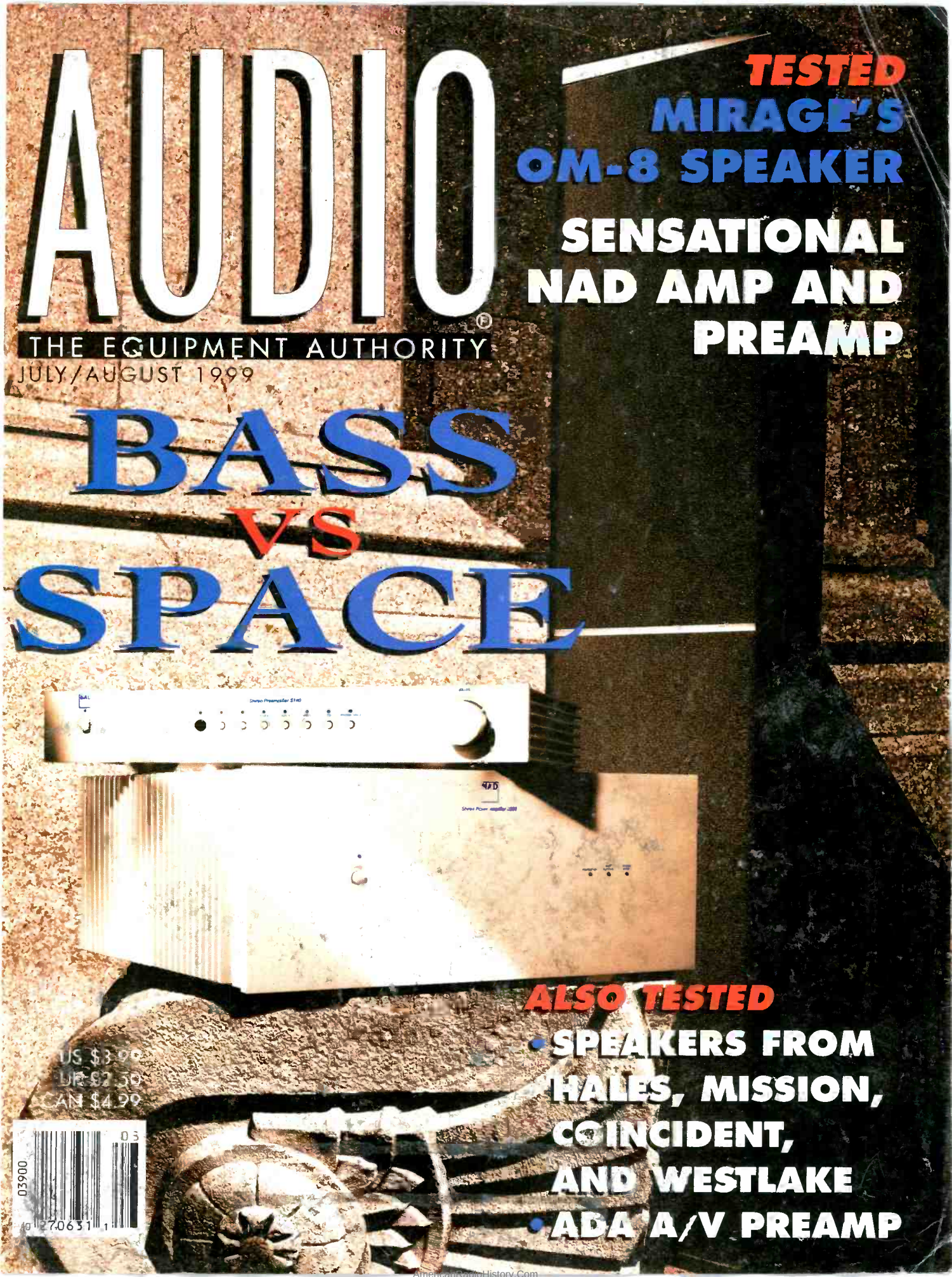

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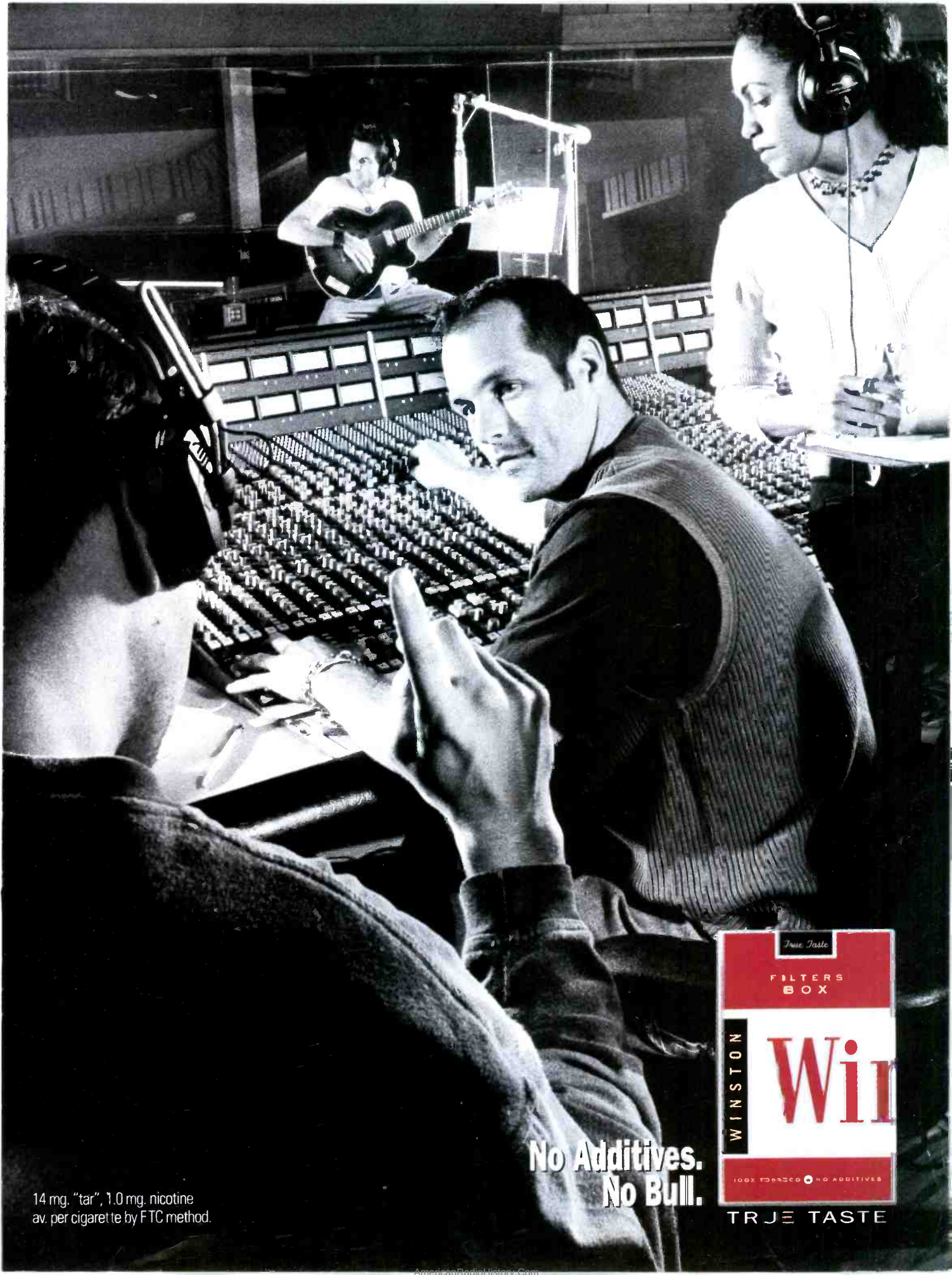

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BRYSTON

AUDIO

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AURICLES

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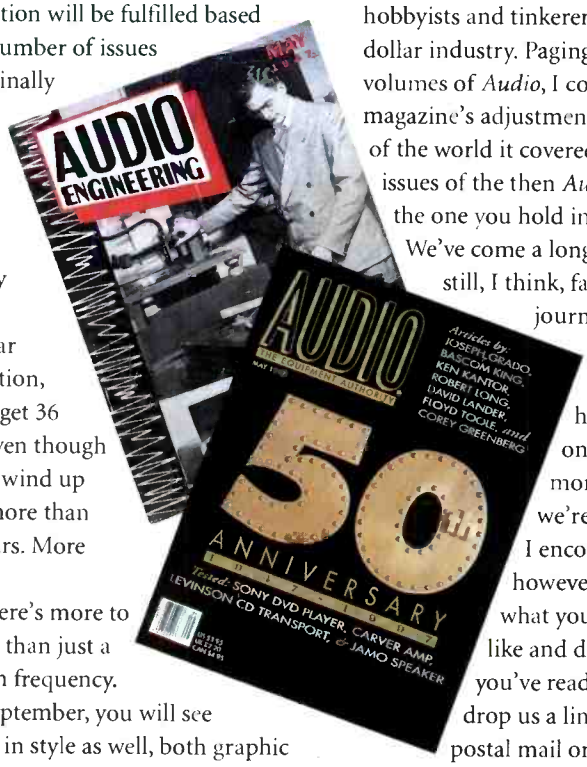
If you're very observant, you may have noticed something unusual about this iteration of *Audio*: the July/August issue date. Like many other magazines these days, we are going to a ten-times-per-year schedule, with combined February/March and July/August issues. Do not, however, take this to mean you will be getting less from us. Indeed, we expect you will wind up getting more—just distributed differently through the year. And if you are a subscriber, your subscription will be fulfilled based on the number of issues you originally signed up for. In other words, if you currently have a three-year subscription, you will get 36 issues, even though that will wind up lasting more than three years. More of more!



But there's more to the story than just a change in frequency. Come September, you will see a change in style as well, both graphic and editorial. I don't want to spoil the surprise, so I'm not going to go into a lot of detail here. Again, however, the goal is to provide more—in this case, more of what's best about *Audio*. More equipment, some new bylines to supplement the old familiars, and a streamlined, up-to-the-minute approach to the contemporary world of high-performance audio.

As significant as the changes will be, I think it is just as important that *Audio* will still be *Audio*. Our values and concerns haven't altered, just the environment in which they dwell. Like any other entity, we must adjust and evolve. It won't be the first time, or the last.

Two years ago, when *Audio* turned 50, we celebrated with a special issue commemorating the progress made over that half century, from the birth of hi-fi to the present. In that time, high-performance audio went from mono to multichannel, from analog to digital, and from the obsession of a handful of hobbyists and tinkerers to a multibillion-dollar industry. Paging through old volumes of *Audio*, I could trace the magazine's adjustments to the evolution of the world it covered, from the first issues of the then *Audio Engineering* to the one you hold in your hand today. We've come a long way, yet we're still, I think, far from the journey's end.

I hope you enjoy this issue. I hope you enjoy the ones to follow even more. That's what we're trying to achieve. I encourage you, however, to let us know what you think, what you like and don't like. After you've read a few issues, drop us a line, whether by postal mail or e-mail (audiomag@aol.com). Tell us exactly how well we're succeeding—or how we're not. After all, we've changed before; we can do it again.

AUDIO

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LISTEN AND YOU'LL SEE

LETTERS

Front and Center

When I listen to classical music, I use single-ended triode tube amplifiers with McIntosh speakers. I have two main channels and four surround speakers for a Yamaha DSP-1 processor. For movies, I have a center-channel speaker connected to a solid-state amp, which is fine for hearing the discourses of characters but not so pure for music.

Now it is claimed that a 5.1-channel audio disc is coming in the form of Super CD and/or DVD-Audio. But for classical music recordings, engineers may choose to omit the center channel so that each main channel can use a higher bit rate.

Will we be using the center channel for classical music recordings? Should I prepare by building an additional tube amplifier, to get more musical sound than solid-state amps yield? *Barney Vincelette*
Houston, Del.

Editor's Reply: It will depend on the artist and producer. Some will use the center channel and others won't, though I would expect most eventually will.—*M.R.*

Firebird Sweet

I'd like to thank John Sunier for his wonderful review of my *Firebird Suite* CD ("Classical Recordings," November 1998). I must take exception, however, to his calling me a pedal steel guitar virtuoso. I'm a competent (by professional standards) player but hardly a great one. So to describe me as a virtuoso saddles me with a reputation I can't possibly live up to and neglects the real virtuosos of my chosen instrument: Buddy Emmons, Herby Wallace, Paul Franklin, Hal Rugg, and the late Harold Lee "Curly" Chalker. The strength of the CD does not rest in my playing but in the great material I chose to record.

Except for the drums and percussion, the CD was recorded in my home studio on semi-pro gear. I used two Fostex 16-track decks running at 30 ips; these decks use ½-inch-wide tape and Dolby C noise reduction. About half the material was recorded with a Seck 1882 mixer, but when I bought the second deck I needed something larger so I sold it and bought a Studiomaster 16 x 8 x 2 Mixdown, which was expanded to 32 channels. For playback, the monitor output of the board was plugged directly into an NEC power amp, which drove a pair of Fostex studio monitors.

All recording (except the drums, which were recorded in another studio) was done direct. I used no mikes of any kind. Instead, I plugged the outputs of the various instruments directly into the board and EQ'd each instrument extensively. That's because even though I had 32 tracks (actually 30, after using one track from each deck for time code), I still ran short and frequently had to go to a third and fourth reel of tape to record all the different parts. Additionally, throughout much of the recording process it was pretty much a game of finding an open track and using it regardless of what was on that track earlier. The result is that the original master tapes are an unmixable jumble, making it necessary to go through an interim step of submixing. For that task I used a Tascam DA-88 (with the SY-88 sync card.) I eventually reduced everything to 16 pairs of stereo tracks on four digital tapes. These ultimately needed to be played on four DA-88s synched together by SMPTE rather than absolute code, though that proved to be no problem. I merely rented three units with sync cards for the final mixes.

The actual mixing was done by computer. I used a Macintosh SE-30 and Cubase 2.5, along with four Niche Audio Control modules and an Opcode Studio 3 MIDI interface. It took a while to get this system running smoothly, but once I did, it ran perfectly. The Mac SE-30 is, of course, obsolete, but as long as it continues to function perfectly I see no reason to upgrade. I intend to use it again when I mix my next project, which is currently in production.

Thank you once again for the review. It's nice to know my work doesn't go unnoticed. *Michael Perlowin*
Los Angeles, Cal.

Ye Shall Be Saved

For some time, I've been reading the ongoing debate about what makes a difference in the sound reproduction chain. I had always believed, as do many writers, that the only real discernible difference would come from changing loudspeakers—until nine months ago, that is.

My music system has been pretty stable for the past 12 years: Hafler preamp, amp, and tuner; B&O turntable; Sony cassette deck; Nakamichi CD changer (replacing a B&O CD player about six years ago); Casio portable DAT; and Allison speakers. I replaced the Hafler amp with an Adcom GFA5400 nine months ago. I didn't think the lone replacement would make a change in what I heard. I was wrong! The floor went down at least an octave and is now cleaner, the midrange is more open and cleaner, and the high end is more open.

The difference probably has to do with the amount of development that has occurred in the last 12 years. I changed only the amp, but I can hear the difference. I'm a convert. *Mike Richardson*
Capitola, Cal.

Tough Customer

Daniel Kumin is lazy. His April "Profile" of the Audio Refinement Complete amplifier presented listening impressions formed while using only one pair of speakers, small two-ways with a very low efficiency of 84 dB. Of course the amp seemed underpowered. He should have listened to it with more efficient, full-range speakers, at least as a reality check of the impressions he reached with his little reference set.

Contrast this to Anthony Cordesman's review of a Proceed AMP 5 five-channel amp in the same issue: He tried it with *five* speaker systems, including some that are quite large.

Is Kumin physically not up to the task of moving speakers around, or is it just his intellect that is lazy? *Charles Houston*
via e-mail

Author's Reply: Dem's fightin' words: You can call me Johnson, but you d'asn't call me lazy. I'm not—and I take what I do for *Audio* quite seriously.

I did, in fact, employ the Audio Refinement Complete amplifier to power two other pairs of loudspeakers that passed

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through my studio during its tenure, but I did not find the results illuminating in any way beyond what I heard via the Platinum Solos. Of course the more sensitive models played more loudly. I assume—possibly erroneously—that the *Audio* reader is capable of figuring out without my help that if my speakers are 3 dB less sensitive than theirs, they can expect 3 dB more ultimate dynamic range from a given amplifier before encountering whatever it was I heard.

As to favoring the Solos for auditioning amps, well, what can I say? Guilty! I consider them very well suited to this task for three reasons. First, they are quite accurate (and very familiar to me, which is all-important); second, I have a lot of confidence in their ability to absorb power up to about 225 watts without yielding to overt speaker distress, which is all too easy to confuse with amplifier behavior. Lastly, the Solo's low sensitivity eases the task of listening to how an amplifier behaves near and beyond the limit of its everyday linear-operating range, without suffering unduly from listening fatigue or risking confusing the nonlinear weirdness that occurs in the ear at high SPLs (particularly in reflective spaces) with anything induced by the amplifier or another component.

It is, in fact, true that what mostly interests me about power amps (and in some cases, line-level circuits) is how they behave with transient waveforms (i.e., music signals) that approach or exceed their steady-state limits—even, in a large majority of cases, when the signals are being played back at quite moderate acoustical levels.

Years of empirical evidence has convinced me that about 90% of what differs among amplifiers has to do with their performance under these conditions, and a system that enables me to hear the differences more easily and more clearly is one I am bound to favor.

