–, Performance: A

When the Lyon Opera inaugurated its new house, it found a rare musical plum for the occasion: the world premiere of a not quite completed, almost forgotten opera by Claude Debussy, one of history's most influential composers and probably the greatest in France's history. The fact that Debussy eventually abandoned this project speaks for itself. But history has unshakably established his monumental genius, making this piece of musicological archeology an event.

The plot can be reduced to a single sentence, quintessentially characteristic of the Romantic age: Honor compels the young cavalier Rodrigue to kill his beloved Chimène's wicked father (in this instance, within the context of that grand old blood-and-thunder Spanish yarn *El Cid*). Improbable as it eventually came to seem, musically speaking, young Debussy made not one but two pilgrimages to the Wagnerian shrine Bayreuth; that perhaps explains his temporary amenability to this stilted, highfalutin libretto, cranked out by the (definitely) minor poet Catulle Mendès. Before long Debussy would define music as "a dream with the veils removed," address his revised sensibilities to Maurice Maeterlinck's impressionistic drama *Pelléas et Mélisande*, and forever change the course of musical and operatic history.

Claude Samuel's conscientious notes in the booklet provide intricate and fascinating musicological details, including the protracted languishing of Debussy's original score in, of all places, the Pierpont Morgan Library in Manhattan. When Debussy undertook this project, he already had behind him his great early orchestral gem, the *Prelude to the Afternoon of a Faun*. And he would abandon *Rodrigue et Chimène* to devote himself to *Pelléas et Mélisande*, so one can hardly dismiss *Rodrigue* as a mere youthful indiscretion. Occasional whole-tone bits, intricate harmonies, meltingly beautiful modulational shifts—almost all the Debussy trademarks inform the music, no matter how incongruous that overwrought libretto.

Debussy never began orchestrating the work, and in culturally chauvinistic France his publisher's selection of a *Russian* composer as its orchestrator of choice astonishes. Yet Edison Denisov's work here amply manifests his mastery of Debussy's idiosyncratic instrumentation: It *sounds* authentically Debussyan. As for overall sound, Erato's recording team gets high marks for fidelity, resonance, and immediacy.

In view of the French national treasure involved, a remarkable cosmopolitanism characterizes this enterprise. Brilliant young conductor Kent Nagano hails from California. Two Anglophones, Laurence Dale and Donna Brown, sing the title roles in impeccable French. The cast may include only one operatic celebrity, Belgium's admirable baritone José van Dam, but estimably capable artists sing even the supporting roles commendably. In all respects, *Rodrigue et Chimène* came through my speakers radiantly alive. *Paul Moor*

The Romantic Mass: Choral Works by Rheinberger and Brahms

Saint Clement's Choir, Peter Richard Conte
DORIAN DISCOVERY DIS-80137
CD; DDD; 57:32
Sound: A–, Performance: A

This album's title may seem like a contradiction to those familiar with the typical, innovative musical experiments of the 19th century. We usually associate Masses with specific ages of faith (such as the medieval or baroque era) or with specific Catholic composers (such as Haydn, Mozart, or Schubert). Yet this lovely recording demonstrates that sacred choral music still flourished in the later Romantic period, and it links the religious expressions of earlier epochs with that of the 1800s.

The Romantic Mass is divided between little-known choral works of Brahms and compositions of one of his contemporaries in Munich, Joseph Rheinberger. Both composers had an exceptional awareness of the music from the past, and this appreciation is conspicuous in their choral works. Except for the advanced chromaticism, especially in the Three Motets of Brahms, the vocal style and the contrapuntal techniques often call to mind the beauties of Monteverdi and Palestrina.

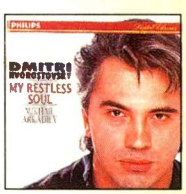
The small choir of St. Clement's Church in Philadelphia is perfect for these intimate choral pieces. Immediately striking is the interesting blend of voices in the alto section, which contains only one female plus countertenors. The result is enchanting, and the four sopranos' pure, precise tone is especially beautiful. Director Peter Richard Conte is not only a noted choirmaster but also the Court organist (yes, the Court organist) at the John Wanamaker (now Hecht's) department store in Philadelphia, home of the world's largest playing pipe organ.

The recording was made at the Daylesford Abbey in Paoli, Pennsylvania. The cathedral's sound is gorgeous, though a somewhat drier environment would have brought out the inner parts in Brahms' Missa Canonica. Nevertheless, this is a splendid CD for those who want to explore music beyond the standard repertoire. *Patrick Kavanaugh*

MY RESTLESS SOUL

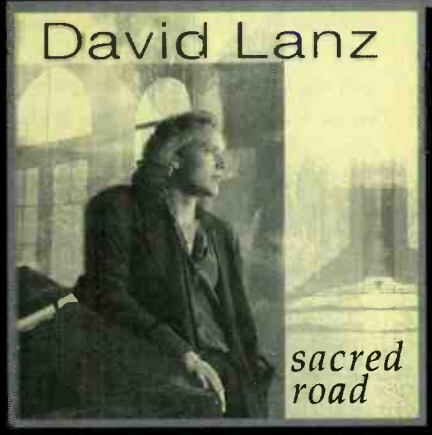
Songs by Tchaikovsky, Borodin, Rimsky-Korsakov, and Rachmaninoff

Dmitri Hvorostovsky, baritone; Mikhail Arkadiev, piano
PHILIPS 442 536, CD; DDD; 57:20
Sound: A, Performance: A



This recording, fine as it is, makes me nervous. The sterling musical sensibility and opulent vocal endowment that dominate the aptly titled Russian recital are too precious to be squandered. But Philips seems to have been promoting Dmitri Hvorostovsky more as a hunk than as a talent; is he beginning to accept this image of himself as truth? At times, as when he forces a climax slightly beyond the point that the song and his vocal prowess render comfortable, I believe that the baritone is. It's a perilous path to tread, and I fondly hope I'm wrong. Texts are supplied only in English and German translations, by the way. *Robert Long*

World CLASS



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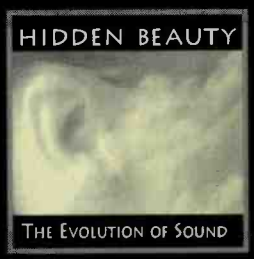