Finally, let me point out that Mr. Houston confuses sensitivity and efficiency, though in this he is hardly unique; in my experience the majority of audiophiles make the same mistake. Applied to loudspeakers, "efficiency" expresses how much electrical energy is converted to acoustic energy: In the case of direct radiators it's usually only 2% to 3%; the rest is lost as heat. "Sensitivity" reports what acoustical loudness is produced by a given input power, measured via a calibrated microphone at a specified distance. Sensitivity is typically taken at 1 meter for an input of 1 watt into an 8-ohm load, though variations in methodology and environment routinely cause variations of ±1 or ±2 dB, so results from different makers (or test facilities) should also be thoroughly salted.

Remember, it's a bad day when you don't learn anything!—*D.K.*

Terrible Tubes

Tom Ace, for his April letter regarding Bascom King's review of the $4,100 Bel Canto Design Set 40 tube amplifier, should be commended for pointing out that it is not fidelity that starry-eyed tube amplifier lovers are reacting to but, as Ace so appropriately notes, the "signal processor" effects that appeal to them.

I wonder how many more readers there are out there who are sick and tired of seeing outrageously priced tube amps—with their anemic output power capabilities, high distortion levels, and narrow bandwidths—being described as "high fidelity."

Richard Dittmer
Jackson, N.J.

Marantz Memory Serves Him

I read with much mirth Corey Greenberg's March "Front Row," in which he discusses the Marantz and Harman/Microsoft remotes. Unfortunately—and he may be very angry to find this out—he is quite wrong about the original Marantz RC2000 lacking nonvolatile memory.

The reason Greenberg thought it didn't have nonvolatile memory is that when you change the batteries it goes back to its default, all-Marantz mode. Pressing the recessed "Mode" button twice returns it to the user-configured settings, and nothing is lost.

I can also testify that the nonvolatile memory lasts at least 18 hours, as once I had an accident with a large glass of orange juice that rendered it useless. I disassembled the unit, then washed the plastic parts with mild dish soap and the electronics with alcohol and a toothbrush. After letting the pieces dry overnight, I found all my settings right there, including those Dish Network, Yamaha preamp, RCA TV, and Sony CD player. Everything.

Erik Squires
via e-mail

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AUDIO CLINIC

JOSEPH GIOVANELLI

Must a System Be Balanced?

Q *My preamp has standard, unbalanced (RCA) outputs. Is the audio signal degraded less by unbalanced wiring, or would it be worthwhile to use an adaptor (if one exists) to balance my system? Could such an adaptor damage the signal or, worse, the system?*—Trevor Scharton, via e-mail

A I know of no convenient way to obtain a balanced output circuit where there is none. I suppose you could use a transformer to accomplish this, but I see no reason for it.

In most home installations, unbalanced operation works just fine. Balanced circuits are used in equipment and in applications where hum or other interference is likely. A balanced circuit is not used to improve the sound quality of a system except to remove hum, which can mask the subtleties of the program being reproduced.

If you keep your connecting cables away from AC lines, you should obtain hum-free performance even with moderately long runs.

Amplifier Hum and Possible Damage

Q *I am running two identical power amps in a biamped setup. When connecting my speakers, I inadvertently crossed wires while the amps were on. A small 6-ampere fuse inside one amplifier blew, and I replaced it. Now that amplifier's power transformer doesn't hum like the other amp's. (This may have been the case prior to the fuse-blowing, but I've just noticed it.) Could there be a problem here?*—George O'Sullivan, via e-mail

A I don't know of a power transformer that doesn't hum, unless it's in a switching power supply. Hum in power transformers depends on how much varnish was used when the unit was assembled, how tight the mounting screws are, and how tight the screws are that secure the transformer assembly. Current draw also affects the amount of hum produced by the transformer. How the amplifier is mounted—its position on a shelf or the composition of the shelf—also influences the amount of radiated mechanical hum.

In your case, when you changed the fuse you may not have repositioned the amplifier in the same place that it had occupied before; this may have altered the nature of the hum. Although increased hum may indicate trouble, the real test is whether or not the power transformer in the "problem" amplifier gets hotter than the transformer in your other amplifier. If both of their

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@cstone.net. 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.

transformers run at the same temperature and if the sound produced by each amplifier is identical, you can assume that nothing is amiss.

Mistracking CD Player

Q *After playing properly for about 30 to 45 minutes, my CD player starts mistracking. It sounds as if a scratched or defective disc is playing. What could be the cause?*—P. Rossi, via e-mail

A I always look for the simplest solutions to problems because, when the solution isn't simple, it's gonna be expensive!

Try checking the CD player's power-supply voltage to see if it drops over a period of time. I'm speculating that you don't have enough power to run the player. A voltage drop can result from a defective diode or a leaky filter capacitor.

With its cabinet removed, you might find that the CD player operates perfectly all the time. If this occurs, it tells you that heat buildup is causing some component to fail, most likely an integrated circuit (IC) in the power supply.

Heat still could be the source of the trouble even if the mistracking continues after the enclosure is removed. If you have one of those sprays used to cool equipment, try it on various components and see if the player returns to proper operation. Although I fingered the power supply as being the most likely culprit, other components in the player could cause similar problems if they became faulty or intermittent from heat buildup.

Underpowered Surround Channels

Q *My A/V amplifier's surround channels are rated at about 25 watts per channel, yet I get little output from my surround speakers. In fact, the main and center channels overwhelm them. When I showed my system to a friend who is a dealer and technician, he concluded that my amp is designed to yield very low output from its surround channels. Any suggestions?*—Name withheld

A Try adjusting the surround-channel level control (you may have already done so, but I thought I'd remind you). If your A/V amp is one of those rare birds that has a front/surround balance control, you may have overlooked it and it may be set far too low for the surrounds. (Sometimes the

adjustment is accessible only by navigating through several layers of on-screen menus.) Increase surround-channel level and check it with the internal test-signal generator that should be part of the amp's Dolby Surround circuit. Look for a dedicated "Test" button on the remote control or on the amp's front panel.

If you like the amp a lot, perhaps you need to get surround speakers that are acoustically more efficient than your present systems. Look for speakers whose rated sensitivity is in the range of 90 to 95 dB (at 1 watt/1 meter). The available power from your amp's surround channels should then drive your surround speakers to adequate levels.

AC Plugs, Prongs, and Grounds

Q *I can't use my amp with its three-prong plug (the type with the U-shaped ground prong) because I hear noise from the AC line. When I complained, the electric company told me I have a ground loop. (What's that?) I use two-prong adaptors with all my components that have three-prong plugs. The adaptors are plugged into a surge protector, which is connected to the wall socket with a three-prong plug. Why do some components—e.g., my CD player, receiver, and tape deck—have two-prong plugs and others three-prong? If it's a safety issue, then why do coffee makers and blenders have two-prong plugs? Is it okay to use my system without grounding plugs? Finally, how does polarity relate to two-prong plugs? Some can be plugged in only one way because one pin is larger than the other.*—Ranjith Semanayake, Chula Vista, Cal.

A It's fortunate that your system works well even though you've eliminated the normal amplifier ground (via the ground pins on your AC plugs). Nevertheless, this is often the way it works out, especially when there are other grounds attached to an audio or audio/video system. Ground-loop problems are frequently caused by cable-TV feeds or satellite-TV systems where the ground for the dish or cable system is located at some remove from the rest of the audio gear.

Any time there is a separate ground located some distance from the house ground (the latter is provided by your electric company), there will be a voltage difference between them. Ground loops arise when there are multiple pathways to the house ground, hence multiple voltage differences, generating hum. The remedy is to remove *one* of the ground connections, which you did by using two-prong adaptors.

If, as is likely, your ground loop is caused by a cable-TV feed, I would rather have you isolate the cable-TV ground from your audio system by using an isolating balun. Ask your cable-TV provider to install one, or if you're handy with tools, try this inexpensive fix yourself: Buy two 75-to-300-ohm transformers, the type used to convert the 75-ohm cable-TV outlet to dual 300-ohm pigtails for connection to antenna screws on an older TV; these shouldn't cost more than a few dollars each. Solder each of the two 300-ohm leads on one transformer to the two 300-ohm leads on the other, and wrap insulating tape around the connections so they won't short out. Then, using short lengths of cable, hook up one of the 75-ohm connectors to the cable-TV outlet and the other 75-ohm connector to the 75-ohm cable-TV input on your TV or VCR. Once connected

in this way, the two baluns will effectively isolate your A/V gear from the cable-TV ground, thereby removing the ground loop and any associated hum.

I don't know the precise Underwriters Laboratories codes related to the use of two-prong versus three-prong plugs on preamps and such, but I do know that if the housing for an appliance is plastic and no metal parts are exposed, then the device can have a two-prong plug.

On the other hand, some appliances, such as lamps, have exposed metal parts; a break in the paper insulation in the socket can create a situation where the power line contacts a metal part. Touching the lamp and a grounded object, such as a faucet or a radiator, could lead to a potentially dangerous shock. To prevent this, lamp manufacturers use polarized plugs, with one large prong (connected to the neutral side of the line) and one small prong (which connects to the "hot" side of the AC line). As you know, this type of plug can be inserted into the socket in only one way. The lamp is wired so that, should the paper insulation fail, the exposed metal is on the neutral side of the line rather than the hot side, avoiding the potential shock hazard.

Three-prong plugs function as a kind of extra insurance. Their U-shaped ground terminals give you additional protection if there's any break in the connection between the neutral side of the house wiring and the neutral side of the circuit or power cord of the device you're plugging in.

DVD Digital Compatibility

Q *I love my new Sony MZ-R50 MiniDisc recorder. However, when I record digitally, I use the optical digital output on my roommate's stereo system; eventually, I'll have to get my own CD player with a digital output. But can't I kill two birds with one stone by buying a DVD player, so long as the optical output on the player works for audio CDs? Or is the DVD player's optical output just for Dolby Digital movie soundtracks? I'm hoping it can serve both purposes.*—Dean Schreuder, Kalamazoo, Mich.

A All DVD machines can play standard audio CDs. If you load a DVD movie that has a Dolby Digital soundtrack, the optical jack (and the coaxial digital jack, if there is one) will output the 5.1-channel AC-3 bit stream. Likewise, if you play an audio CD, the two-channel audio bit stream will be present at the optical digital output. Therefore, you will have full digital compatibility for dubbing CDs to MDs with your MiniDisc recorder.

Cleaning Old Switch Contacts

Q *I've used Radio Shack contact cleaner to clean the signal-routing switches on my old amp, but within a few days the switches act up again. What would you suggest?*—Ray Gilmer, via e-mail

A I have had good results using Shield, from Channel Master, and Cramolin Spray R, from Caig Laboratories, as contact cleaners. I've also found that Cramolin Spray B (a lubricant and preserver) will keep old potentiometers and switches noise-free for several years; WD-40 has worked for me as well. But if the switch contacts are worn to a point where they do not have enough pressure to close reliably, no cleaner will work for you. Nevertheless, it can't hurt to try one of the aforementioned cleaners. A

What's New

ATLANTIC TECHNOLOGY SURROUND SPEAKER

Designed for in-wall or surface mounting, the 370 IN-SR has THX Ultra certification as a dipole surround and is said to produce a broad, diffuse sound field. The sealed system has an offset internal partition to overcome dipole bass cancellation, by giving one side of the speaker smooth bass down to 80 Hz while the other side rolls off below 200 Hz. Price: $849 per pair. *(Atlantic Technology, 781/762-6300)*

Denon CD Changer

Intended for custom installation in the home, the DCM-5000 can serve as a stand-alone 100-disc changer or as a master controller for up to 600 discs when linked with Denon DCM-5001 slave units. The changer features 24-bit Alpha processing, which is said to reproduce 16-bit data with 24-bit resolution, and comes with two CD drives. Features include a cross-fade function for smooth transition between tracks, HDCD decoding, and title/artist storage and display. Among the outputs are two sets of RCA analog jacks and two coaxial digital connectors. Prices: DCM-5000, $1,800; DCM-5001, $1,300. *(Denon, 973/396-0810)*

RICOH CD-R/CD-RW Drive

With four-times writing speed for CD-Rs and CD-RWs, and twenty-times reading speed for CD-Rs (eight-times for CD-RWs), the MediaMaster MP7040A is said to be the fastest drive of its type on the market. Its Easy CD Creator software enables you to record original music CDs and other data. The MediaMaster can be used for primary and secondary data storage, and the discs it records can be read by most DVD-ROM drives. Ricoh says an internal ATAPI interface allows for easy PC installation. Price: $399. *(Ricoh, 877/742-6479)*

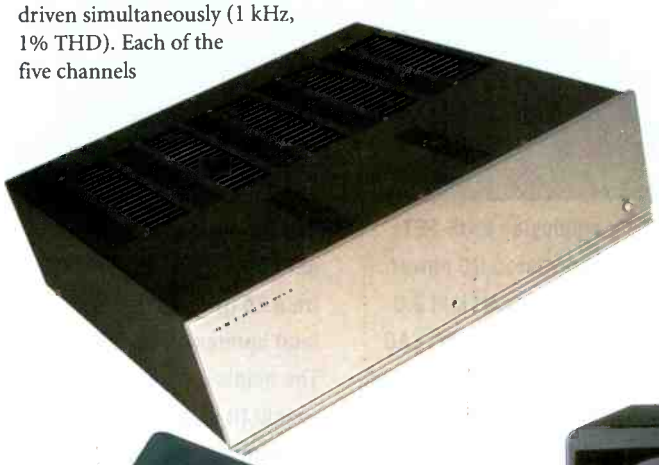
ONKYO A/V RECEIVER

Motorola's latest-generation 24-bit chip powers the TX-DS474's Dolby Digital, Dolby Pro Logic, and DSP processing. Discrete output stages are used in the receiver's five amplifiers, which are rated at 55 watts each, continuous, into 8 ohms, from 20 Hz to 20 kHz, at 0.08% THD. The TX-DS474 has a line-level subwoofer output, a discrete 5.1-channel input (for an external DTS decoder or later system expansion), three A/V inputs, three audio-only line-level inputs, and a phono input. The tuner section has 30 AM/FM presets with FM auto-tuning. Price: $399.95. *(Onkyo, 201/825-7950)*

What's New

Anthem Five-Channel Amp

Engineered by Sonic Frontiers for multichannel music and home theater applications, the MCA 5 five-channel amp is rated at 150 and 225 watts per channel into 8- and 4-ohm loads, respectively, with all channels driven simultaneously (1 kHz, 1% THD). Each of the five channels uses eight bipolar output transistors. At 150 watts, power bandwidth is specified as 20 Hz to 80 kHz, –3 dB, with A-weighted noise at –99 dBW. Price: $1,399. *(Anthem, c/o Sonic Frontiers, 905/829-3838)*



NHT CENTER-CHANNEL SPEAKER

Designed to provide a seamless timbral match to NHT's 2.9 and 3.3 four-way, floor-standing speakers in home theater setups, the AudioCenter-2 (AC-2) center-channel speaker uses two 6½-inch woofers, one 4½-inch midrange, and the same 1-inch aluminum dome tweeter as the Models 2.9 and 3.3. Rated frequency response is 48 Hz to 26 kHz, ±3 dB, with sensitivity of 87 dB. Price: $850. *(NHT, 800/648-9993)*

Sony MiniDisc Recorder

Measuring just 3 inches wide, 3 inches high, and ¾ inch thick, the MZ-R55 is said to be the world's smallest MiniDisc recorder. With its rechargeable nickel metal-hydride battery or with AA batteries, the MZ-R55 can play more than 16 hours, according to Sony. A smart remote enables titling and moving songs even during recording. And its 40-second memory buffer reportedly makes the MZ-R55, which is available in gold or blue, essentially shockproof. Price: $399.95. *(Sony, 800/222-7669)*

Canton Speaker

Supplied with its own calibrated measurement mike, the Digital 1.1 incorporates digital room-acoustics correction for the listening position. The DSP circuitry also corrects intrinsic nonlinearities of drivers, crossovers, and cabinets. Canton says this enables the Digital 1.1 to yield a high level of musical realism in different acoustic spaces. The three-way, bass-reflex 1.1 has dual 10-inch woofers, a 7-inch midrange, and a 1-inch aluminum-manganese dome tweeter. Price: $15,000 per pair, including processor and mike. *(Canton, 612/706-9250)*

What's New

H.H. SCOTT HOME THEATER SYSTEM

Equipped with a proprietary decoder that is said to be compatible with Dolby Surround-encoded soundtracks, the Cinema Surround SCS-60 comprises a powered bass module, two Micro Satellite loudspeakers, a magnetically shielded center-channel speaker with an infrared sensor, a single rear-channel speaker, and a remote control. The bass module has a 6½-inch woofer driven by an internal amp rated at 30 watts into 2 ohms at 80 Hz (1% THD); the satellite speakers receive 15 watts per channel into 4 ohms (1 kHz, 1% THD). System price: $299. *(H.H. Scott, 973/428-2023)*

SoundScience Dynamic Processor

A cleaner midrange, crisp treble, and powerful bass tones, with no phase alteration, are among the benefits SoundScience claims for the Truesound Dynamic Sound Improvement Processor. The Truesound is available in four versions; the portables are smaller than a cassette. Prices: Battery-operated portables, $50 and $70; AC-powered version for TVs, $75; AC-powered version for sound systems, $90. *(SoundScience, 201/767-3297)*

QSC AUDIO AMP

By employing MOS-FETs and a four-tiered DC power supply, the PowerLight 6.0 is said to draw 40% less AC current yet still be capable of massive output power. The 6.0 is rated at 1,500 watts per channel into 8 ohms, 2,500 watts per channel into 4 ohms, and 3,000 watts per channel into 2 ohms, all from 20 Hz to 20 kHz at 0.1% total harmonic distortion. The amp's ratio of power to weight (it weighs 59 pounds) is claimed to be exceptionally high. Price: $5,948. *(QSC, 800/854-4079)*