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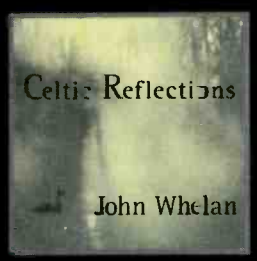

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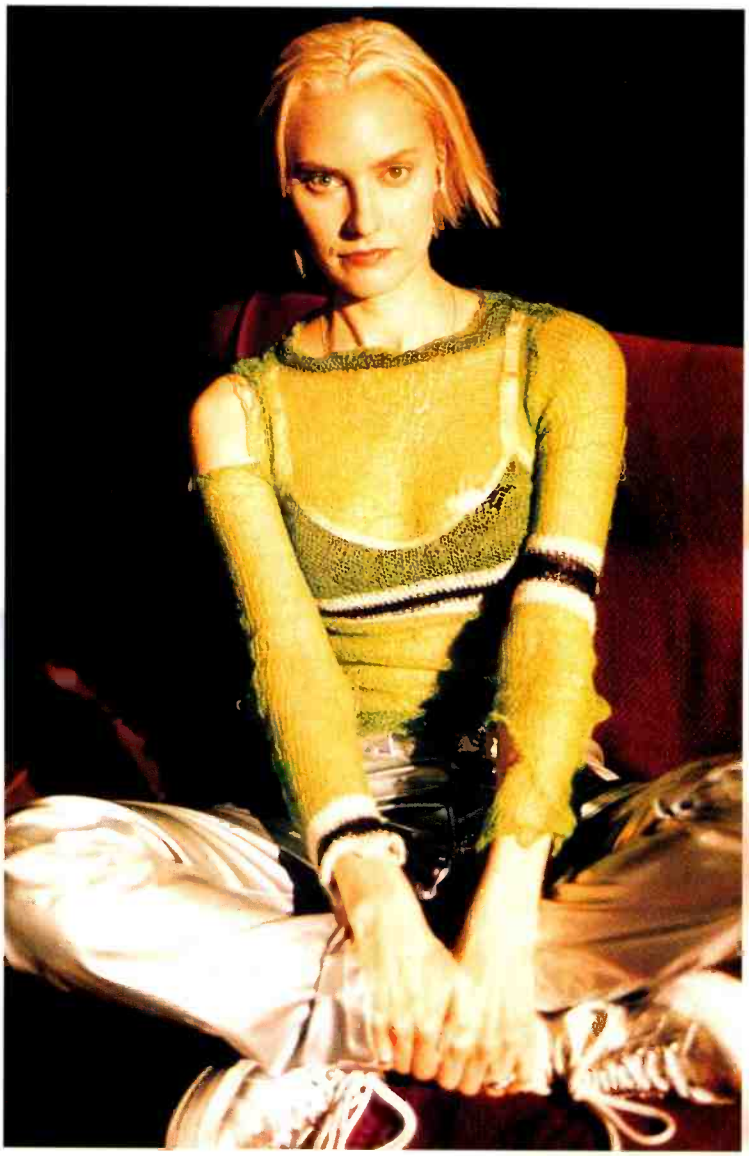

Photograph: Kate Garner

I'm with Stupid

Aimee Mann
DGC DGCD-24951, 56:21
Sound: B+, Performance: A–

Ah, the long-gone days of label flogging. Back in the punk/New Wave era, with the likes of Graham Parker ("Mercury Poisoning") and The Sex Pistols ("EMI") leading the way, it was practically *de rigueur* for seditious performers to rail at the clueless suits who mangled and mismanaged their careers. But here in the '90s, when every record label is affiliated in some manner or another with one of a handful of entertainment conglomerates, it's become a bit too chancy for snarling dogs to bite the hands that feed them. After all, you just never know where that hand has been or where it's going.

Aimee Mann, however, unveils her very own label screed for the mid-'90s on her second solo album, and it's a direct hit. A song like "You're with Stupid Now" stings all the more because of Mann's understated introspection: "Though you pay for the hands they're shaking/The speeches and the mistakes they're making/As they struggle with the undertaking. . .you're with stupid now." Ouch! Someone in a boardroom just flinched.

Mann has, nevertheless, earned the right to be a little indignant. After 'Til Tuesday, the band that helped launch her career, broke up, it was eight years before Mann's first solo album (1993's *Whatever*) was released. Over the same period, she's been entangled with four different labels. That's too bad, since *I'm with Stupid* is an inspired enough recording to make you wonder what we've been missing while Mann has been going over the fine print.

What we've got here is what we've come to expect from Mann: pop arrangements of literate songs that deal with knotty relationships involving lovers, critics, or corporations. Mann co-wrote a song with Elvis Costello for the final 'Til Tuesday album, and it was an apt pairing. Like Costello at his best, Mann is equal parts adroit and direct. She and producer/multi-instrumentalist Jon Brion keep the songs pithy and punchy, bringing on such guests as Juliana Hatfield (on the particularly intoxicating "You Could Make a Killing"), Suede alumni Bernard

SALIF KEITA

"Folon". . .The Past
MANGO 162-531 022-2, 56:21
Sound: A, Performance: A–

Mali-born/Paris-based singer Salif Keita has been on the verge of World Music stardom for years. He's worked with musicians and producers who have tried to give his sound a contemporary veneer, but the results have always been mixed. Surprisingly, he's reunited with many of these people and created his best album to date. "*Folon*" was produced by synthesist Wally Badarou (another African living in Paris) and keyboardist Jean-Philippe Rykiel. They have brought out the African in Keita, populating his music with balafons and n'gonis that heighten the tribal groove.

With deep roots in African m'baquanga music, "*Folon*" nevertheless has a distinctly modern resonance. Keita is an impassioned singer, intoning his heartfelt songs (some sung in Zulu) against chanting African choirs. A standout is the 10-minute "Mandjou." It's a trance-skank workout of Afro-beat, dub, and Glaucus Xavier's Wayne Shorter-inspired sax framing Keita's ecstatic praise poem. *John Diliberto*

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Butler (with whom she co-wrote "Sugarcoated"), Michael Penn, and Squeeze's Chris Difford and Glenn Tilbrook for occasional adornment. But mostly Mann and Brion maintain a hands-on approach, and the result frequently recalls Abbey Road-period Beatles.

When dumb things block their paths, artists can sink to the required depth or risk taking time off to explore other options. Aimee Mann's *I'm with Stupid* is the intelligent response *Steven Stolder*

The Land of Heroes

Jorma Kaukonen
AMERICAN HERITAGE/RELIX
RRCD2072, 38:33
Sound: B, Performance: A–

Thirty years after his emergence from the Haight-Ashbury scene, Jorma Kaukonen remains a guitarist's guitarist, and the proof is

on *The Land of Heroes*, his first studio album in 11 years. The Jefferson Airplane's co-founding member offers a set of traditional songs and originals, as well as a few songs by his mentor, Reverend Gary Davis. Kaukonen culled inspiration from his ancestors' stories of immigrating to America from Finland in the early 1900s, and his extraordinary talent as a storyteller and virtuoso instrumentalist is best exemplified on the title track. *The Land of Heroes* has a spiritual character that's clearly evident in his gentle Dobro playing and passionate vocals.

With instrumentation limited to guitars and occasional bass and keyboards, Kaukonen and collaborator Michael Falzarano have created a modern country blues/folk/bluegrass opus that should satisfy longtime fans and cultivate some new ones. Throughout, *The Land of Heroes* maintains an ambience that makes you feel you're sitting by a fire while Jorma Kaukonen, in the next seat, is playing his guitar and singing. *Lauren Somerstein*

Salt peter

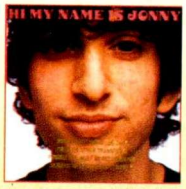
Ruby
CREATION/WORK OK 67458, 48:32
Sound: A–, Performance: A–

Ruby's singer/songwriter Lesley Rankine kicks off this debut album with a question: "Why can't I feel the things that I'm supposed to?" She's also a little mixed up, declaring "I cry when it feels good and I scream because I want to." Rankine's demons are rampant; she erupts so completely, you might hear her as an industrial-strength P.J. Harvey. She grunts, shouts, hollers, and whispers over a swarming electric landscape that's occasionally punctuated by pulsing beats and bumps.

Hi, My Name Is Jonny

Jonny Polonsky
AMERICAN 9 43055-2, 24:17
Sound: B, Performance: A–

About a year ago, we received in the mail a Frank Black-produced demo tape by a new guitarist/songwriter/singer named Jonny Polonsky. It was one of the best pop/rock tapes we had gotten all year, adolescent up-tempo songs about hormonal urges with little or no pretension. On his first album, Polonsky has lost none of the verve from his demo. These 10 songs of youthful angst are well played and could easily have come from the 1965-66 English rock scene; the vibe of Ray Davies (circa "Well Respected Man" or even as late as "Waterloo Sunset") and the more lyrical Jagger/Richards period ("Mother's Little Helper"/"Lady Jane") loom large. Our only complaint: too short! With songs



that get to the point, you have to deliver at least a dozen to make that leap from vinyl to CD worthwhile. C'mon, Jonny, you can do it! *Jon & Sally Tiven*

Rankine's partner in Ruby is Mark Walk, who played most of the instruments on *Salt peter* and produced, engineered, and mixed it. This album's strange brew of sandpapery textures is set against wide-open spaces; the music first abrades, then seduces. Rankine cites Edgar Allan Poe as a major influence, but Jim Morrison and Nick Cave are also part of her maelstrom. Ruby's music is preoccupied with fear, power, and physicality, but it's hardly an assault on your ears. The approach is more subtle, with words and sounds combining to seep under your skin. You won't find *Salt peter* filed under "easy listening."

On "Bud," Motown-ish string samples play against twisted horns as Rankine warns, "I'll collect your jewels in my bag/And take them back to mama." By the time Ruby takes a stab at a love song, you're ready for anything. On

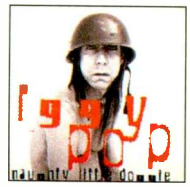
the album's closing song, "Carondelet," Rankine confides, "I'd open my heart just to see what's inside"; her scratchy vocal comes across as almost an inner dialog. She has finally cast off her armor to reveal a beating heart, a happy ending to a harrowing journey. *Steve Guttenberg*

Naughty Little Doggie

Iggy Pop
VIRGIN 41327-2, 38:46
Sound: B, Performance: B+

There's a plush, misty-eyed moment at the end of this latest Iggy outing, a big timpani-backed ballad called "Look Away" that practically lulls you to sleep. And that's it, period, the only quarter given on a gut-wrenching rock 'n' roll record that's straight out of Stooges 101 and a working postscript to Pop's manic 1993 album, *American Caesar*. Pop takes no prisoners, yowling in his patented damn-but-those-headphones-are-tight style while a phalanx of riffed guitars thunders like an old warship. The energy level is so punkishly high (on anthems such as "To Belong" and "Heart Is Saved"), you'd never guess the guy's pushing 50.

In a couple of places, the urgency sounds retreaded, as on the cliché-hampered "Knucklehead." But a weak track from the ole Iguana



is worth 10 of its modern, alterna-chart counterparts. And when he's firing on all six, you better run for cover. The swaggering strut of "Pussy Walk," for instance, has spoken-word verses that find the singer in a reflective mood, contemplating (purely for aesthetic purposes, you understand) female genitalia. In "Shoeshine Girl," he passes a rather entrancing lass at the airport; smitten, he'd love to have sex with her, but—darn the luck!—he's running short on time. If Pop has his libido on a leash, the tether must be at least a few city blocks long.

The rest of *Doggie* is rife with tongue-in-cheek sarcasm. "Innocent World" implies exactly the opposite, while "Keep on Believing" addresses, not longevity, but continued pleasures of the flesh. And, of course, when Pop screams (literally) that the only important thing in life is "to belong here," his hidden agenda is clear: He'll never fit in with polite society, which, after all these rowdy years, still suits him just fine. *Tom Lanham*

Viva! La Woman

Cibo Matto
WARNER BROS. 9 45989-2, 48:18
Sound: A, Performance: A

Cibo Matto is the brainchild of two Japanese women living in that vortex of cross-culturalism known as Manhattan's East Village. Vocalist Miho Hatori claims to be the illegitimate daughter of jazz great Sun Ra. That

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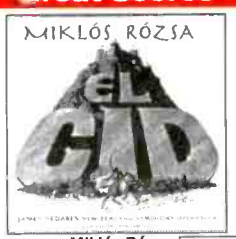

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might account for her out-of-this-world voice: Yoko Ono as a wannabe rapper, or maybe Suzanne Vega with an accent. But that voice grows on you. Hatori's partner in crime, Yuka Honda, is Cibo Matto's sole instrumentalist. An eight-year veteran of the downtown music scene, she's an incredibly versatile keyboard player. Hatori and Honda's interlocking talents were drawn together by a love of everything unconventional, yet their music's accessibility is never in question: They've cooked up an album chock-full of songs about food, and what could be more appetizing and universal than food? (Cibo Matto means "food madness" or "crazy food" in Italian.) *Viva!*'s menu of song titles is a touch eclectic: "Sugar Water," "Beef Jerky," "Birthday Cake," "White Pepper Ice Cream." Hatori and Honda clearly haven't bothered to study nutrition; these girls just want to have fun.