LEXICON DIGITAL SURROUND PROCESSOR

Meeting the criteria for THX Ultra certification, the MC-1 is Lexicon's flagship processor. Besides Dolby Digital, DTS, and Logic-7 (an upgraded version of Lexicon's proprietary 7.1-channel surround processing), the MC-1 has two dozen surround and ambience modes. Features include a six-channel digital input array, 24-bit delta-sigma A/D and D/A converters, 96-kHz compatibility, RS-232 serial ports, and switching for eight video sources (composite or S-video). Price: $5,995. *(Lexicon, 781/280-0300)*

What's New

ENERGY POWERED SUBWOOFER

At 12 x 12 x 12 inches and weighing 50 pounds, the Microstar 10.1 is compact yet is said to pack a punch. The front-firing, sealed sub has a rated frequency range of 20 to 150 Hz, and its internal switching amp is claimed to deliver 1,000 watts to the 10-inch driver. The 10.1 features high- and low-level inputs and low-level outputs, with silent, automatic power on/off, continuously variable phase, and an adjustable-slope low-pass filter. Price: $1,100. *(Energy, 416/321-1800)*

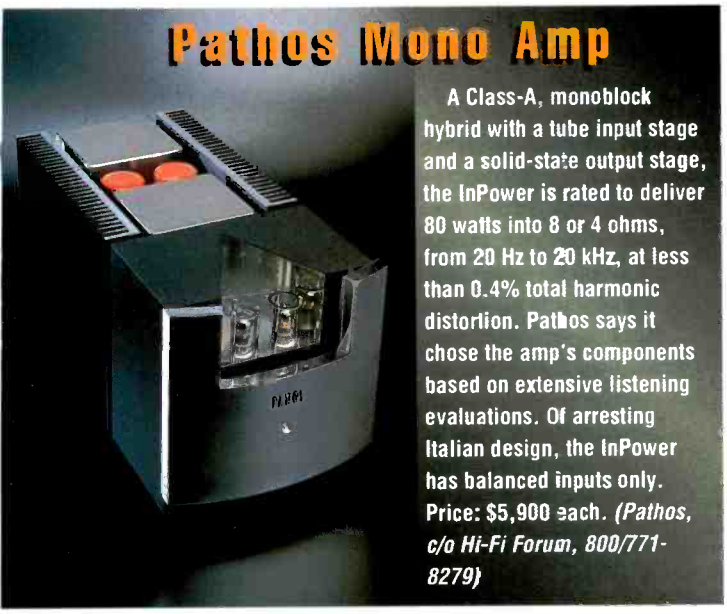
Canary Mono Amp

Built around matched 300B tubes, the CA-303 is a push-pull design with a rated output of 24 watts, which, Canary Audio says, is more than enough power to drive many speakers. The CA-303 features military-spec circuit boards and custom-wound output transformers, with 4- and 8-ohm output taps. Its rated frequency response is 10 Hz to 65 kHz, ±1 dB, with a signal-to-noise of 60 dB at 1 watt. Price: $6,125 per pair. *(Canary Audio, 888/322-6279)*

KRIX SPEAKER

Designed primarily for the main and surround channels in Krix's Digital Xperience five-channel system, the KDX-M is also sold in pairs. (Its Australian maker also offers a matching center speaker, designed to match the KDX-M's timbre precisely.) Rated frequency range is 50 Hz to 20 kHz, with a sensitivity of 86 dB/1 watt/1 meter. The magnetically shielded, vented speaker, which comes in Aussie jarrah wood or black-ash veneer, has dual 5-inch woofers and a 1-inch soft-dome tweeter. Price: $899 per pair. *(Krix, c/o MoonDance Audio, 303/777-4449)*

Pathos Mono Amp



A Class-A, monoblock hybrid with a tube input stage and a solid-state output stage, the InPower is rated to deliver 80 watts into 8 or 4 ohms, from 20 Hz to 20 kHz, at less than 0.4% total harmonic distortion. Pathos says it chose the amp's components based on extensive listening evaluations. Of arresting Italian design, the InPower has balanced inputs only. Price: $5,900 each. *(Pathos, c/o Hi-Fi Forum, 800/771-8279)*

When our DSP-A1 debuted last year, it wasn't only its distinctive amber gold finish that created an instant classic. Its proprietary Yamaha technology inspired reviewers to hail it as their personal favorite—the best home theater integrated amplifier they'd ever heard.

This tour de force of power, versatility and Digital Sound Field Processing stunned critics and enthusiasts alike. Offering Dolby Digital and DTS processing, plus seven channels of spectacular sound. The DSP-A1's sonic impact set a new benchmark for the industry.

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Spectrum

BY IVAN BERGER

DOWNLOADING IS ON AN UPSWING

You need no crystal ball to see that more and more of the music we buy will be delivered online as digital files rather than picked up as discs or tapes from stores. But if you do consult a crystal ball about the details, you'll find it as murky as a flooding river—and, like that river, full of odd items that surface and quickly sink again.

Data-rich files—e.g., CD-quality recordings—take an appallingly long time to download from the Internet via standard phone lines and modems, so substantial data reduction is needed to speed up the process. Although data-reduction algorithms abound, one of them, MP3 (MPEG-1, layer-3), is becoming a household word. It's also shaking up the music industry. The sound quality of MP3 varies a lot; I've heard it sounding like AM radio on a bad reception night and like FM on a fairly decent night. But because it's free, fun, and an easy way to cock a snook at the establishment, its popularity is growing. Finding a particular song that you want on the Internet isn't always easy, but the more people use MP3, the greater the odds your song will be there—somewhere. Unfortunately, most of the music you'll currently find on the Internet infringes on the copyrights of its creators, performers, and publishers and of the record companies.

At first, the music industry merely growled at all this. The Web is hard to police, and MP3 seemed no threat as long as you could listen only if you sat by your computer. However, when the first portable MP3 player, the Rio PMP300, hit the market, its maker (Diamond Multimedia Systems, www.diamondmm.com) was greeted with an almost instantaneous lawsuit. The lawsuit failed, and other portables are now here or coming soon from Creative Labs, LG Electronics, Sensory Science, and Varo Vision, as is a car player from Empeg (www.empeg.com), a British firm. Most of these will have greater storage capacity than the Rio, and some will be able to do things beyond playing MP3 files. Creative's Nomad, for example, can also be used as a voice recorder that can capture 4 hours' worth of speech, and future versions may be able to play music in other formats, such as Liquid Audio and AT&T's a2b. Varo Vision's Clikman and Sensory Science's Rampage MP2000 will incorporate phone books and schedulers as well as voice recorders; the LG Electronics MP Free can play cassette tapes, and the Empeg car unit, which holds 35 hours' worth of music, has an FM tuner.

Illustration: John Ueland

Makers of these machines are attempting to work out the copyright issues involved in their use. Rio now has a Web portal (www.RioPort.com) to steer hobbyists to sites that carry MP3 files authorized by copyright holders or in the public domain. Samsung and LG Electronics will incorporate copyright-protection systems (Samsung's SecuMax has been approved by the Korean music industry). And Creative Labs plans to make future Nomads compatible with whatever protection system is settled on by the Secure Digital Music Initiative (SDMI), a music industry effort to find a way of making music available for downloading without violating copyright.

news & notes

●Car stereos would be more widely used in boats if it weren't for all that water. Water-resistant versions of a few head units are available but not enough to ensure that every boat owner can get exactly the features and performance he wants. So Sony has come out with a waterproof wired remote, the MRC-2 ($99.95), which is compatible with the many Sony head units made in the past two or three years that can use its RM-X2S remote.

●In Japan, Sansui is offering its first tube amp in 30 years, the $6,250 Model B-209. At the other end of the price scale, EK Japan is offering stereo tube amp kits for as little as $175.

●Giving in to an itch that pundits in every field of art are scratching this year, the BBC has compiled a list of the century's top 100 songs. Titles were selected through a a public poll, by consulting a panel of songwriters, and through sales figures. The top four were "Yesterday" (John Lennon and Paul McCartney), "Stardust" (Hoagy Carmichael), "Bridge over Troubled Water" (Paul Simon), and "White Christmas" (Irving Berlin). Like all such lists, this one caused an immediate outcry from music lovers who would have made different choices. (Me, for instance: The only one of the first four I'd rank that high is "Stardust.")

●By 2008, there will be an estimated billion transistors for every man, woman, and child on Earth, according to a projection from the Semiconductor Industry Association.

The existence of SDMI shows the power of MP3: The music industry, instead of merely trying to stop downloading, is countering with constructive steps. Its goal is to establish criteria for digital music-distribution systems that meet everybody's needs—those of the recording industry, computer and consumer electronics manufacturers, Internet music purveyors, and us music listeners. So far, SDMI has announced few specifics, but its efforts will probably be devoted to technical systems for copyright protection (from "watermarks" that reveal a file's origin and ownership to copy-restriction strategies), industry business practices, and possibly quality standards. In January, SDMI named Leonardo Chiariglione, an Italian scientist who helped found MPEG (Motion Picture Experts Group), its executive director. He promises to have standards in place for portable devices soon, so that portables compliant with the standard can be available for the Christmas season. A spec for online downloads should be released by March 2000.

Meanwhile, a number of major companies have announced music-download programs or demonstrations. One of the first was Project Madison, a joint venture of IBM and five major music companies (Sony, EMI, Bertelsmann, Time Warner, and Universal) that was scheduled for testing in San Diego in June. About 1,000 homes connected to Time Warner's Road Runner cable modem service will be able to download a CD-quality album in just a few minutes, say early reports; approximately 1,000 albums will be available. The heart of the system is IBM's EMMS (Electronic Music Management System) software, which handles the downloads, credit-card payments from customers, and royalty payments to music providers. RealNetworks, the company behind the RealAudio file format (a competitor of MP3), has licensed EMMS as well. Theoretically, even record stores could use EMMS to download whatever titles they don't have in stock and burn them onto CDs for customers who request them.

Good IDEAs

Audio products are usually represented among the winners of the Industrial Design Society of America's annual IDEA awards. This year, IDEA99 awards went to Samsung's family of digital players for downloaded music, Monsoon Multimedia MM-1000 computer speakers ("Play-Back," November 1998), Benwin's Executive computer speakers with NXT satellites, and Shure Brothers' KSM32 studio cardioid microphone.

Shure microphone

Monsoon Multimedia speakers

Benwin speakers

Although not originally part of EMMS, Sony's MagicGate copyright-protection system will be built into it. MagicGate is designed to limit the copying of digital information via MiniDiscs and memory cards. Using a combination of encryption and embedded microchips, it (and OpenMG, a similar system for PCs) aims to have you move files rather than let you copy them. Copying might not be the only thing MagicGate will restrict: It might be used to limit the number of times you can play a track or the time period over which you can play it. On one hand, this would enable you to download a file for a few free auditions, buying only if you want to keep it. On the other hand, MagicGate could possibly be used to make all listening pay-per-hear.

MagicGate will presumably be in Sony's first portable player for digital music files, being introduced as part of Project Madison. Tentatively dubbed the Netman, it will use Sony's Memory Stick flash-memory modules for storage but will *not* play MP3 files.

In addition to its participation in Project Madison, Sony is working on music downloading via direct broadcast satellites (not the Internet, as previously reported) in Japan. Downloaded signals will be recorded on MiniDisc at four-times normal speed, via an IEEE-1394 connection. A second 1394 port on the MD recorder will connect to a PC but only to send still images and exchange audio editing commands, not audio itself. The receiver and MD recorder reportedly will sell for less than $1,000.

And then there's Microsoft, which claims its MS-Audio software compresses files twice as much as MP3, cutting storage requirements and transmission time in half. Its sound, initially claimed to be better than MP3's, is now billed as "equivalent quality." MS-Audio (part of the latest version of Microsoft's Media Player software) also has "rights management" safeguards that MP3 lacks. Downloaded files can't be used until they're unlocked by a software key, which, *The Wall Street Journal*'s online edition says, might be usable for a specified time only. Further, Microsoft has bought into Reciprocal, a company whose software is designed to ensure that copyright owners get their share of income from downloads. *The New York Times* says some record companies are not overjoyed at Microsoft's entry into music delivery, viewing it as an 800-pound gorilla they wish would play in someone else's yard.

Exhausting as this summary may be, it's not exhaustive. There's plenty more to talk about. And by the time we do, there should be even more developments.

news & notes

● I don't know of any car stereo equipment styled by car designers, but I do know some home audio gear that is: Kenwood's Series 21 system was designed by Giorgetto Giugiaro, of ItalDesign, whose automotive projects include the Lotus Esprit, DiTomaso Mangusta, and a number of Maserati models. Series 21 comprises a DVD player, a MiniDisc recorder, a five-disc

CD changer, a tuner/preamp (with Dolby Digital), a six-channel power amp, and home theater speakers.

● Two companies have announced advances in CD-R recordable discs. Memorex is offering discs that can hold 80 minutes of music, 6 minutes more than previous blanks. And new Kodak discs that use a mixture of gold and silver in their reflective layers are claimed to hold their reflectivity three times longer than discs employing only silver.

● Dolby Laboratories has unveiled a new digital audio technology, Dolby E, but it may never show up in home equipment. It's intended for broadcasting, to simplify the distribution of multichannel digital sound. With a Dolby E encoder and decoder, as many as eight channels can be distributed via an AES/EBU cable or stored on two tracks of a digital videotape recorder. You may, however, hear its benefits if it encourages digital TV stations to broadcast 5.1-channel surround instead of the stereo mixdowns some DTV stations now use.

Battle of the Buses

Does Intel hope to extinguish FireWire? The company does not plan to incorporate FireWire (Apple's name for the IEEE-1394 connection bus) in its chip sets but will instead incorporate USB 2.0, a new and faster version of the Universal Serial Bus. Most new computers and a growing number of peripherals have USB connectors, which can carry up to 12 megabits per second (Mbps). Intel says USB 2.0's data capacity could reach 120 to 240 Mbps; some other sources say it could reach 300 Mbps. In Intel's view, IEEE-1394, a more complex system, is a "niche" standard because it's currently used to interconnect computers and A/V equipment only.

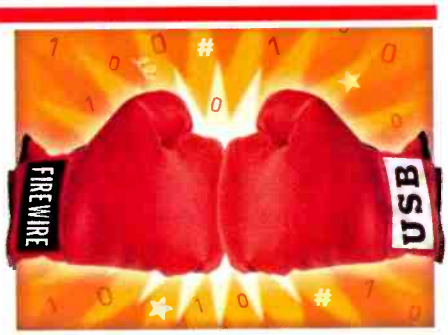

Illustration: John Ueland

But that niche is pretty wide. According to the 1394 Trade Association, about 7 million digital camcorders with IEEE-1394 connections have been sold to date, not to mention hard-disk drives for A/V recording. These devices will soon be joined by computer peripherals and digital TV equipment (including TVs, set-top boxes that enable analog TVs to receive DTV programming, and D-VHS digital videocassette recorders). As to speed, Apple is already shipping Power Macintosh computers with FireWire links that reach 400 Mbps, more than is projected for USB 2.0.

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KEN KESSLER

OUT WITH THE NEW, IN WITH THE OLD

Photo: Media/H. Armstrong Roberts

It struck me recently that the retro craze is no longer a mere marketing ploy. Sure, the amazing revival of Harley-Davidson had every company more than 10 years old looking to exploit its past in an attempt (usually successful) to savor former glories. With Harley, the timing was right: Retro-as-a-sales-gimmick was something of a novelty, there were enough Baby Boomers entering prosperous middle age to buy the company's wares, and *Easy Rider* had been around long enough to earn classic status. But now we've had it up to our eyebrows with retro, and still the revivals keep coming. Only now I know why: This renewed flood of retroism is preparation for post-Y2K nostalgia for the current, outgoing century.

We should have seen it coming when, earlier in the 1990s, two firms well down the road to mainstream acceptability reissued at great expense the very models that had made them purists' heroes 30 to 40 years before. And though collectors were amused to find that McIntosh's C22 preamp and MC275 amp and Marantz's Model 7 preamp and its Model 8 and Model 9 amps cost more than mint originals, those of us who aren't handy with soldering irons or adept at sourcing tubes welcomed these limited-edition replicas in the same way that Harley-Davidson newbies loved the idea of an ancient motorcycle no older than the last issue of *Easyriders*.

But now it's getting out of hand, and not just in audio. Since December, hoary old rockers thought missing in action—such as Spooky Tooth, Kevin Coyne, Steve Harley, and The Pretty Things—have reappeared with new albums. For those of us who missed 'em, great. Welcome back. But each release reminded us oldsters (anyone over 25) of just how much water has flowed under the bridge. Not surprisingly, all of the above are so experienced—in one or two cases, further matured by adversity—that their comebacks are also returns to form. Coyne, for example, can out-angst the best of 'em, even the pretender to the King of Pain throne, the miserable Kurt Cobain, whose suicide should have surprised nobody.

Now the word is out that one of the most despised teeny-bop glam-shams of all time, The Bay City Rollers, have re-formed with four-fifths of the lineup from the band's heyday. I realize that in the United States this group somehow managed to defy taste and intelligence by securing a following that believed its members to be power-poppers of Raspberries grade. But back home in the United Kingdom, The Bay City

Fifty years and counting: Klipsch is introducing the Klipschorn Jubilee, a new, two-way, version of its legendary three-way flagship speaker.

Rollers were of interest only to prepubescent girls who, a decade earlier, would have worshipped the likes of Bobby Sherman. And I'm embarrassed to admit that an old buddy of mine is responsible for the band's revivification.

Mark St. John, a producer talented enough to have been employed by B&W for the first recordings issued on its ill-fated CD label, was the man who salvaged The Pretty Things. Not only did he manage to acquire for The Pretties their entire back catalog, he also remastered the lot, oversaw the release of an anthology, coordinated a comprehensive reissue program, arranged the first-ever live performance (broadcast simultaneously) of their legendary *S.F. Sorrow* album, *and* still had the energy to bully them into completing a 1999 studio release. It was while working for The Pretty Things that Mark honed an amazing talent: He learned how to threaten record labels and to prize from them the monies owed to artists under his wing. Think of him as the anti-Morris Levy.