Cibo Matto's playfully bizarre universe of sounds never stops: Hip-hop beats, mysterious sound effects, and snatches of Ellington, Ennio Morricone, and Afro-Cuban jazz are all interspersed with real instruments. *Viva! La Woman* is an impressionistic smorgasbord of sonic delights. The genius of this recording is how all this stuff holds together; it's like a big souffle that threatens to collapse but somehow never does. *Steve Guttenberg*

Black Love

Afghan Whigs
ELEKTRA 61896-2, 53:11
Sound: A–, Performance: A–

Ever since Afghan Whigs frontman Greg Dulli graduated from film school, he has been obsessed with the art of moviemaking. So it's no surprise that Afghan Whigs' fifth album, *Black Love*, flows like a cinema blockbuster. Throughout, the band focuses on image, atmosphere, and melodrama, unveiling stark vignettes of passion, persecution, and revenge. Instead of relying on melody and hooks, Afghan Whigs establishes mood and setting, then fills in the frames with texture and emotion. Diehard fans of the band's last record, *Gentlemen* (a bitter, biting, yet ultimately catchy narrative of dysfunctional relationships), might give this follow-up a "thumbs down." But taken in its entirety, *Black Love* is more diverse and long-lasting, with a broader array of musical styles and emotions.

The album reflects Afghan Whigs' kinship with black music. *Gentlemen* may have introduced some Whigs fans to Stax and Motown, whereas *Black Love* is truer to that music's roots. "Blame, Etc." features wah-wah guitar surges, twanging bass, strings, and a fierce funk groove that bring to mind Isaac Hayes, while "Step into the Light" is a devotional track full of longing vocals, gliding pedal-steel guitar, and a chiming organ that recall the passion of Marvin Gaye. But although the band revels in exploring the heart of soul music, it never strays too far from its alterna-punk upbringing: On "My Enemy" Dulli howls over a wall of scrawling guitars, and on "Honky's Ladder" undulating rhythmic scree and weepy slide guitar blend with a great R&B rhythm.

There's more shade and texture to *Black Love* than meets the eye. As Gene Siskel might conclude, "a passionate and truly enduring production." *Jon Wiederhorn*

It's Hard To Believe It: The Amazing World of Joe Meek

Various Artists
RAZOR & TIE RE 2080-2, 53:35
Sound: C, Performance: C

Joe Meek broke the rules. All of them. From the late '50s until his death in 1967, this audio innovator shook up the staid British recording industry with his I'll-try-anything approach to making pop records. His tiny North London studio cranked out hundreds of singles, and *The Amazing World of Joe Meek* offers a panoramic overview of Meek's finest work. Like Phil Spector's, Meek's production style frequently overshadowed the contribution of the performing artist: The sound was the star. Meek painted with sound; his palette of dense sound effects, oceans of reverb, and the squelched dynamics of heavy compression ensured that his records jumped out of '60s radios.

The world was listening in 1962 when Meek released a record by The Tornados interpreting his own composition, "Telstar." The record even crossed the Atlantic, becoming the first British single to hit No. 1 on the U.S. charts. Inspired by the pioneering Telstar communications satellite, Meek employed an early synthesizer, the clavioline, to create a new sound that would suggest the sounds of space.

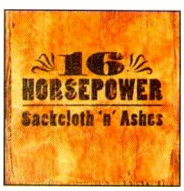
Meek was an early pioneer of close-miking drums, and he constantly searched for ways to push the rhythm forward. In 1964, he produced The Honeycombs' "Have I the Right," augmenting the rhythm with a new twist: The band stomped out the beat on a staircase. This catchy tune was Meek's second and final U.S. blockbuster. Other highlights include the two tracks by The Blue Men, "Valley of the Saroos" and "The Bublight," which form a dreamy interlude. Their delicate melodies go beyond the lovable kitsch that makes up much of this CD.

The Amazing World of Joe Meek might just be the perfect soundtrack for Quentin Tarantino's next foray into dementia. Yes, much of Meek's work is dated and crude lo-fi, but that's its charm. It's so retro it's new all over again. *Steve Guttenberg*

Sackcloth 'n' Ashes

16 Horsepower
A&M 31454 0416 2, 42:58
Sound: A–, Performance: A

Like Flannery O'Connor and Carson McCullers, ex-Southern gentleman David Eugene Edwards is obsessed with the dissolution of modern man and fascinated with the latent amorality waiting within us all. And to state his case, he's gone back to a frontier-justice way of thinking: On *Sackcloth 'n' Ashes*, Edwards and his Gun Club-ish trio, 16 Horsepower, employ such vintage instruments as bandoneon, banjo, slide guitar, and bullet mikes to create a frontier-brutal kind of sound. Edwards' emotive, wolf-bay singing is equally primitive and his imagery stark and Wild West-evocative. All told, it makes for one hell of a great debut album.



Edwards doesn't mince words; his songs reflect sin and salvation, fire and brimstone, and the image of a pale horse and a scary pale rider—all tied together with some dirty Appalachian twine. In fact, there's so much lyrical gold in them thar hills, it's a wonder so few have mined 'em before.