With The Rollers, Mark's task is Herculean: Somehow, an estimated £120,000,000 (call it $180,000,000) allegedly went missing. Which shows you that, no matter how much snobs such as I loathed The Rollers, they sold an awful lot of records. In the U.K., in the United States (where they had their own TV show), and in Japan they were the closest we have come to a repeat of the craziness of Beatlemania. And, like their fellow resuscitated artists as well as the new VW Beetle, the new Jaguar S-type, and a ton of other nods to the past, they've been timed just right for Millennium Fever, which implies that the McIntosh and Marantz replicas came a few years too early.

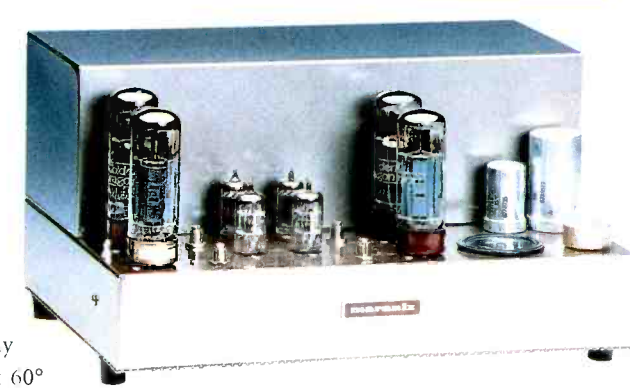
Don't think for a moment that Mac and Marantz were isolated (audio) cases, however. I recall replicas of certain Dynaco models made, I believe, by an American firm called Stereo Cost Cutters. And now we find Klipsch launching a new version of the Klipschorn, which the company can rightly boast is "the only loudspeaker in the world that has been in continuous production for over 50 years."

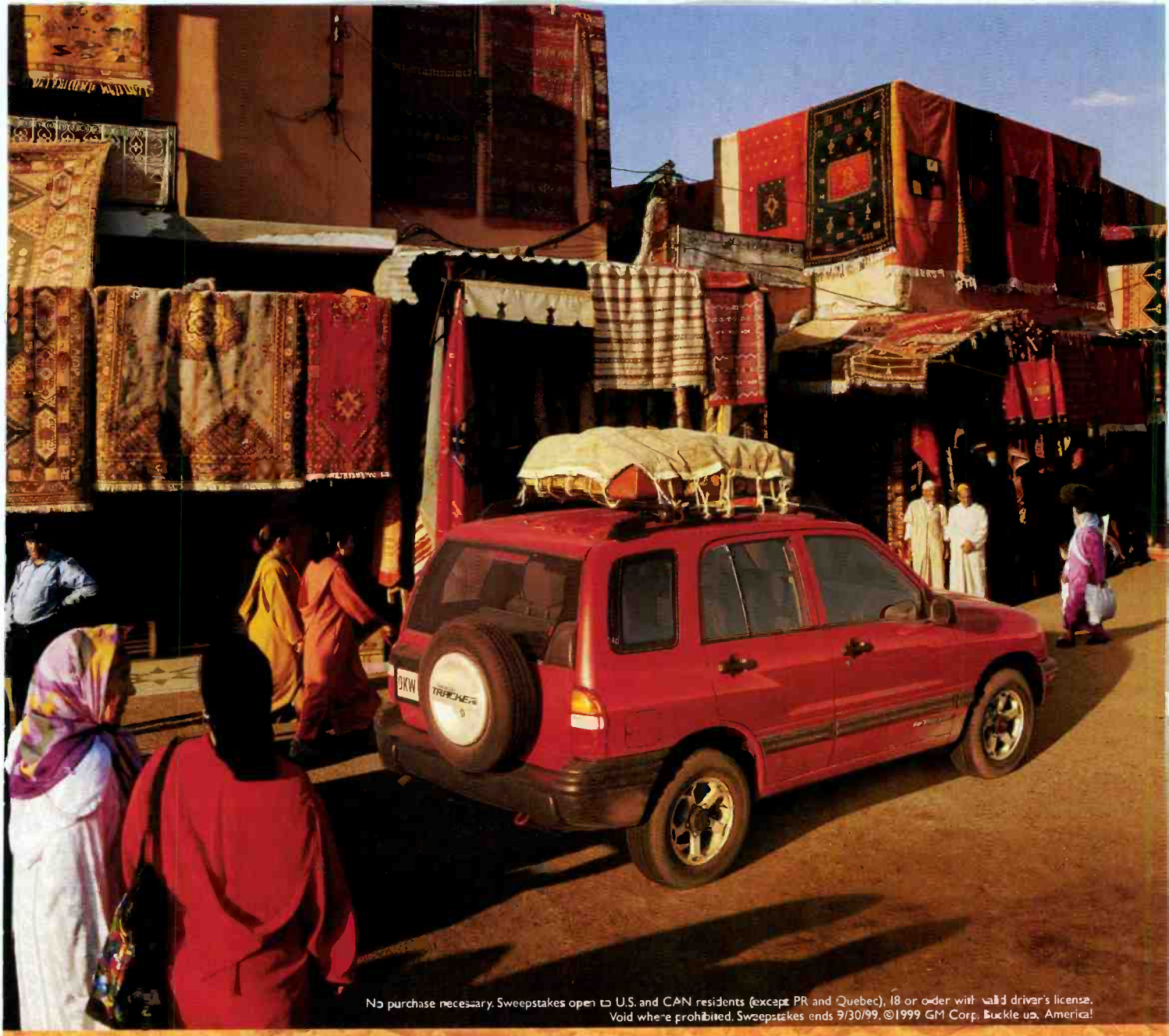
THE NEW KLIPSCHORN SHOULD PASS MUSTER WITH ALL BUT THE MOST RIGID OF "RETROBATES."

Ninety-four-year-old Paul Klipsch even turned up in Las Vegas in January for the launch of the Klipschorn Jubilee at the Consumer Electronics Show. And despite extensive modernization, it should pass muster with all but the most rigid of "retrobates." It's a two-way, full-range system, in contrast to the familiar three-way. According to Klipsch, "It is thanks to Tractrix technology and advanced compression driver design that the Jubilee is now a two-way [speaker]"; it has a 90° x 60° Tractrix horn and a 3-inch titanium diaphragm compression driver with a 2-inch throat. The low-frequency horn, addressing a widespread hunger for deep bass not in evidence among most music lovers a half-century ago, uses two 12-inch woofers working below 800 Hz. Overall frequency response is stated as 38 Hz to 19 kHz, ±4 dB. Claimed sensitivity is an awesome, single-ended-triode-lovin' 105 dB at 1 watt, and impedance is 8 ohms. Price will be between $10,000 and $12,000 per pair, depending on finish—a decidedly unretro cost. True, the Klipschorn Jubilee really looks the part, but its real worth is (like the Harley-Davidson) the genuine credibility of a never-broken bloodline.

This is in stark contrast to, say, Siemel, a French brand known for its classy solid-state and tube amps. But Siemel just ain't old enough or famous enough simply to unearth some long-forgotten, legendary design, nor does the company even possess a cod-vintage logo to suggest antiquity, like Moth. Instead, it came up with a treat that looks like it was designed around the time France was occupied by the Nazis. The HY20 is a hybrid integrated amp with a pure Class-A triode output stage. The front panel, sculpted from some luscious wood, features only three rotary controls for power, volume, and selection of its five inputs. What marks it for the retro market is a clever design fillip: a window covered by gilded mesh through which you can see the tubes. If it smacks a bit too much of those vintage-look radios that are simply new transistor models in curvy Bakelite or

Marantz's reissue of its Model 8 power amp helped get the retro movement started.





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WHERE'S THE TRACKER?

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THE ALL-NEW CHEVY TRACKER. IT GETS AROUND.

A few years too soon? McIntosh's reissued MC275 power amp (above) and C22 preamp (below)

its type—a fan club, as it were—has been formed to mark the achievements of Arthur Radford. If you think this is just a case of British chauvinism from the same people who believe that Logie Baird deserves more credit for modern television than Vladimir Zworykin, you need to know that Arthur played a key role in the development of transmission-line speakers and UltraLinear amp circuitry. And he once manufactured test equipment still cherished by audiophiles who like to measure their systems as well as listen to them.

A gentleman named Philip Parkinson was granted permission by the estate of Arthur Radford to organize the Arthur Radford Appreciation Society. The minute I heard about it, I sent my check for £20 ($35) to make sure I didn't miss a single newsletter. In case you, like me, don't mind being called a groupie, you may want to get an application form (send an e-mail to Philip at pparkin352@aol.com). And then ask yourself why we don't yet have appreciation societies for Paul Klipsch, David Hafler, Saul Marantz, and other pioneers in the audio field.

Before you revel, though, in another decade's worth of retroism, note that it has just experienced a major setback. The first reviews of Jaguar's new S-type, a millennial interpretation of the revered Mk. II and S-type of the '50s and '60s, recently hit the stands. And even the nationalistic British press isn't too impressed. But then again, Jag is now owned by Ford, so what did it expect? A

wooden boxes (to suggest that they once received *War of the Worlds*), at least the HY20's tubes are real.

Curiously, it was neither the reissues of the McIntosh C22/MC275 nor of the Marantz Models 7, 8, and 9 that started the craze for purist audio reproductions. The honor belongs to Radford, which reissued the still-revered STA-25 tube amp in a limited run in the mid-1980s. I take part of the blame for it, because I met the then-retired Arthur Radford and was so worshipful and enthusiastic that he didn't dismiss outright the possibility of resurrecting the design. With his permission, John Widgery (who worked for Radford and would eventually form Woodside Electronics) oversaw the manufacture of 100 Radford STA-25s, finished in black and containing KT77 tubes instead of EL34s. Each amp bore a gold plaque and came with a signed certificate of ownership. What these Radfords now command on the collector's market, I shudder to think.

ASK YOURSELF WHY WE DON'T YET HAVE APPRECIATION SOCIETIES FOR PAUL KLIPSCH AND OTHER AUDIO PIONEERS.

Given the esteem in which Radford products are held in the U.K., Japan, Germany, and elsewhere and given that Radford was, upon reflection, responsible for the practice of reissuing classic hi-fi components, it's only fitting that the first organization of

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It is no wonder that Home Theater magazine concluded: *"If you're in the market for a full-featured controller for your system, look no further than the amazing value you get with the Theater Grand."* – **Jeff Cherun,** *Home Theater, February, 1999*

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by DAVID J. WEINBERG and HOWARD W. FERSTLER

BASS VERS

ROOM ACOUSTICS AND GOOD SOUND

Many people enjoy the body-vibrating bass experienced in the finest concert halls (like Boston's Symphony Hall) and in a few movie theaters. However, this experience has proved exceptionally difficult to bring home. In fact, the acoustics of a normal home listening room make it nearly impossible to secure flat frequency response in the important range of 20 to 400 Hz at the listening position.

Acoustical factors that influence the amount and perception of bass in a listening room include:

- three-dimensional standing-wave patterns,
- room dimension ratios,
- room volume (how big the room is),
- rigidity of the room boundaries (floor, walls, and ceiling),
- boundary augmentation/cancellation effects and speaker placement, and
- speaker spacing.

Although it is impossible to separate these effects in a real room, as all of them act simultaneously on the sound traveling from the speakers to the listener's ears, they are easier to understand when analyzed separately.

BASICS

Physically, sound consists of cyclic air movements, which produce pressure waves and velocity waves that are correlated as shown in Fig. 1. At the point where the pressure is maximum or minimum, the velocity is zero (that is, the net velocity of the air molecules near this point in space is zero); where the air molecular velocity peaks, the pressure differential is zero. (By pressure differential, we mean the difference between the pressure at that point and the nominal atmospheric pressure.)

Complex sounds, such as music or speech, can be viewed as ever-changing linear combinations of individual frequencies of various amplitudes. Therefore, a discussion of single-frequency sine wave patterns will make the explanation easier and can be extrapolated to cover complex sounds.

A sound's frequency is marked off in cycles per second (now called hertz, or Hz, after the 19th-century German physicist Heinrich Hertz), which is how often the sine

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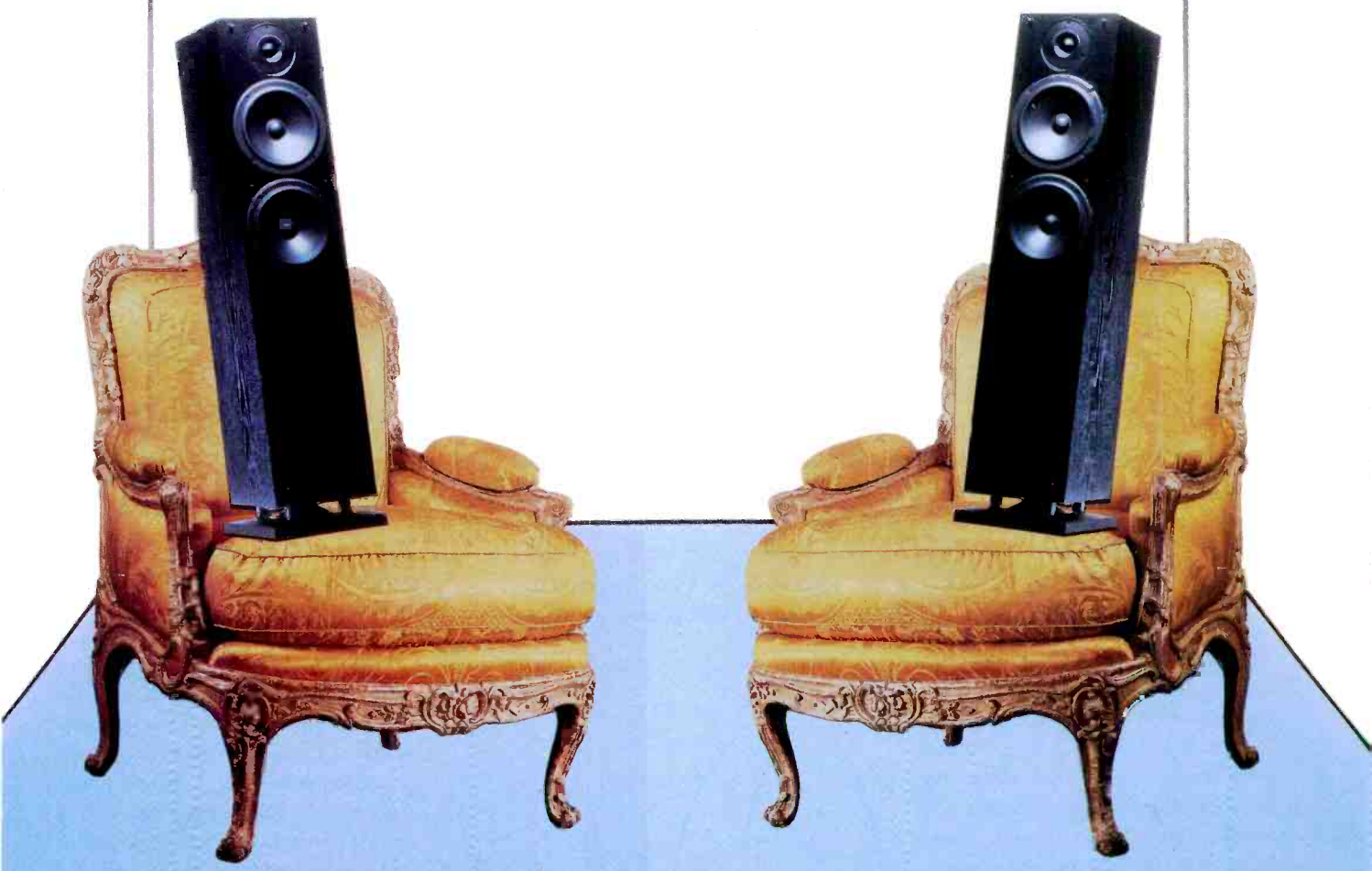
Howard Ferstler has written many articles and books on audio, including *High Fidelity Audio-Video Systems*, *High Definition Compact Disc Recordings*, and *The Home Theater Companion*. Howard can be contacted at 850/386-6983 or via e-mail at hferstle@mailer.fsu.edu.

US SPACE



Photographs: David Hamsley

wave pattern recurs each second. A corollary to frequency is wavelength—how far a single cycle of the sound travels. This is a simple function of the frequency and the speed of sound in air, which is approximately 1,130 feet per second. The higher the frequency, the less time between reversals and thus the shorter the wavelength (Fig. 2).

Sound pressure level (SPL, measured in decibels, or dB) is a time-averaged calculation of the "effective" amplitude (see Fig. 3) of the sound pressure relative to a very low reference level (0.0002 microbar) that approximates the mid-frequency threshold of human hearing.

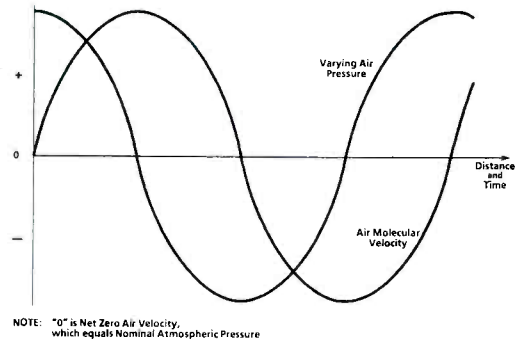


FIG. 1—RELATIONSHIP OF AIR PRESSURE AND VELOCITY IN THE PROPAGATION OF A SOUND WAVE.