Jeffrey Lee Pierce tried to achieve the same gunfighter intensity in Gun Club, but he ultimately collapsed back into the blues. Edwards looks to be in it for the long Conestoga haul, judging by this extraordinary expedition. Just don't get trapped in a snowy Colorado pass with the guy. *Tom Lanham*

FAST TRACKS

The Return: *David Massengill* (Plump 5903-2, 51:58). Massengill writes songs that focus on outsiders: orphan brothers on a train ride to where they will part for life, a blind man in the subway, a modern fugitive Jesus, et al. He wields great empathy, humor, and insight and is blessed with a sturdy melodic gift. Evocative production from Steve Addabbo and guest vocals by The Roches, Jane Siberry, and Suzanne Vega add the right touches. **M.T.**

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JAZZ~BLUES
RECORDINGS

Live at the Village Vanguard

Joe Lovano
BLUE NOTE 29125-2
Two CDs; 2:07:28
Sound: A, Performance: A+

The sheer breadth and ambition of tenor saxophonist Joe Lovano's artistic endeavors speak of a consistent level of achievement, one that transcends any stats page or critic's poll. Like all great players (tenor saxophonists or center fielders or point guards), Lovano raises the level of the game—and the level of those around him.

Look no further than New York's Village Vanguard and its intersections with Lovano's itinerary for illustration of the saxophonist's versatility. In four separate weeks, Lovano brought four distinct ensembles into the venerable jazz room, each reflecting a different facet of his diversity. There was a pianoless quartet featuring trumpeter/flugelhornist Tom Harrell, bassist Anthony Cox, and drummer Billy Hart; another quartet with pianist Mulgrew Miller, bassist Christian McBride, and drummer Lewis Nash; a trio with Al Foster and Cecil McBee; and Lovano's Universal Language group, which includes pianist Kenny Werner and vocalist Judi Silvano. *Live at the Village Vanguard* presents the first two (and arguably the best) of these groups, in separate gigs in 1994 and '95. Here we can sense the brilliant fire at the core of Lovano's gleaming musical presence and his straight-ahead soul.

Disc one's seven tracks introduce Lovano's quartet with Harrell, Cox, and Hart. It's easy to compare this band to Ornette Coleman's pianoless group of some 30 years ago; the album's opening track, "Fort Worth," makes this reference especially clear. But Lovano, with his singular tone, and Harrell, a gorgeously idiosyncratic player, never overtly echo Coleman's work with trumpeter Don Cherry. Instead, the group as a whole gives Lovano's composition a sense of Coleman's "happy cry" and at times hints at the entropic energy of his "harmolodics." Early on, Lovano offers a tender reading of "I Can't Get Started,"

free at last

Various Artists
B&W MUSIC BW076, 54:25
Sound: A+, Performance: A–

Freedom should always sound this good: free, like Mandela with a (Don) cherry on top. But freedom defies domination and classification, not to mention convention. B&W's Outernational Meltdown series pits Brazil's Airto Moreira and José Neto, the United Kingdom's Byron Wallen and Andrew Missingham, and a posse of South African musicians (led by Pops Mohammed and Sipho Gumede) against the forces of techno-apartheid; the result is equal parts crusade and celebration.

The first of the series, *Free at Last*, neatly encapsulates the various aims of the venture: folk tradition, township pop, South African trad-jazz, and Afro-fusion meet on seven long tracks that feel as extemporaneous as Wallen's trumpet solos. A Miles-inspired "Hungry on Arrival" shows off Neto's guitar and Max Mntambo's vocals. Waves of marimba, xylophone, shakers, and birdcalls are a prelude to the outstanding percussion summit, "Giya Kasiamore." Folksy guitar, a Mbira-mouthbow breakdown, and lush vocal themes await.

Limitations of the South African recording studios are apparent. You can't, for example, count the cowries on the shekere or identify the wood of Airto's djembe. Barring these, the sound is phenomenal: The crackle of a million kinds of percussion and the spontaneity of live vocals have a fidelity that rarely sounds this much fun. You can almost hear the system crack up on the album's closing jam. Such are the hazards involved in any bold enterprise, but in the end, *Free at Last*'s exuberance carries the day. *Mark Schwartz*

Photograph: Guy Aroch

with Harrell's flugelhorn offering tidy harmonic support near the end. Harrell's beautiful tone is deceptive; like Lovano, he also ventures out onto improvisational high wires and makes good use of the harmonic space left by the piano's absence.

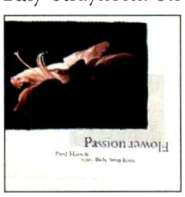
Disc two features seven tracks of Lovano's quartet with Miller, McBride, and Nash. Where the first disc dazzles in its clever permutations of four instruments and an artful use of space, the second triumphs through sheer execution. Again, Lovano pays tribute to some of his musical predecessors (Coltrane, Bird, Mingus, and Monk), but his goal is of a spiritual, not didactic, nature. Monk's "Reflections" is lent a cool, driving swing. McBride's bass tone is so deep and rich that he mines one single note on Coltrane's "26-2" without ever sounding repetitious.

Even in the packed Village Vanguard, the crowd could focus on such nuances as Harrell's delicate use of silence, Lovano's breathy end to an upward run, and Nash's stop-time rhythmic statements. The wedge-shaped, acoustically superior Village Vanguard is steeped with jazz history; this club challenges a player to interpret, to turn pages—or risk being buried by the weight of it all. But the broad-shouldered Lovano is very much his own man, one who never shrugs off tradition. The saxophonist has succeeded in establishing his own distinct improvisational style, drawn as much from be-bop and contemporary classical influences as from '60s exploration. Here is the proof. *Larry Blumenfeld*

Passion Flower

Fred Hersch
NONESUCH 79395-2, 62:44
Sound: A+, Performance: A+

Fred Hersch's 13th album is entirely devoted to the music of Duke Ellington's alter ego, Billy Strayhorn. Strayhorn was an extraordinary composer, and his lyrical, impressionistic, and classically influenced music is a perfect focus for pianist Hersch. Hersch's own originals and arrangements are marked by many of the same qualities, including beauty, vulnerability, and humor.