STANDING WAVES

Sound emanating from any source (our mouths, speakers, noisy machines, etc.) travels through air, all the while maintaining its complex shape of pressure over time and distance. When the sound strikes a surface, it begins traveling in a new direction, but the shape of the pressure wave continues unchanged, except for losses into or through the surface, which we'll get to later.

When a wave traveling in one direction crosses the path of a wave traveling in another direction, their instantaneous pressures (relative to nominal air pressure) reinforce or cancel, depending on their values. For example, if both are positive (or negative) relative to atmospheric pressure, they will sum to a larger pressure differential. But if one is positive and the other negative, they will sum to a smaller pressure differential (zero if the two happen to have the same amplitude at that time and place).

To make visualization a little easier, assume that the speaker is at one surface. For a given spacing between two surfaces, there is a frequency for which that distance is equal to one-half the wavelength (see Fig. 4); in other words, with the positive peak pressure point at the speaker, the next negative peak pressure point in the waveform is at the other wall. The result is that as the sound continues, and the reflection off the far surface returns to the speaker, the next positive peak pressure point is back at the speaker. Thus, the forward and return waves reinforce each other all along the path (except at the zero-crossing point, where there *is* nothing to reinforce). This is known as a resonance, or standing wave, and at any frequency that creates such a resonance, there will always be maximum pressure differential at the two opposing surfaces. And for this fundamental resonance, where the surfaces are a half-wavelength apart, the pressure differential will drop to zero midway between them.

While any waves will interact where they intersect, only those with a specific relationship to the surface spacing will reinforce all along their path, no matter how many times they bounce back and forth between the two surfaces. The rest of the interactions are random and average out to no net effect.

For a given dimension, resonance also occurs for each multiple of the fundamental frequency, with the number of reinforcement peaks and cancellation nulls proportional to the multiplication factor. This yields a series of maximally affected frequencies, with twice as many in each octave as in the one below.

This effect occurs no matter where the speaker is with respect to the surfaces! In fact, it occurs for each pair of opposite surfaces—wall-to-wall and ceiling-to-floor. Thus, in a conventional rectangular room there are three series of axial standing waves—one series for each pair of opposite surfaces—and the fundamental frequency of each series can be calculated by the formula f=565/d, where d is the distance in feet between the surfaces.

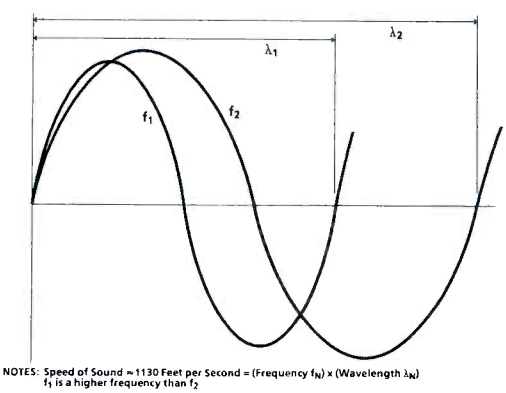


FIG. 2—RELATIONSHIP OF WAVELENGTH TO FREQUENCY.

Speakers should be unequal distances from the floor, each wall, and the ceiling, and no distance should be a multiple of any other.

There is more to the story, however. Measurements and analysis have validated the original work of Philip M. Morse and Richard H. Bolt (of Bolt, Beranek and Newman), who 45 years ago described three types of standing waves: axial, involving only a single pair of opposite surfaces; tangential, which, like a four-cushion billiard shot, involve the four successively adjacent surfaces of a closed rectangle; and oblique, which involve all six room surfaces.

Morse and Bolt noted that there is a difference in relative energy for each type of standing wave, such that, for a given pressure amplitude, an axial wave has twice the energy of a tangential wave and four times that of an oblique wave.

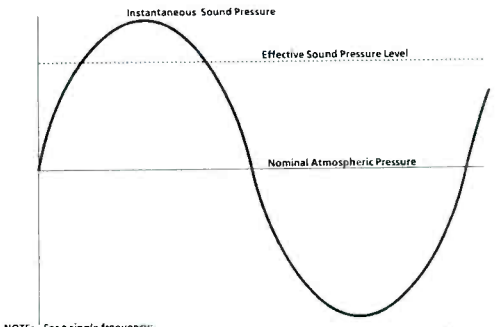
F. Alton Everest and many others have concluded from this that tangential and oblique resonances can be effectively ignored, since their energy is so much lower than that of the axial waves. However, Morse and Bolt also stated the following (emphasis added): "Axial waves are made up of *two* traveling waves propagated parallel to one axis and striking only two walls. Tangential waves are built up of *four* traveling waves, reflecting from four walls and moving parallel to two walls. Oblique waves are built up of *eight* traveling waves reflecting from all six walls." So the reduction in energy per wave for the tangential and oblique resonances is exactly offset by the increase in the number of waves, making the total room energy contribution of each type of standing wave the same. This finding conflicts with Everest's assumption but seems to agree with experimental data collected by a number of well-respected researchers. Thus, a calculated room resonance series based only on axial standing waves is incomplete and will lead to erroneous conclusions.

What all of this means is that regardless of where the speakers are located, there is a set of standing waves based on the room dimensions that will cause peaks and dips in the frequency response at every point in the three-dimensional space of the room, and at different frequencies these peaks and dips will occur at different locations.

ROOM DIMENSION RATIOS

Now that we know that standing waves affect the frequency response and that the standing-wave frequencies can be calculated from room dimensions, the question arises whether there is some optimum ratio of room dimensions to minimize the sonic impact of standing waves. In other words, what ratios will yield the most even distribution of standing-wave frequencies?

The most widely accepted work on this subject is that of M. M. Louden, which followed on that of Morse and Bolt. Louden's most highly recommended room dimension ratio is 1:1.4:1.9, which for a room with an 8-foot ceiling would be 8 x 11.2 x 15.2 feet. This agrees with the recommendations of Bolt, Ludwig W. Sepmeyer, and Tomlinson M. Holman and of the ITU-BR (International Telecommunications Union—Radiocommunications Assembly, formerly the CCIR). The ITU-BR also concludes that the criteria used to determine a good listening room for two-channel stereo are also valid for 5.1-channel surround.



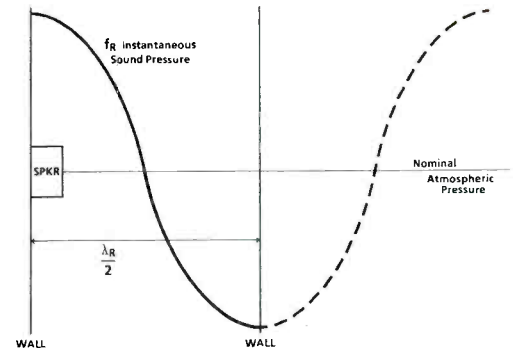
NOTE: For a single frequency:
Effective SPL = 2.707 x [(Peak Instantaneous Sound Pressure) - (Nominal Atmospheric Pressure)]
in dB re 0.0002 microbars

FIG. 3—RELATIONSHIP OF PEAK INSTANTANEOUS AND EFFECTIVE (OR AVERAGE) SOUND PRESSURE LEVEL TO AMBIENT ATMOSPHERIC PRESSURE.

ROOM VOLUME

Over a fairly wide range of room sizes, and all else being equal, a larger room will yield better bass response than a smaller one. The exception, discussed later, is a very small volume (such as an automobile's interior), which forms a low-frequency "pressure pot."

FIG. 4—A FUNDAMENTAL AXIAL STANDING WAVE BETWEEN TWO ROOM BOUNDARIES.



NOTE: λ_R = Wavelength of Fundamental Standing Wave Frequency f_R

The main advantage of a large room is that it will tend to have a lower Schroeder frequency than a smaller room, which in turn will tend to make the frequency response smooth over a wider range. The Schroeder frequency is the approximate frequency above which the room resonances (standing waves) are so closely spaced that they do not substantially affect the sound. Thus, it is necessary to pay serious attention only to the dimensionally determined resonances below the Schroeder frequency, which is a function of room volume and reverberation time. The larger the room or the shorter the reverberation time, the lower the Schroeder frequency.

BOUNDARY RIGIDITY

The more rigid a room's surfaces, the better it will maintain low frequencies. Roy Allison and others have described how "soft" walls, "soft" ceilings, "soft" floors, padded furniture, room dividers, and openings (doors or windows) affect the severity and "Q" (bandwidth) of response peaks and dips in a room.

We're all familiar with loud bass coming from a closed-up car idling next to us at a traffic light. We also are aware of the bass thumping through the walls from a neighboring apartment, especially late at night when we want to sleep.

Sound is vibrating air molecules. When these molecules strike a surface, they transfer energy to it, causing the surface to vibrate. The surface reflects some of the energy back into the room and dissipates some of it as heat, but the rest is transmitted through the surface into the adjoining area, whether that is a room or the outside air. The less rigid the surface, the higher the percentage of the energy transmitted to the other side. Because of the mass and dimensions of typical room surfaces and the longer wavelengths of lower frequencies, bass tends to be transmitted through these surfaces much more easily than high frequencies, attenuating bass inside the listening room. Also, and for all the same reasons, doors and windows cause a greater bass loss from a room than the walls. This is why, all other factors being equal, a listening room in a cellar will usually have stronger bass than a room on an upper floor.

BOUNDARY EFFECTS AND SPEAKER PLACEMENT

Apart from his work as a speaker designer, Roy Allison is best known for his investigations into the sonic effects of room dimension ratios and boundary augmentation of loudspeaker output. In particular, he quantified what has become known as the Allison effect: a predictable dip, or suckout, in the low-frequency response that is determined by the distance from the center of the driver to each room boundary. This effect is noticeable only for the woofer, since for the distances normally involved, the frequencies affected are usually around 150 to 200 Hz.

For a given distance from the speaker to one surface, there is a 1-dB dip at the maximally affected frequency. For a speaker that is the same distance from each of two surfaces, such as the floor and the wall behind the speaker, the dip is around 3 dB. If, by some chance, the speaker is the same distance from each of the nearest three surfaces (i.e., in a corner), the suckout is approximately 11 dB.

Psychoacoustically, a narrow bass notch (suckout) is less objectionable than a broad-spectrum boost (ignoring the fact that a lot of us are perfectly happy with bass boost, even though it moves us away from high fidelity!). But such boost is another product of boundary interaction. As the frequency gets lower and the wavelength becomes longer than about ten times the distance from the speaker to the nearest surface, the room becomes a pressure pot and output is entirely displacement-limited. Exact location is irrelevant, because at longer wavelengths the woofer is acoustically "close" to the room boundary. As the distance to the nearest surface meets this criterion, there is a shelving bass boost of about 3 dB. As the next surface comes into play, a total boost of around 6 dB occurs. When the speaker is close enough to all three of the nearest surfaces, the bass boost is 9 dB. As Allison makes clear, this effect has two causes. It reduces the angle into which the speaker radiates—from a full sphere (suspended in open air), to a half sphere (on the floor), to a quarter sphere (also at one wall), and then to one-eighth sphere (near a corner). And nearby surfaces improve the cone's "bite" on the air, which increases speaker efficiency.

For a single-surface effect, the boost-to-dip ratio is 4 dB; for two surfaces the same distance from the speaker, it is 9 dB; for three surfaces, it is an amazing 20 dB from shelving boost level to the pit of the suckout! This is why it is best to have the front of the speaker flush with the wall (or, in the case of bookshelf speakers, buried in a shelf full of books). Given that this is unlikely for many situations and speakers, it is best that the speaker be different distances from the floor, each wall, and the ceiling and that none of the distances be multiples of any other. A simplistic formula that is fairly effective is: $B^2 = A \times C$, where A is the distance to the nearest boundary, B is the distance to the next nearest boundary, and C is the third distance; only in rare cases do the fourth, fifth, and sixth distances have any substantive influence.

The Allison effect is usually exacerbated by the often-recommended placement of speakers away from walls and on stands. This typical speaker siting causes the well-documented suckout of upper-bass frequencies, making cellos and basses sound thin while coincidentally seeming to enhance clarity.

Suckout is a power-response phenomenon and will influence the sound no matter where you sit. It is the result of quarter-wave cancellation effects, in which sound reflects from large nearby boundaries back to the woofer and nulls its output at certain frequencies. If the boundaries are far enough away, the suckout moves downward in frequency and begins to affect the lower bass range. A large boundary 3 feet away from a speaker will cause a power-response (not standing-wave) dip at 113 Hz everywhere in the room. At 4 feet, the suckout will occur at 84.75 Hz; at 5 feet the null drops to 67.8 Hz; at 6 feet it is at 56.5 Hz; at 7, 48.4 Hz; at 8, 42.4 Hz; at 9, 37.66 Hz; at 10, 33.9 Hz; and so forth.

The reason commonly given for using speaker stands is to raise the tweeter to the same height as the listener's ears. What is important, however, is not the tweeter's elevation relative to the listener's ears but the quality of the sound at his ears. If a tweeter is so beamy that its height is critical, then the prime listening area must be extremely small, in which case a better solution is to tilt the speaker. Aiming the tweeter up at the listener's head will solve the problem without compromising the smoothness of the low-frequency response.

Allison has also pointed out, by the way, that boundary augmentation/cancellation effects apply to listeners as well as to speakers. Therefore, the recommendation for keeping a speaker unevenly from the nearest three surfaces also, ideally, applies to the listener's ears.

SUBWOOFER PLACEMENT

A single, well-designed subwoofer sitting in a corner will ensure the most bass power input to a room, but that is not the only significant factor. The flatness of the bass response at different points in the room depends on the free-air subwoofer response and on the evenness of the room modes. For example, there might be a cluster of modes near one frequency within the subwoofer's passband that could be somewhat suppressed by placing the sub away from a corner to induce a compensatory suckout. Similarly, if a subwoofer has more output from, say, 60 to 100 Hz than it does from 20 to 60 Hz, pulling it out of the corner a few feet might flatten the hump. Placing the sub close to the listener (as recommended by Hsu Research) might also have audible benefits in some cases, though this can be difficult to establish without sophisticated test gear or a lot of trial and error. Usually, however, the best "safe" bet is corner placement, at least as a starting point. Experiment by moving the sub out in increments of only a few inches, shifting its placement until the deep bass in the listening position is most satisfying.

Moving a subwoofer out of a corner reduces the output at the high end of its operating range more than at the low end because the augmentation is frequency-related. Again, that may help flatten the response with some subs, even though you'll need more input power at the high end than you did before. It amounts to equalization by location, and a little change can make a lot of difference.

Assume a sub in a corner has its woofer 12 inches from each boundary. The augmentation is about 8 dB at 80 Hz. Moving the box so that the woofer is 48 inches away from the walls, with it still sitting on the floor, reduces the augmentation at 80 Hz to zero. So it isn't really correct to say that a sub is acoustically "close" to all six room

boundaries, at least not over its full range. A car (with closed windows) resembles a pressure pot over a wide range of low frequencies because of its small dimensions compared with a living room. But a living room approaches a pressure pot only below the lowest room-dimension resonances, which typically are in the region of 30 to 35 Hz, even for a room of modest size.

Under most conditions, the flattest bass is radiated into the room by placing a single subwoofer in a corner.

SPEAKER SPACING

Similar to the boundary augmentation/cancellation effect, and caused by essentially the same interactions, are the spaced-speaker effects: shelving bass boost from multispeaker coupling and a cancellation dip created by the spacing between speakers.

Allison has pointed out that at frequencies whose wavelengths are more than a quarter the distance between two speakers, there will be a shelving boost of 3 dB (assuming that the two speakers are radiating the same signal at the same level); for two speakers 8 feet apart, that would be 3 dB below about 140 Hz. If two more speakers are added (left and right surround, for example), radiating the same signal at the same level, an additional 3-dB bass boost results. However, rarely do surround signals include the same bass, or bass at even nearly the same level, as the front channels. The exact result in a multichannel system will depend on the bass content in the various channels, the low-frequency extension of the various speakers, the placement of those speakers, and where low frequencies are directed by the bass-management system. Consequently, results can be extremely difficult to predict.

The other side of the speaker-interaction coin is what happens at frequencies where the wavelength is smaller than that at which augmentation by mutual coupling begins. And again, the result is analogous to what happens in speaker/boundary interactions. When woofers are spaced apart, each one's power response will have a notch whose center frequency will depend on the exact distance between the speakers. The suckout is a result of inter-woofer cancellations that are similar to what would happen if one woofer were turned off and a perfectly reflective wall were exactly centered between them. The reflections from the virtual boundary, simulated by the low-bass signals from the second woofer, would cause a dip at the same frequency. Stated another way, with two woofers the null will occur at the same frequency as a boundary effect in which the woofer-to-boundary distance is half the woofer-to-woofer distance. For example, if two woofers are 12 feet apart, or one large boundary is 6 feet from either of the woofers, a null will occur at 56.5 Hz.

The dip will not be very significant sonically unless it is reinforced by a second, boundary-generated dip at the same frequency (note again that this is not about position-independent standing-wave effects). If both speaker-spacing and boundary cancellation occur at the same frequency, the dip will be deeper and more audible. To minimize the adverse effect of using two woofers in the low-bass range, it is important to make sure that they do not also interact with boundaries that are half the distance from either woofer as the two woofers are from each other.

Two woofers placed in two corners would have only one cancellation dip, which would probably not be deep enough or broad enough to be audibly significant with musical program material. Under most conditions, the flattest bass is radiated into the room by placing a single woofer in a corner, the biggest advantage of which is the uniform reinforcement from three adjacent surface boundaries—something that two subwoofers placed in two corners would also have, although they would still have that cancellation null at one frequency because of their spacing. For example, two woofers in corners 20 feet apart would have a dip at about 34 Hz. However, other room effects (the cancellation effects caused by boundaries plus, of course, standing waves) would cause similar aberrations.

Interestingly, if two main-channel satellite speakers are placed 6 feet apart, the interwoofer null will occur at 113 Hz, meaning that a single subwoofer in a corner, crossed over at 80 Hz, will not eliminate the suckout. Indeed, with 8-foot spacing, the resulting 85-Hz suckout might foul up the 80-Hz crossover blend between the subwoofer and the satellites. As noted above, however, this becomes a serious problem only if the speakers are the same distance from a wall as half the distance between the speakers.

STANDING WAVES VS. BOUNDARY INTERACTION

Suckouts—the wave-cancellation nulls caused by interaction between two speakers or between a speaker and a boundary—are not the same as standing waves. Standing waves are determined solely by boundary-to-boundary distances and occur independent of where acoustic power originates in the room; that is, they are purely acoustical effects, not power-response effects. Suckouts, whether caused by speaker-to-boundary or speaker-to-speaker cancellations, *are* power-response nulls. Standing waves control the distribution of power, not the amount; they are fixed spatially in the room, the pattern varying with the frequencies involved. They cause the bass balance of a program to change dramatically as a listener moves around the room. Suckouts affect power response and cannot be changed by moving the listener, although moving him will change his relationship to standing waves in ways that may ameliorate or exacerbate the subjective effect of a suckout.

To change a suckout frequency, move the speakers in relation to each other or to boundaries. Optimally, moving two woofers next to each other and into a corner eliminates the null completely, if the crossover point is below the frequency where the three close boundaries in the corner would cause a null in the upper bass. A

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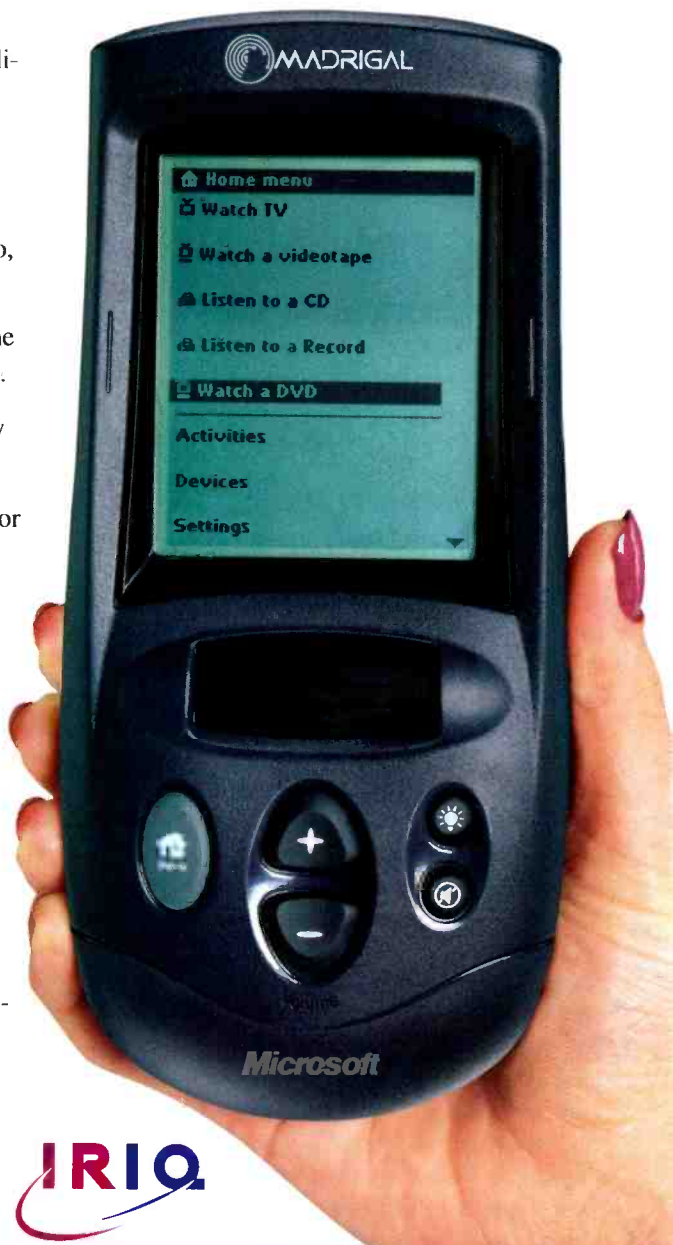

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DANIEL KUMIN

NAD S200 AMP AND S100 PREAMP

From its inception, NAD has prided itself on low-key styling, aiming to sell "what the box *does* rather than the box itself," as one exec told me. By those standards, the firm's distinctive new Silver Series is almost sinfully stylish. These high-performance, two-channel components were built to commemorate NAD's 25th year. The Silver Series S200 power amplifier and S100 preamplifier are finished in striking, sand-blasted aluminum that looks almost snowy yet reveals fine texture up close—a radical departure from the maker's traditional charcoal gray. This preamp and power amp (and the CD player, FM tuner, and integrated amp that round out the series) are constructed along classic high-end audio lines: They have massive, heavy chassis, aluminum front panels made from solid aluminum billets 9 millimeters thick, and cast, vibration-damping feet. To me, the Silver Series looks great. And that beauty is not just skin deep; the S200/S100 combo is more than just another pair of pretty faceplates.

In today's digital, multichannel age, it's refreshing to get back to basics now and again, and the S200 and S100 are about as basic as you could ask for. The preamp's slim-line front panel carries just a single volume knob, seven input selectors, a power button, and a round sensor for the remote control. Around back are six line-level inputs (including two complete tape loops) served by mechanically solid, screwed-to-the-panel RCA jacks. A seventh input position, marked "Phono," functions as an extra line-level position until an optional $299 phono module, installed by the dealer, is added; NAD says it's configurable for moving-magnet or moving-coil cartridges and has adjustable loading to match any cartridge's impedance. The S100 has two pairs of unbalanced line outputs plus one pair of balanced outputs on gold-plated XLRs. The preamp's power cord is the IEC removable type.

AMPLIFIER

Rated Output at 0.03% THD, 20 Hz to 20 kHz, into 8 Ohms: Stereo, 225 watts/channel (23.5 dBW); bridged mono, 780 watts (28.9 dBW).

Dimensions: 17¾ in. W x 7⅛ in. H x 15¾ in. D (45 cm x 18 cm x 40 cm).

Weight: 59.4 lbs. (27 kg).

Price: $1,799.

PREAMPLIFIER

Dimensions: 17¾ in. W x 2⅝ in. H x 11⅜ in. D (45 cm x 6.7 cm x 29 cm).

Weight: 13.6 lbs. (6.2 kg).

Price: $1,199, including system remote; deluxe system remote, $199; phono module, $299.

Company Address: 633 Granite Court, Pickering, Ont. L1W 3K1, Canada; 800/263-4641; www.nadelectronics.com.

Photos: Michael Groen

THIS AMP AND PREAMP ARE TEXTBOOK EXAMPLES OF SOLID-STATE CIRCUITRY DONE RIGHT.

The S100 preamp's interior is impressive. The power supply has a massive, 35-volt-ampere toroidal transformer, 14,000 microfarads of storage capacitance (enough for some small amplifiers), numerous regulators with individual heat sinks, and an unusual output stage. This stage, built of discrete devices, is a power amp in miniature and is said to achieve an exceptionally low output impedance of 50 ohms. There are separate output stages for the positive and negative signal phases, to drive the XLR outputs in true balanced mode.

The S100's bill of materials lists plenty of audiophile-approved goodies, including

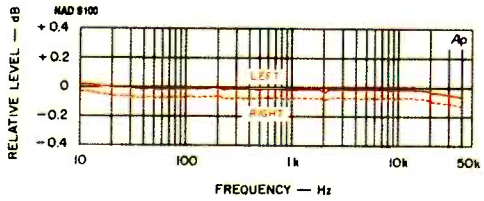


Fig. 1—Frequency response, S100 preamp.

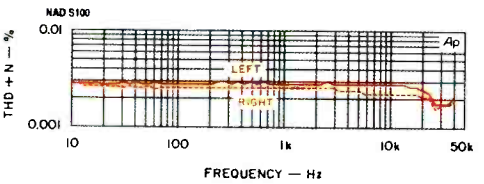


Fig. 2—THD + N vs. frequency, S100 preamp.

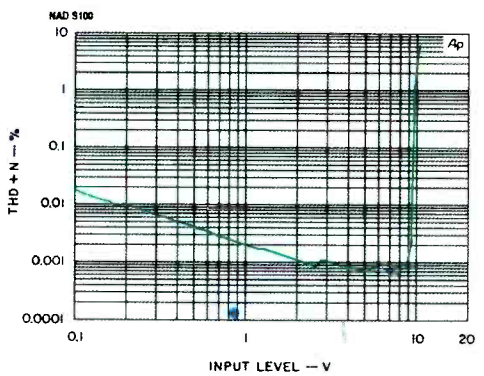


Fig. 3—THD + N vs. input level, S100 preamp.

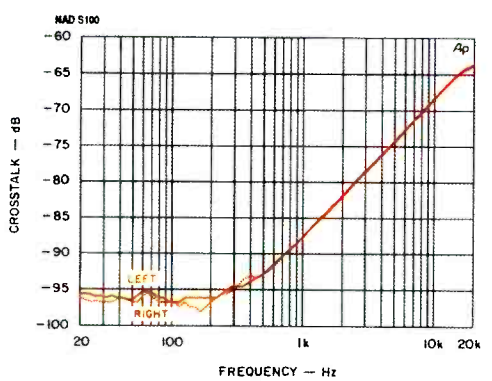


Fig. 4—Crosstalk, S100 preamp.

red WIMA capacitors (NAD says they're "more highly regarded" than the commoner yellow ones—*sheesh*, it's getting to be like M&Ms), 1% metal-film resistors, film-type filter-bypass capacitators, a double-sided glass-epoxy circuit board, and gold-plated signal relays within an inch of each input jack to handle signal routing. The preamplifier's circuitry uses only discrete transistors except for the driver, a Burr-Brown OPA134 op-amp, preceding its output stage. NAD characterizes this op-amp as having ultra-wide bandwidth, low noise, low distortion, and low DC offset. I found the S100's innards about as handsome as its outtards—even the internal heatsinks were made of sand-blasted aluminum!

The S200 follows the same pattern, of course. Front-panel features comprise a power switch and pilot light plus pinpoint LED indicators for the S200's Soft Clipping circuit (which is said to "gently limit the output waveform and minimize audible distortion when the amplifier is overdriven"), bridged mono mode, and protection circuitry. The amp's rear panel carries balanced and unbalanced inputs, an IEC power socket, and spiffy, WBT gold-plated speaker terminals. Each speaker terminal has metal connectors encased in clear plastic wire guides for easy insertion of pins or bare wire. (These work great, but—curses!—the pairs are not spaced for ¾-inch dual-banana plugs.) Tiny slide switches activate bridging and Soft Clipping and select balanced or unbalanced input.

Topology-wise, the S200 is described as being derived from NAD's 218THX amp but with many circuit and component upgrades. The S200's performance claims include stability into very low impedances (down to 1 ohm), storage capacitance built up from banks of many small capacitors rather than a few large ones (to speed rail-voltage recovery by reducing equivalent series resistance and inductance), and direct-coupled layout throughout (excepting the inputs, which are coupled through WIMA capacitors). The supply transformer, rated at 1,200 volt-amperes, is a Holmgren toroidal unit said to keep stray magnetic fields very low. (I confirmed this with my highly unscientific guitar-pickup-proximity audible test.) Like the preamp, the S200 contains a high-grade op-amp at a key circuit position. But here that position is the input, and the op-amp is Analog Devices' OP249, a J-FET design said to have superior slew rate, settling, distortion, and noise as well as extreme stability. Overall, the S200 is a conventional Class-AB design, with bipolar output devices (eight per channel), minimal global feedback, and (thanks to its very ample heat sinks) an unusually high idle point that enables the amp to stay in Class A at higher output levels than more typical Class-AB amps in its power class.

The S100 preamp comes with this remote, which also controls other NAD components. A simpler but fancier remote is optional.

Under its handsomely perforated top cover, the S200's most prominent feature is the huge power transformer, which sits on edge against the front panel. The remaining circuitry is arrayed symmetrically on a connection board to the rear, channel cards bolted to each side-wall heat sink, and a power-supply board (which holds eight 4,700-microfarad Nichicon storage capacitors) on the floor. Component quality looked good everywhere, with parts selection similar to the S100's. I was very impressed by the amp's construction: sturdy steel peripheral rails, heavy panels, and dozens of Allen-bolt fasteners.

In short, construction of this amp and preamp is beyond reproach, especially considering the Silver Series' affordable-high-end pricing. The fit and finishof these components, and their quite elaborate heat sinks and structural elements, are definitely worth a second look.

The system remote provided with the S100 commands the preamp's volume and

source selection (what else is there?) and has buttons (37 of them) to operate current or recent NAD tuners, CD players, and tape decks. The new S70 Silver Series system remote ($199), which is machined out of solid aluminum and has a "paged" LCD display to keep its button count to just 14, was not available for this review.

Measurements

The test results for the NAD S100 preamp and S200 amp could easily serve as textbook examples of end-of-the-century, solid-state-done-right performance.

The S100's frequency response for a 500-millivolt signal at unity gain (Fig. 1) is flat, and channel balance is within 0.1 dB. (The 2-kHz glitch is in my test system.) Over the final one-quarter or so of its rotation, from about 2:30 or 3 o'clock, the volume control's channels did not track as well, deviating by about 0.5 dB. But unless your amp, speakers, or both have very low sensitivity, you'll rarely set the control this high. (I did virtually all my listening with it set between 11 and 1 o'clock.)

Figure 2, a plot of the S100's total harmonic distortion plus noise (THD + N), reveals that there's effectively zero distortion and very low noise. Taken with an 80-kHz measurement bandwidth, the curves indicate that the preamplifier is very linear at ultrasonic frequencies, suggesting a low-feedback design and implying low transient-related distortion and, possibly, good immunity to RF interference. The S100's THD + N is plotted against input signal level in Fig. 3. (The performance of only one channel is presented; the other's was identical.) The NAD cheerfully absorbed nearly 10 volts from a low source impedance and so should handle just about any unbalanced consumer audio source with aplomb.

SUBJECTIVELY, THIS IS ONE OF THE QUIETEST AMPLIFICATION SYSTEMS I'VE ENCOUNTERED.

The preamp's channel separation, seen in Fig. 4 for a 500-millivolt signal at unity gain, is perhaps 10 dB less than I might have expected in view of the S100's otherwise fine performance. The 6-dB/octave reduction above the midband suggests capacitive coupling, probably a result of board layout. However, because separation remains better than 70 dB at any frequency where you're likely to notice it, this is merely a paper issue.

Noise is not much of an issue with this preamp, either. A spectral analysis of its residual noise relative to 500 millivolts (Fig. 5) indicates that the S100 is quiet—*real* quiet.

I am not presenting any plots from the S100's balanced outputs because the results were little different from those with the unbalanced jacks; what modest differences I did uncover appear in "Measured Data." I should report that idling noise was a bit higher at the balanced outputs (which is predictable, given the balanced input's extra circuitry), but channel balance was actually a touch better.

The S100's output impedances measured a very low 65 ohms (near enough to the specified 50 ohms as makes no nevermind), which should minimize or eliminate response changes caused by interconnect cables. All this adds up to stellar performance.

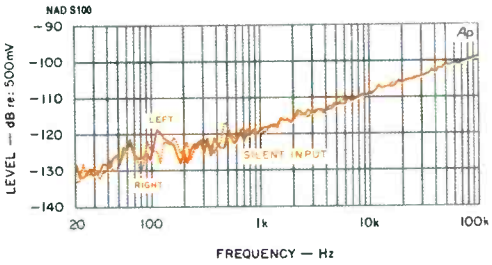


Fig. 5—Spectral analysis of residual noise, S100 preamp.

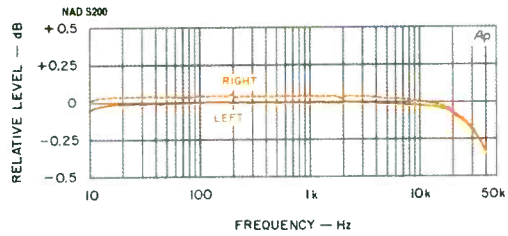


Fig. 6—Frequency response at 1 watt, S200 amp.

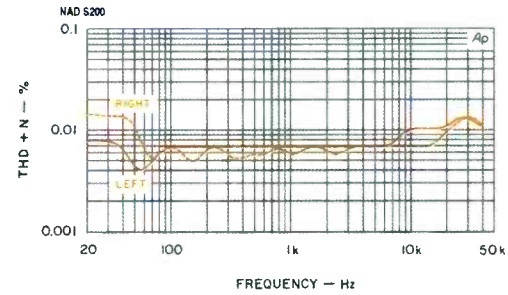


Fig. 7—THD + N vs. frequency at 1 watt, S200 amp.

The S200 power amp delivered generous wattage and behaved very well on the bench. Clipping came within a tick of 250 watts for 8-ohm loads and 365 watts into 4-ohm loads, both channels driven. During these tests, my lab's AC line sagged to about 115 volts (from 120). Bridged into 8 ohms, the S200 produced about 750 watts at 1 kHz and sucked the line down to 112 volts. However, I had little doubt that the amplifier would yield at least its rated 780 watts bridged, were it connected to a better-regulated AC line. Dynamic headroom into 8 ohms was almost exactly 1 dB (285 dynamic watts), but since clipping headroom is already about 0.5 dB, this isn't very significant. Driving 4 ohms, the S200 had roughly the same dynamic headroom, relative to an arbitrarily selected 350 watts (NAD does not spec 4-ohm power). Into either 4 or 8 ohms, the Soft Clipping circuit made no measurable difference.