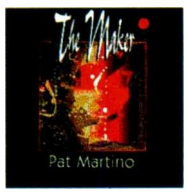


The dozen tracks move smoothly through different moods and instrumentations, similar to those in the suites that Strayhorn created for the Ellington band. "Elf (Isfahan)," for example, is from the *Far East Suite*. Hersch looked for a few pieces that are rarely performed today. One of those, "Rain Check," has been reduced from Ellington's large ensemble version to Hersch's trio. Some, like the lovely but hardly obscure opener, "Lotus Blossom," are for solo piano; the bluesy "Tonk" is a piano duet with Nurit Tilles. The lone vocal track features Andy Bey on "Something To Live For," while the remaining tracks alternate Hersch's trio with strings. Two more familiar Strayhorn tunes, "Passion Flower" and "Lush Life," close out this superb and deserved homage, with the latter basking in a piano concerto treatment. *John Sunier*

The Maker

Pat Martino
EVIDENCE ECD 22121-2, 51:02
Sound: A, Performance: A

Since his early days on the organ circuit with Charles Earland, Brother Jack McDuff, and Don Patterson, guitarist Pat Martino has been regarded as an icon—a player's player with godlike chops. During his periods with the Prestige label in the '60s and Muse in the '70s, Martino's lightning lines were unmistakable; nobody else burned through the changes with such a ferocious, fluid attack, blowing lengthy lines with uncanny endurance and a heightened intensity that went a step beyond his boyhood idol, Wes Montgomery.



All that came to a sudden, tragic halt in 1979, when Martino receded into silence after a severe brain hemorrhage. Robbed of his memory and motor skills, he had to methodically reteach himself the instrument that had been his lifeblood for more than 25 years. After years of painstaking physical therapy and rededication to the intricacies of guitar theory, Martino managed to return to form and resume his career in 1987. A live recording from around that time reveals the once-godlike guitarist struggling to keep stride with his past accomplishments. He didn't record again until 1994's *Interchange*, which showed a marked improvement in technique and the flow of ideas.

With *The Maker*, Martino shows flashes of the fabled technique of old, with no grandstanding. On tunes like the driving opener "Noshufuru" and "You're Welcome to a Prayer," his warm, muted tones and staccato, single-note lines blend well with James Ridl's lush piano voicings to create a kind of conversational flow. Drummer Joe Bonadio's open-ended, interactive approach allows the conversation to develop on "The Changing Tides." And bassist Marc Johnson, always rhythmically solid as a rock, proves himself a formidable soloist on "Noshufuru" and "Yoshiko."

Martino may not be flying on this one, but he's never played anything lovelier than the dark, Zen-elegant ballad "Yoshiko." And he's never sounded more at peace with himself than on the buoyant, Brazilian-flavored "This

Autumn's Ours." At age 51, with a life-threatening tragedy behind him, Pat Martino has arrived at a place where composition and his band take precedence over the exhibition of blazing guitar chops. *Bill Milkowski*

Groovy

EXTREME XCD-033, 52:41
Sound: A–, Performance: B+

Ming

Slowly
INSTINCT EX320-2, two CDs; 1:47:02
Sound: A, Performance: A

The initial excitement of acid jazz has cooled considerably; every day brings another truckload of hip-hop and horns that's more retread than retro. Fortunately, two new releases prove that post-jazz for party people has entered its metaphase.

Dan Burke's one-man band, Groovy, is either biting satire or devilishly kitschy: a sample-heavy deconstruction of disco bumping with atmospherics courtesy of Sun Ra's galaxy. "Inclimate" starts the party with a hip-hugger bass-and-timbale threatening to implode under ever-ascending space drones, while "Inventing Zeros" throws 007-style horn hits around the first few guitar scratches of "Shaft." Cutting and mixing with the abandon of a true aficionado, Burke takes the reliable bounce of disco and soul grooves and fashions something unexpected, unnerving, and not half as derivative as you might at first expect.

If there's enough irony in your life, Slowly's two-disc debut is sheer psychoactive experimentation. A full house of acid jazz, trip-hop, and ambient talent (from Bjork collaborators to The Chemical Brothers) updates a fusion vibe with hi-fi dub effects and turntable scratching. The groove is organic and precise: Bracing flute, fluid guitar, and cool, muted trumpet punctuate the decidedly velvet bass throughout.

But as far out as *Ming* gets, the real eye-opener is the bonus CD, which remixes the entire album along nearly every electronic genre imaginable. Autechre's remix of "On the Loose" strips down to a far-off crackle of drums like tracer fire, panning from left brain to right brain. And the Tribal Drift mix of "Rites of Spring" bridges ambient and jazz with menacing jungle breakbeats that turn friendly under a wild flute solo. Remix kings C.J. Glover, Chance, and Drum Club are also on hand for a harmonic convergence of '90s instrumental music that kisses the old acid-jazz nouns goodbye. It's time to bring on the modifiers! *Mark Schwartz*

LEE MORGAN

The Complete Blue Note Fifties Sessions

MOSAIC MD4-162, four CDs; 4:17:59
Sound: A, Performance: A

As the long, angular melodies of early 1950s be-bop yielded to the more harmonized sound of hard bop, one trumpeter rose above the rest to epitomize the genre's combination of heady lyricism and high emotion: Lee Morgan. Emerging from the shadow of fellow trumpeter Clifford Brown, Morgan injected a highly advanced technique and versatility into musical improvisations of reckless abandon.

Although often recognized for his bluesy, R&B-tinged hit from 1964, "The Sidewinder," Morgan's talent shines on less constraining vehicles, such as the Benny Golson originals in this box set. The 37 tracks cover Morgan's earliest sessions as a leader, from November 1956 through February 1958, a fertile period in his development.

While it's true that the young Lee Morgan also shone as a sideman on records by Art Blakey, Jimmy Smith, and numerous others, this overview gives excellent insight into the precocity of one of jazz's true stylists as he broke out on his own. (Available from Mosaic Recordings, 35 Melrose Place, Stamford, Conn. 06902.) *James Rozzi*

Inspiration

Eddie Henderson
MILESTONE MCD 9240, 71:33
Sound: A, Performance: A–

Eddie Henderson is distinct from most of today's trumpeters: Though he understands Miles Davis's aesthetic of using silence and space to create power and meaning, he doesn't cop Miles's sound (or Freddie's or Louis's or anyone else's sound, for that matter). Since gaining recognition more than 20 years ago in Herbie Hancock's sextet, Henderson has carved out a singular approach.

A devotee of the martial arts, Henderson's powers of concentration inform his playing, which is at times meditative, at other times explosive. Lovingly produced by Todd Barkan, *Inspiration* captures Henderson's essence, as well as his full dynamic and expressive range, more fully than any previous recording.