Like the S100 preamp, the S200 power amp has very flat frequency response (Fig. 6). At 1-watt output into 8 ohms, the amp's THD + N versus frequency is about 0.005% through the midband (Fig. 7); this is pretty close to the noise floor—impressive. Results for THD + N into 4 ohms at 1 watt in stereo mode and into 8 ohms in bridged mode were substantially the same, within a hundredth of a percent.

Figure 8 shows the amplifier's power versus distortion. (Because the two channels performed essentially identically, I've included results for just one of them.) Figure 8A shows the amp's output for 4- and 8-

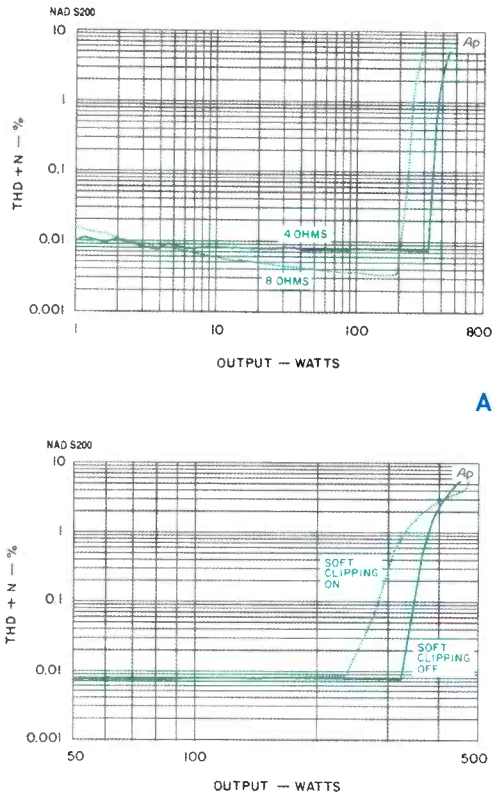


Fig. 8—THD + N vs. output of S200 amp at 1 kHz into 4- and 8-ohm loads without Soft Clipping (A) and at 16 kHz into 4 ohms with and without Soft Clipping (B).

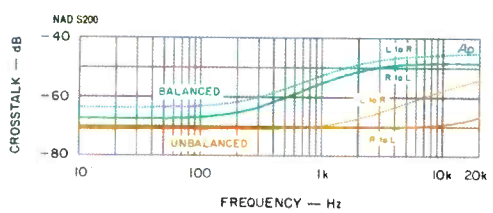


Fig. 9—Crosstalk, S200 amp.

ohm loads with a 1-kHz signal; Fig. 8B is for a 16-kHz signal into 4 ohms, with Soft Clipping on and off. Clearly, this circuit's impact on steady-state signals of average power is not terribly meaningful (in fact, it hastens sine-wave clipping by some fraction of a decibel), but it's designed to make dynamic musical signals sound less harsh when clipped rather than to delay clipping.

Although the S200's channel separation doesn't exactly push the envelope, keep in mind that the curves in Fig. 9 are referenced to 1 watt and are thus well below levels that might by any stretch be considered audible. The difference between the curves taken with the unbalanced input could be a factor of board layout or of lead dress (which might apply only to my review sample or to all S200s).

Figure 10 shows the NAD amp's residual noise, graphed spectrally in dBW (decibels re 1 watt). The curves for unbalanced input (Fig. 10A) need little comment: Power-line components are clearly in evidence but are all below –100 dBW, which ought to be plenty good enough for any rational soul; the ultrasonic peaks are from my test environment, not the amplifier. The noise obtained with balanced input (Fig. 10B) is a little tougher to interpret. On the left channel it looks about as I would expect, with 15 dB or so less hum and buzz than the unbalanced input. The right channel, however, looks to be enjoying little (if any) of the benefits of common-mode rejection; this was also reflected in the S/N results taken with the balanced input. I experimented a good deal with ground lifting, lead dressing, and instrument grounds without discovering anything conclusive. Either way, we're still talking about noise levels below –100 dBW.

Use and Listening Tests

I hooked the Silver Series combo into a simple audio system comprising a pair of Platinum Solo two-way speakers and a Sony DVP-C600D DVD/CD changer (which happens to make a very good-sounding CD player). I used balanced connections (pro-quality XLR mike cables) between the preamp and the amp and Wireworld cabling to the speakers.

Both Silver Series components wink awake with sci-fi-blue LEDs—indisputably handsome against the S100's and S200's silvery-gray finish. Whether I used the front panel or the remote, the preamp's volume control worked well, and pressing input selectors caused no hint of a pop. The amp's and preamp's power keys worked just as silently.

Subjectively, the NAD combo is certainly one of the quietest amplification systems I've ever encountered. During the ear-to-the-tweeter test and with maximum volume, it was just possible to tell there was any noise at all. Now, that's quiet!

Maybe it was the terrifically low noise floor, but something about this NAD pairing drew me to solo piano and chamber music. An old favorite recording of Prokofiev sonatas (Sony Classical SK 52-484) sounded more than terrific. This was one of the rare setups over which, at a life-like, close-range volume (what I call page-turner's volume), I could actually hear pianissimo-note fade-outs ooze into the CD's inherent noise floor. (And that floor was low, this being a quasi-20-bit Super Bit-Mapped recording!) I could even more easily hear producer's edits; they were expertly done, with the music cutting seamlessly, but subtle discontinuities in studio rumble and room sound gave the game away.

Musically, the NADs sounded ultra-clean, neutral, detailed, and defined, with-

THE NADs SOUNDED ULTRA-CLEAN, NEUTRAL, DETAILED, AND DEFINED, WITH NO COLDNESS OR STERILITY.

out that coldness or sterility that some buffs term "transistor sheen." From this I infer that the S200 (and S100) did not clip, at least audibly, on even the briefest, most nearly vertical, piano transients. The amp had ample wattage to shove the Solos' diaphragms back and forth despite these speakers' notably low sensitivity (84 dB/1 watt/1 meter on the spec sheet but in real life, I'd wager, a decibel or two lower still).

This meant that even in Prokofiev's most aggressive passages, Yefim Bronfman's superbly precise, almost fussy piano playing sounded almost squeaky clean. And I could hear that loud, near-field upper-bass-string thrumming I hear in live piano concerts but only rarely in playback of recordings.

A new Bruckner Ninth from the Minnesota Orchestra (Reference Recordings RR-81CD) serves up similar, though much more gradual, dynamic contrasts—but only if you have the patience to let the stately counterpoint work itself out. (I frequently don't. Listening to Bruckner sometimes makes me feel as if his "circle of fifths" had 24 spokes instead of the more usual 12.) The NADs preserved this recording's mildly distant perspective. The stereo sound field was very rich, and the brass-choir sounds from the Ninth's many broadside Wagnerian episodes were gutsy and honest. There was never a hint of constricted sound or stress from the electronics.

For a pop trial I cued up, among others, *Lyle Lovett and His Large Band* (MCA MCAD-42263). Punchy tracks, such as "Cryin' Shame," benefited from the crisp, dynamic, and solid reproduction and its powerful, snappy bass and excellent percussive detail. The S200 provided as much power as the Solos could comfortably absorb. (In my current setup, however, the speakers appear to start overloading at about the same point as my ears, so the actual onset of serious clipping can be something of an open question.) The ability of the NAD pairing to spring from utter silence—and fall seamlessly back into it—was commendable, as demonstrated by Lovett's spoken snippets on "Here I Am."

Did engaging NAD's Soft Clipping circuit make an audible difference? I can't say with a lot of conviction. On several piano recordings (including the Prokofiev) I thought I heard a very subtle darkening of big transients at high listening levels when I engaged it, but that was about it. And, being in a purist mood, I left it off for the bulk of my listening.

The NAD S100 and S200 sounded superb from start to finish. The combo costs just about $3,000—a fortune, even for an entire surround system, by some standards but also a sum you could easily spend on a preamp or power amp alone (or a set of cables, for that matter). There very likely are better two-channel pairings available for two or three times this figure (heaven knows there are enough priced that high). But because they're subject to the law of diminishing returns, I, for one, would have an awfully hard time justifying spending much more (of my own money—*Audio*'s is another matter) to get so small a potential sonic gain. Well done, NAD. A

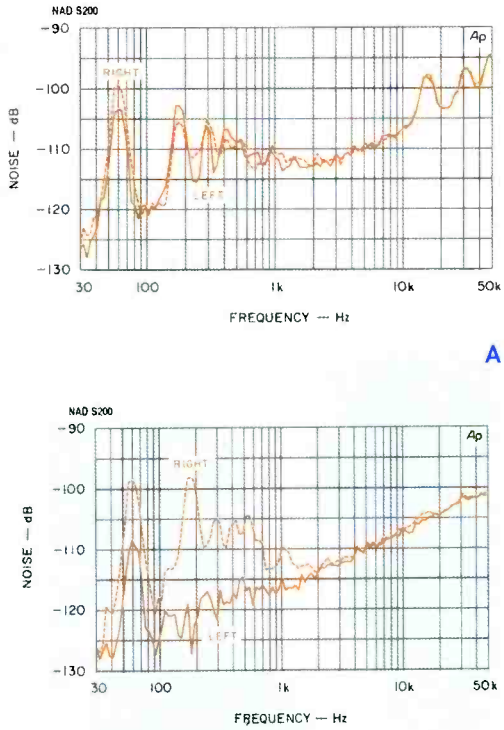


Fig. 10—Residual noise for S200 amp with unbalanced input (A) and balanced input (B).

MEASURED DATA

AMPLIFIER

Output Power at Clipping (1% THD + N at 1 kHz): Stereo, 247 watts/channel into 8 ohms and 365 watts/channel into 4 ohms; bridged mono, 750 watts into 8 ohms (limited by line voltage; see text).

Dynamic Power: Stereo, 284 watts/channel into 8 ohms and 474 watts/channel into 4 ohms; bridged mono, more than 900 watts into 8 ohms (limited by line voltage; see text).

Dynamic Headroom: 8-ohm loads, 1 dB; 4-ohm loads, 1.3 dB (re 350 watts).

THD + N, 20 Hz to 20 kHz, from 1 Watt to Rated Output: Stereo, less than 0.02% at rated output and at 1 watt/channel into 8 ohms and less than 0.02% at 350 watts/channel and at 1 watt/channel into 4 ohms; bridged mono, less than 0.02% at 700 watts and at 1 watt into 8 ohms.

Damping Factor re 8-Ohm Loads: 177 from 50 Hz to 1 kHz, 157 at 10 kHz, and 118 at 30 kHz.

Output Impedance: 45 milliohms at 1 kHz.

Frequency Response: 10 Hz to 20 kHz, +0, –0.1 dB.

Maximum Channel Imbalance: 0.02 dB.

Sensitivity for 1 Watt Out: Unbalanced, 155 mV; balanced, 120 mV.

A-Weighted Noise: Unbalanced, –94 dB; balanced, –84.7 dB.

Input Impedance: Balanced or unbalanced, 100 kilohms.

Channel Separation, 20 Hz to 20 kHz: Unbalanced, greater than 56 dB; balanced, greater than 45 dB.

PREAMPLIFIER

Maximum Output: Unbalanced, 9.7 V; balanced, 19.4 V.

Input Overload: More than 12.5 V.

THD + N, 10 Hz to 40 kHz re 500 mV In/Out: Balanced, less than 0.004%; unbalanced, less than 0.003%.

Frequency Response: 10 Hz to 40 kHz, +0, –0.1 dB.

Maximum Channel Imbalance at 6 dB Gain: Unbalanced, 0.2 dB; balanced, 0.1 dB.

Gain with Volume at 12 O'Clock: Unbalanced, –4.5 dB; balanced, 0 dB (unity).

A-Weighted S/N re 500 mV In/Out: Unbalanced, 100.1 dB; balanced, 94.4 dB.

Input Impedance: 40 kilohms.

Line Output Impedance: Unbalanced, 65 ohms.

Record Output Level: 509 mV for 500-mV input.

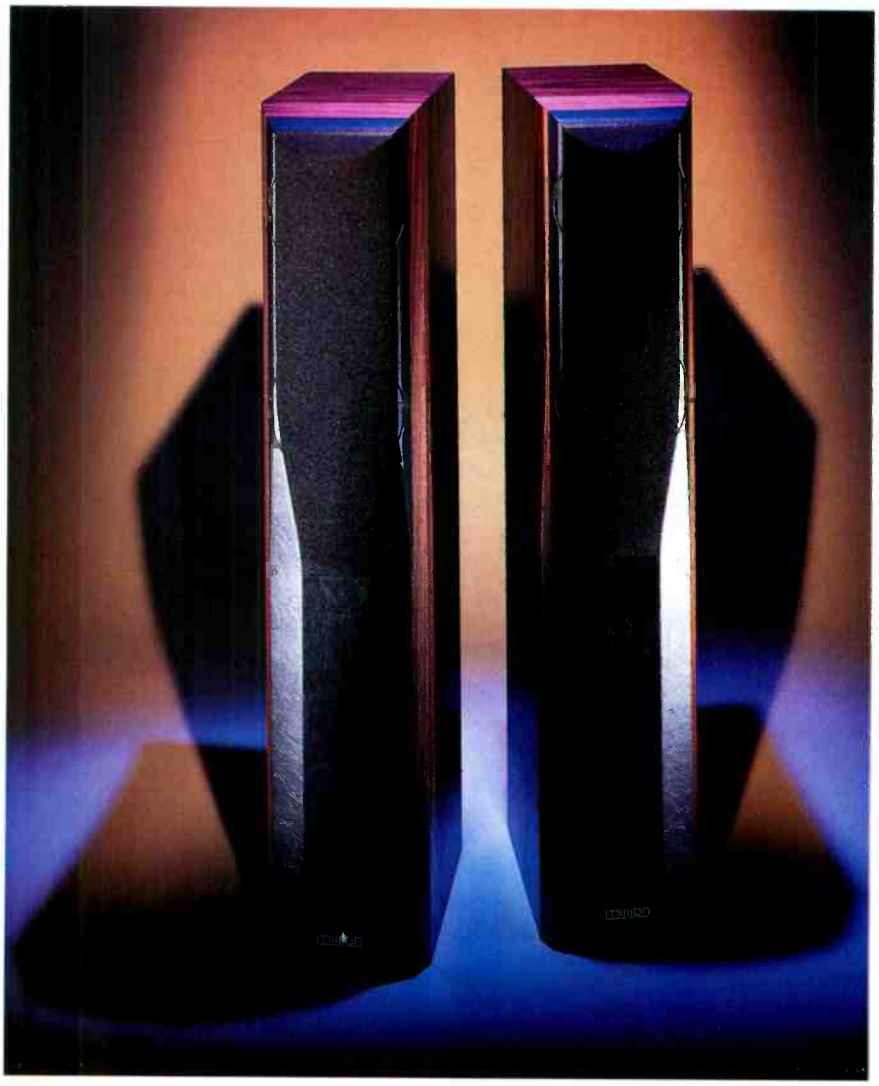
Record Output Impedance: 65 ohms.

Channel Separation: Greater than 65 dB, 20 Hz to 20 kHz.

EQUIPMENT **PROFILE**

D. B. KEELE, JR.

MISSION 774 SPEAKER



British manufacturer Mission is really into the number 7. In past years, I've reviewed its 750LE mini monitor (August 1998) and 735 (January 1996). Now I'm reviewing a model from Mission's 77 series, which comprises nine home theater and stereo loudspeakers ranging in price from $400 to $2,000 per pair.

The 774's slender cabinet houses a 1-inch fabric-dome tweeter between two 5¼-inch cone woofers, in the well-known D'Appolito configuration. (The woofers and tweeter are made for Mission in France by Audax.) Rated crossover frequency is 3 kHz. A flared port tube, 2¼ inches in diameter and 1½ inches long, is just below the bottom woofer.

The Mission's front panel, of medium-density fiberboard (MDF), is impressively thick (1½ inches); it provides a strong and stable platform for the flush-mounted drivers, Mission says. Wrapped in black vinyl, the panel has generously rounded edges with a gentle 25° bevel (which is continued by the cabinet's front edge) to reduce edge diffraction and improve stereo imaging. Otherwise, the cabinet is made from ¾-inch-thick MDF.

Strengthening the enclosure is an internal MDF shelf that divides the cabinet into two roughly equal halves; the shelf has a 2½ x 6-inch hole in it. The drivers and port are in the top chamber, the crossover and input connectors in the bottom one. Internal damping is provided by closed-cell foam, ¾ inch thick, that covers the back of the top chamber, the top of the shelf, and, surprisingly, the hole in the shelf.

All four sides of the 774's cabinet and the front bevel are covered by real wood veneer. The grille has a flexible plastic frame that plugs into grommeted holes in the front panel. The bottom of the grille snugly covers the port tube; this turned out to be quite significant.

The 774's woofer diaphragms are made of Aerogel, a mix of Kevlar and carbon fibers in an acrylic polymer, which Mission says combines low mass with high stiffness. In the center of each woofer is a gold-plated, bullet-shaped phase-correction plug. Because the plug is attached to the driver's center pole, it does not move with the cone. According to Mission, the plug improves off-axis performance, smooths frequency response, and eliminates dust-cap resonances. A rubber surround attaches the cone to a molded-plastic frame. The ferrite magnet, about ⅝ inch thick and 2¾ inches in diameter, is not shielded.

Rated Frequency Response: 45 Hz to 20 kHz, ±3 dB.
Rated Sensitivity: 89 dB at 1 meter, 2.83 V rms applied.
Rated Impedance: 8 ohms, nominal.
Rated Power Handling: 25 to 150 watts.
Dimensions: 36⅜ in. H x 7 in. W x 12½ in. D (92.3 cm x 17.8 cm x 31.6 cm).
Weight: 26.4 lbs. (12 kg) each.
Price: $1,200 per pair; available in black ash, rosewood, or cherry veneer.
Company Address: c/o Denon, 222 New Rd., Parsippany, N.J. 07054; 973/396-0810; www.del.denon.com.