Pianist Kevin Hays, vibist Joe Locke, bassist Ed Howard, and drummer Lewis Nash work regularly with Henderson. Their shared sensitivity shows on every track and is especially evident when Locke's vibes and Henderson's horn double lines. Soprano saxophonist Grover Washington, Jr., shows up on Benny Golson's "I Remember Clifford" and Herbie Hancock's "Oliloqui Valley"; Washington proves a restrained and compassionate foil for Henderson.

The album's title clearly refers to artists who have influenced Henderson most: Hancock, Davis, and Clifford Brown, among others. However, what is most affecting is not what went into Henderson's horn but what has emerged from its bell. Nowhere is this more clearly displayed than on his reinventions of such seemingly innocuous songs as "Surrey with the Fringe on Top" and "When You Wish upon a Star." Henderson's horn is alternately tender and harsh, offering up gleaming round tones one moment, only to dissolve into muted asides and silence in the next. *Larry Blumenfeld*

Screaming Headless Torsos

DISCOVERY 77019, 57:35
Sound: A, Performance: A

Guitarist David Fiuczynski is an inspired maniac, a fretboard visionary with one foot in the 21st century. Sure, he plays the same old six-string that axe-slingers have been swinging on since the days of Charlie Christian. And he's got the audacious speed and chops like all other modern-day shredders. But he thinks differently from the rest and, consequently, plays like no one else.

Fiuczynski has already demonstrated his mondo facility in various contexts, playing with, among others, rapping pop-funk diva Me'Shell NdegéOcello, former Mingus sideman Jack Walrath, and avant jazz pioneers Muhal Richard Abrams and George Russell. He's even stretched his whammy bar to the limit in Lunar Crush, his raucous fusion outfit with organist John Medeski. But Screaming Headless Torsos has been Fiuczynski's personal project since his days at the New England Conservatory and has gone through various permutations since its inception.

The group, in its current incarnation, is a frightfully hard-edged, high-energy ensemble with connections to hip-hop, punk, fu-

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Bill Milkowski

Finger Painting

Joe Beck

WAVETONE RECORDS WT8634, 48:28
Sound: A, Performance: B+

Over the years, guitarist Joe Beck has recorded everything from funk and Latin to straight-ahead jazz. In spite of his workmanlike approach, Beck's style has never lacked emotion or exuberance. Every note may seem premeditated and every nuance flawless, but this is a player who simply knows his music and his instrument.

On *Finger Painting*, Beck draws from his previous and varied experiences to offer a contemporary set of eclectic grooves that manages to maintain a solid jazz feel throughout. With his "jazz box" guitar, Beck always maintains a dark and woody tone, even while funking it up with the solid rhythm team of electric bassist Mark Egan and drummer Danny Gottlieb.

Saxophonist Bill Evans, whose recorded work has lacked inspiration recently, contributes some of his best, most aggressive solos since his days with Miles Davis. When Evans calls on his tenor, it exudes warmth and boasts an abundance of sheer chops, while his soprano saxophone sound blanches slightly by comparison.

Beck's colorful recording displays a fine quartet in full swing. The nine originals and a cover of Gershwin's "Summertime" are performed with class and taste. (Available from Wavetone Records, P.O. Box 1563, New York, N.Y. 10011.) *James Rozzi*

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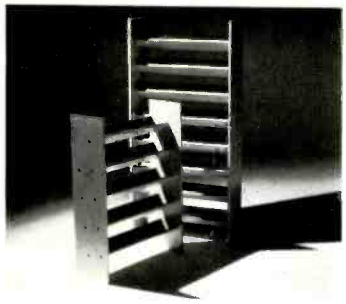

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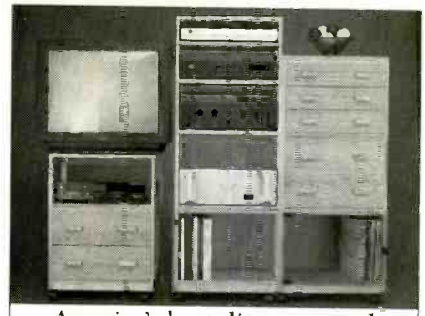

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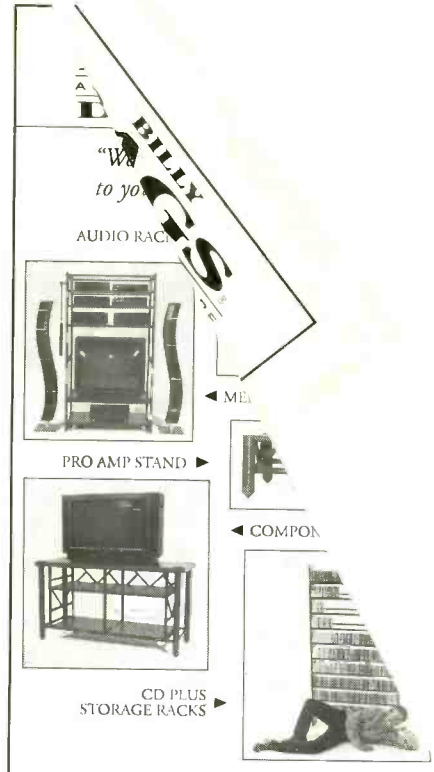

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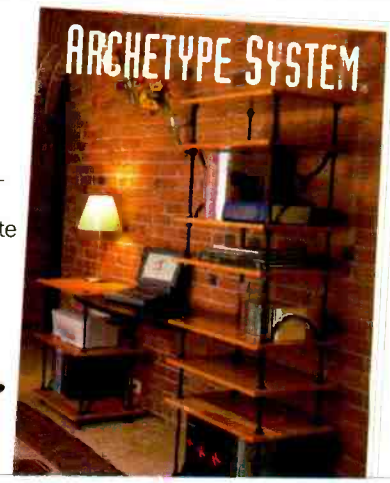

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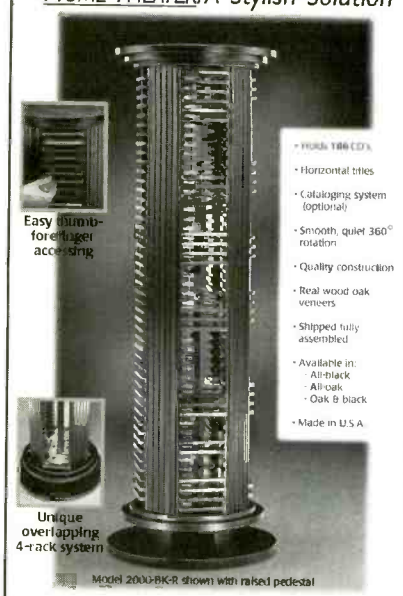

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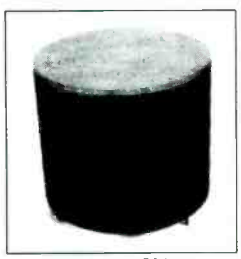

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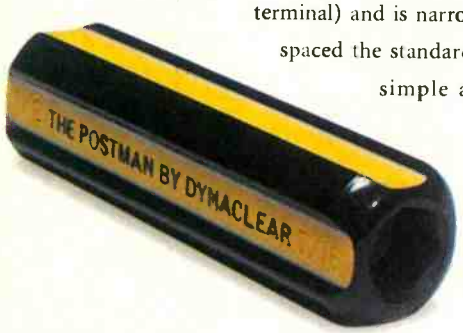
PlayBack

DYNACLEAR POSTMAN WRENCH

I have spent a lot of time twisting my wrist and squeezing my fingers in the struggle to tighten amp and speaker terminals enough to hold cables securely. Now there's a better way. Dynaclear's Postman ($7.95) may look like the handle of a screwdriver that's lost its blade, but it's actually a specialized tool, a wrench with sockets for ½- and 7/16-inch hex-head speaker-cable terminals on speakers and amps. That leaves some terminal posts it won't fit (oversize ones, terminals with two parallel flat surfaces and curved ends, and the inexpensive tapered, fluted kind). However, it does fit most of the binding posts in my audio system. Postman gives a good grip (but not so much leverage that you're likely to break a terminal) and is narrow enough to fit posts spaced the standard ¾ inch apart. It's as simple as dirt but almost as useful to audiophiles as dirt is to gardeners.

GRADE: A

Ivan Berger



For literature, circle No. 120

DYNACO STEREO-80 AMPLIFIER

Dynaco's Stereo-80 is a surprisingly good high-end amplifier, not just a run-of-the mill modern tube amp. The longer I lived with it, the better I liked it.

The amp is switchable to deliver 42 watts per channel in pentode mode or 21 watts per channel in triode mode. The output tubes are matched Sovtek EL34s, and other stages use hand-selected 6DJ8s and 12AT7s. Features include adjustable bias with defeatable LED indicators and a very handy input sensitivity potentiometer on the back. Speakers connect to 4- or 8-ohm binding posts.

The switch for bias display was miswired on my sample, but a Dynaco technician put it right. Aside from that, the amp performed flawlessly. With either 8- or 4-ohm speakers, the Stereo-80 had a nice, "modern" tube sound. It was open and transparent, with tight bass and a good high end (tighter and less bright in triode mode). It did not have the lumpy, rolled-off quality of the old Dynaco 70s.

GRADE: B-

My sole reservation is the $1,699 price. However, there are only a few other 40-watt tube amplifiers in this price range, and none that I know of are triode-switchable.

John Gatski

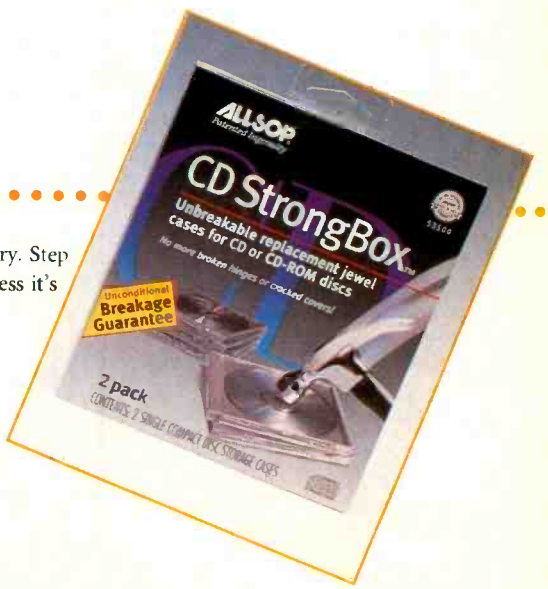
For literature, circle No. 122

Allsop StrongBox CD Box

Compact Discs don't break, but the jewel boxes they come in are another story. Step on one, and the cover cracks; drop it on a hard floor, and the hinge breaks. Unless it's an Allsop StrongBox: I tried stepping on a StrongBox, dropping it on concrete floors, even backing over it with a car. No problem. The worst I can say about the StrongBox is that it's a shade darker than the original jewel boxes (so you can distinguish it from regular jewel boxes, Allsop says) and, at $3.49 a pair, costs about 50% more than regular jewel boxes do.

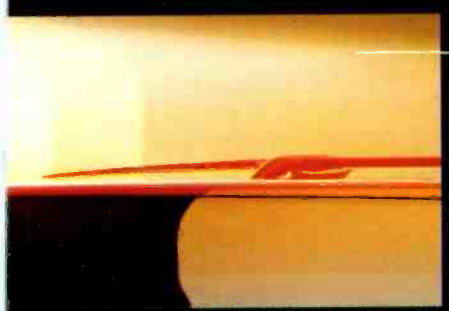
GRADE: A+

Ivan Berger



For literature, circle No. 121

It looks like a speaker. It sounds like a revolution.



First, a history lesson. Conventional speakers are highly inefficient because only 30% of the magnetic field is focused on the voice coils. Decades-old design and the limitations of a ferrite-based magnet combine to give you what you've been getting: Midband and high frequency distortion. Distortion breeds discontent, the seeds of revolution. DDDrive (code for Dual gap Direct Drive) uses an injection-molded magnet placed around the voice coils to focus 80% of the magnetic field on the coils. This new magnetic geometry creates a wider bandwidth for a seamless transition from woofer to tweeter. Seamless sound means virtually no distortion, virtually pure sound. And that wider bandwidth improves stereo imaging when you put DDDrive speakers where your old speakers are now. Sounds like what you'd expect from a revolution.

DDDrive

Precision molding suspends densely packed neodymium magnetic particles in high temperature resin to become an integral part of the dual gap structure. The result is higher efficiency, more focused magnetic energy and greater electrical control over the voice coil movement. Therefore, higher cone damping.

ALPINE
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