Photos: Michael Groen

The 774's tweeter, whose rare-earth magnet is also unshielded, has a laminated fabric dome. The tweeter is isolated from the front panel by a molded-plastic suspension that Mission refers to as a Driver Isolation System and describes as a leaf spring. This springy suspension combines with the tweeter's mass (magnet and all) to form a mechanical low-pass filter that attenuates upper-frequency cabinet vibrations before they can reach the tweeter.

A wide plastic flange, which Mission calls an outrider, can be attached at the cabinet's bottom rear to provide additional stability by broadening the speaker's footprint from 7 to 12 inches. Spikes and rubber feet are also provided.

Mission says that it designed the 774's crossover to be as simple as possible and to minimize the signal path between amplifier and speaker; this was done to maximize detail and resolution and make the speaker an easier load for the amplifier. The low-pass to the woofer is a first-order filter. The tweeter is driven via a second-order LC high-pass filter.

ON JAZZ PIANO, THE 774s DELIVERED CRISP, CLEAN HIGHS, DYNAMIC PIANO NOTES, AND REALISTIC DRUMS.

The tweeter and woofer terminals can be bi-wired. They have heavy-duty, gold-plated five-way binding posts that can accept up to 8-gauge wire. Each pair of terminals is spaced ¾ inch on center, so standard double-banana plugs can be used.

Measurements

Plots of the Mission 774's on-axis frequency response are presented in Fig. 1. With the grille off, the response fits a fairly tight, 5.4-dB, window from 55 Hz to 20 kHz. Low-frequency extension is fairly good: At 45 Hz, the Mission's output is only 3 dB lower than it is at 100 Hz, and at 41 Hz it's only 6 dB down from the 100-Hz level. As with most speakers, the 774's grille affects high-frequency response, reducing it by about 2 to 3 dB above 4 kHz and significantly roughening it. What's unusual here is that the grille also affects bass response, reducing output by 3 dB at 52 Hz. As will be discussed later, this is at (or near) the vented enclosure's tuning frequency. The snugly fitting grille apparently provides a high acoustic resistance to airflow through the port and thus reduces the output at and near box tuning. Covering a port with a grille will usually reduce its output, but I've never before seen it happen to this degree. (The curves in Fig. 1 combine near-field measurements in the bass range with upper-frequency measurements taken in a large anechoic chamber. The curve taken without the speaker's grille was smoothed with a tenth-octave filter; the curve taken with the grille wasn't smoothed.)

From 250 Hz to 4 kHz, the 774's sensitivity averaged 88.9 dB, almost exactly as rated by Mission. The right and left speakers matched fairly closely, within ±1 dB above 100 Hz.

To check driver phasing, I reversed connections to the tweeter terminal posts. The ensuing dip, 1½ octaves wide and 20 dB down at 4 kHz, suggested that the woofers' and the tweeter's acoustic outputs will be solidly in phase through the crossover region when none of the drivers' connections are reversed. As a result, there should be only minimal lobing.

Figure 2 shows the 774's phase and group-delay responses, referenced to the tweeter's arrival. No surprises here. As with most direct-radiator speakers, the Mission's phase decreases as frequency increases and then levels off. The group delay is relatively short, about 0.2 millisecond, from 350 Hz to the rated crossover frequency, 3 kHz, and the woofers' output lags the tweeter's. This is because of the combined effects of the crossover network's electrical delay and the drivers' positions.

The 774's on- and off-axis horizontal responses (Fig. 3) are extremely uniform in the main, ±15°, listening window. A bit farther off axis, at ±20° to ±25°, response rolls off above 14 kHz. The speaker's vertical on- and off-axis responses (Fig. 4) are fairly uniform except in the crossover region, between 2 and 6 kHz. The responses are quite symmetrical above and below the axis (not clearly seen), which confirms that there's

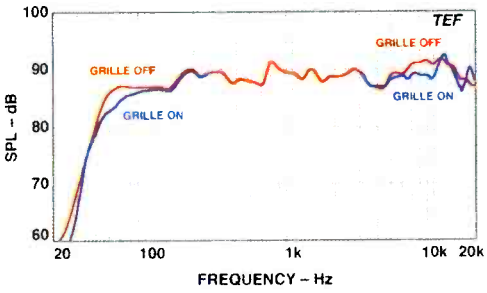


Fig. 1—On-axis frequency response.

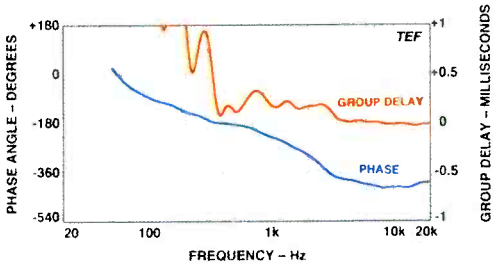


Fig. 2—On-axis phase response and group delay.

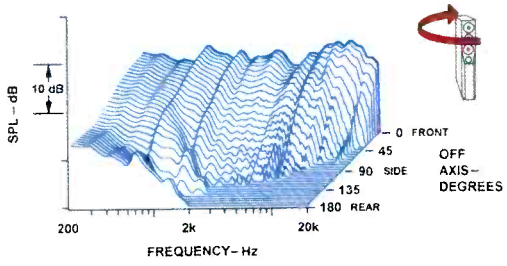


Fig. 3—Horizontal off-axis frequency responses.

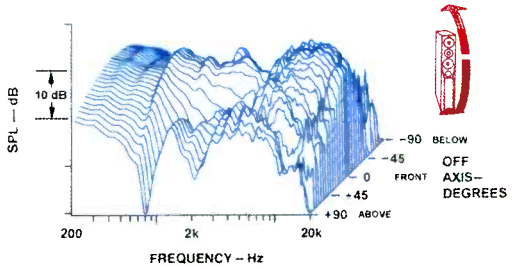
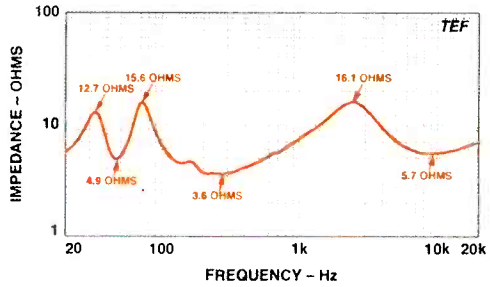
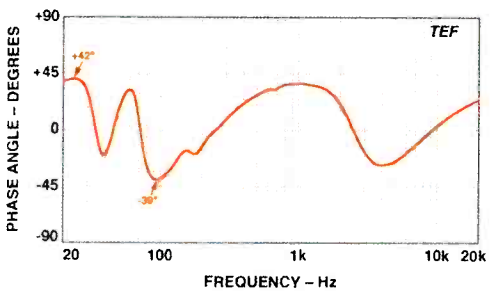


Fig. 4—Vertical off-axis frequency responses.



A



B

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

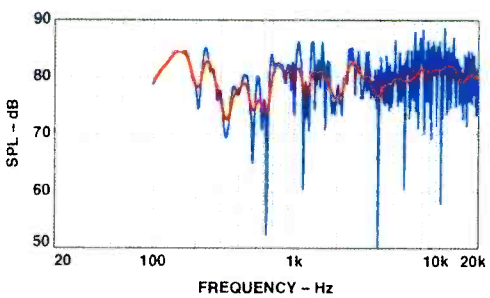


Fig. 6—Three-meter room response.

little lobing. However, the directional pattern narrows significantly at angles greater than ±10° from the axis. This narrowing is most pronounced at 4 kHz and extends below 1 kHz.

The Mission's impedance magnitude (Fig. 5A) has the two bass peaks that characterize vented enclosures. The dip between these peaks, at 47 Hz, is another clue to the speaker system's approximate tuning frequency. (Tuning frequency is always approximate, because it varies with level and the level varies with the type of test.) The 774's impedance ranges from a low 3.6 ohms (at 280 Hz) to 16.1 ohms (at 2.5 kHz); to keep response deviations from cable-drop effects to less than 0.1 dB, cable series resistance should be a maximum of 0.054 ohm. For a typical run of about 10 feet, that would correspond to 14-gauge (or heavier), low-inductance cable. The 774's impedance phase (Fig. 5B) reaches a maximum of +42° (inductive) in the low bass range, at 25 Hz, and a minimum of –39° (capacitive) at 90 Hz. Despite these moderate phase angles, the 774's low impedance means it would be preferable to use just one of these speakers per amplifier channel.

A high-level sine-wave sweep revealed that the Mission's cabinet is fairly rigid; the only significant wall resonance, at 220 Hz, involved the cabinet's sides and top. For both woofers, minimum excursion occurred at about 48 Hz (yet another sign of the enclosure's approximate tuning frequency); however, this minimum was not particularly pronounced, a sign of cabinet leakage. At 48 Hz, the 774 overloaded significantly, sounding strained and distorted, when signals exceeded even the relatively low level of 12 volts rms (18 watts into the rated 8 ohms). The woofers' maximum excursion capability was moderate, about 0.35 inch, peak to peak; they didn't bottom when overloaded, however, and I noted no dynamic offset at any drive level or frequency.

For Fig. 6, raw and smoothed 3-meter room responses, I placed the 774 in the right-hand stereo position and aimed it toward a test microphone in the listening position. The smoothed curve is fairly well behaved and fits a 12-dB window, which is reasonable for this tests's frequency range. Above 700 Hz the smoothed curve fits a tighter, 6-dB, window and is fairly flat and even. No deep nulls are evident in the room-boundary region, below 700 Hz.

When plotting harmonic distortion versus level, I always use a test signal at or above the speaker's tuning frequency (distortion always rises below that point) and a power level at which the speaker still sounds relatively clean. For the Mission 774, that worked out to 50 Hz instead of my usual 41.2 Hz (E_1) and a level of 12.5 watts (Fig. 7). At this level, the 774's output was about 100 dB SPL. When I tested the speaker at 41.2 Hz at the same power level (not shown), the third harmonic rose to a high 44% and the second harmonic was 21%; remaining harmonics were much lower. When I fed the Mission more than 12.5 watts at 50 Hz, it sounded strained because of a rapid rise in third-harmonic distortion.

For A_2 (110 Hz), the only distortion products above my display's noise floor were 3.7% second harmonic and 2.4% third. At A_4 (440 Hz), distortion was even lower, 1.6% second and 0.4% third.

Figure 8 presents the 774's IM distortion versus power; it was created by 440-Hz (A_4) and 41.2-Hz (E_1) tones of equal power, over the range from 0.1 to 12.5 watts. The IM distortion rises at a moderate rate below 7 watts but then increases more rapidly at higher power levels and reaches 10% at 12.5 watts. When I raised the lower test frequency to 50 Hz, the IM at 12.5 watts reached only 5.4%.

THE MISSION 774 HAS SMOOTH RESPONSE, EXCELLENT IMAGING, AND TOP-RANK LOOKS AND CRAFTSMANSHIP.

The 774's short-term peak power input and output are plotted in Fig. 9. The peak input power (power handling) and peak output are very low at bass frequencies. At 20 Hz, the speaker can handle just 1 watt and delivers an unusably low 70 dB SPL (the threshold of hearing at that frequency). Output starts to become usable at about 45 Hz and is more satisfactory above 90 Hz or so. Not until 110 Hz does the output reach fairly normal levels, with the speaker accepting about 120 watts and delivering 110 dB SPL. If you use a 200-watt/channel amplifier (which can deliver 400 watts, peak), you can easily get 115 dB SPL from this speaker above 250 Hz. At higher frequencies, the Mission's output can reach a very loud 120 to 125 dB SPL—but that would take a bigger amp than you'd probably use with this small speaker, one delivering a kilowatt or more. The low-frequency peak output of the 774 places it in the lower third of speakers I've tested.

Use and Listening Tests

The Mission 774s are definitely small and light, as floor-standing speakers go—the pair arrived in a single carton, and until I'd unpacked it I thought I'd gotten only one of them. After the many large, heavy floor-standing systems I've reviewed recently, the Missions were a welcome change.

The 774 is easy to lift and move, because it's light and because, once you remove the grille, its port tube provides a convenient finger hold. It also has a rather small footprint (7 x 12½ inches) for its 3-foot height, which makes it rather tippy if you set it on thick carpet without using its spikes and outrider.

Mission did an excellent job on the appearance and workmanship of the 774s. The front panel, drivers, and grille showed first-class industrial design, and the light cherry veneer on my review samples was quite handsome.

The owner's manual covers the whole 77 Series in 22 pages plus a double-page pullout. The text is shorter than that page count may suggest, because it is printed in eight European languages and Japanese. It's still packed with useful details, however.

The music system I used when listening to the 774s included a Krell KRC preamp and Crown Macro Reference power amp, Straight Wire Maestro cabling, and, for comparisons, B&W 801 Matrix Series 3 speakers.

THE BITE AND BLAT OF BIG-BAND BRASS SOUNDED ACCURATE, ENGAGING, AND AGGRESSIVE.

I placed the 774s 2½ feet from my room's side walls and about 3 feet from the wall behind them and canted them in toward my listening position. I also tried placing them closer to the wall behind them; this raised the bass level but reduced upper-bass and midrange smoothness. I sat 8 feet from the speakers and did most of my listening with their grilles off. The Missions were more sensitive than the B&Ws, so I had to attenuate their input signal by about 3 to 4 dB to make the two sets of speakers equally loud.

The Missions had extended highs and excellent imaging. On recordings with moderate amounts of bass, the 774s proved to be quite dynamic performers. But on recordings with high levels of bass, the 774s could not be played at the loudest levels without suffering overload.

On my favorite demo CD of jazz piano, *The Wonderful Sound of Three Blind Mice* (Three Blind Mice GS CD004), the 774s proved to be very able performers, delivering crisp, clean highs and very dynamic, clean piano notes. The 774's high-frequency response reproduced the drum set's snare and brushes with great accuracy, realism, and clarity. Acoustic bass sounded clean when reproduced at moderate levels but lightweight compared to the way the 801s presented it.

The 774 reproduced female vocals quite well except when they'd been recorded with microphones having peaky high-frequency response. For example, on the title track of *Amor a La Mexicana* (EMI Latin H2 7243 8 57977), Latin pop artist Thalia's vocals sounded quite harsh and annoying because the Missions' treble response emphasized sibilants. With the B&Ws, this recording sounded quite acceptable, though still not great. On more cleanly recorded female vocals, such as Selena's *Amor Prohibido* (EMI Latin H2 7243 8 28803, a longtime favorite of mine), the 774s sounded quite clean and clear. The Missions were noticeably brighter than the B&Ws on all recordings.

With band-limited third-octave pink noise, the 774 was easy to overload at 63 Hz and below, making the sound strained and distorted. The 20-, 25-, 32-, and 40-Hz bands produced no usable output, only distortion. At 50 Hz, the effective output was quite usably loud but was accompanied by wind noise from the port. The output at 63 Hz, which also contained port noise, was not quite as strong as at 50 Hz. Output at 80 Hz and above was quite usable. On the 50- through 80-Hz bands, however, I heard a noise from one speaker. I traced this to a loose piece of damping foam on the internal shelf, which was probably vibrating because of the rush of air through the port at these frequencies. I could stop the noise by sticking my fingers through the port and pushing down on the foam.

On pink noise, the Missions exhibited some tonal coloration in the mid and high ranges. Furthermore, on the pink-noise sit-down/stand-up test, a significant portion of the 774s' upper midrange became weaker when I stood up.

I could play the 774s quite loud and cleanly on pop/rock and jazz recordings as

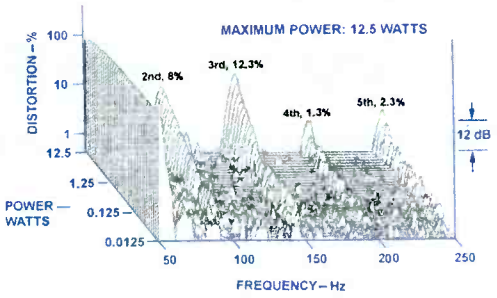


Fig. 7—Harmonic distortion for 50 Hz.

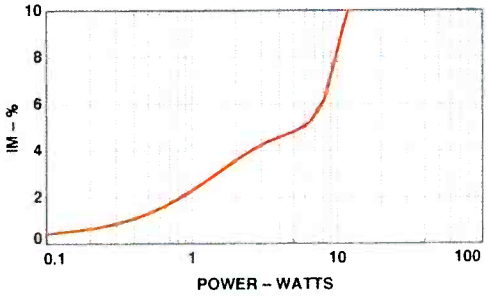


Fig. 8—IM distortion for A_4 (440 Hz) and E_1 (41.2 Hz).

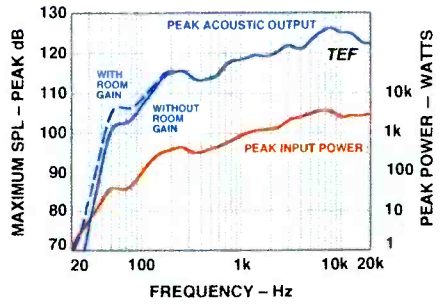


Fig. 9—Maximum peak input power and sound output.

The Mission 774's attractive, sculpted enclosure is 36 inches tall and only 7 inches wide.

long as they didn't have a lot of bass. Big-band brass sections sounded quite engaging and appropriately in-your-face, with the horn's bite and blatt conveyed realistically. Tracks with high-level kick drums, however, were less engaging because I had to turn the level down so they wouldn't overload the speakers.

For classical chamber music, I turned to one of Mission's own sampler demo discs, *The Sound of Baroque, Volume 1* (produced in conjunction with England's *Gramophone* magazine). The 774 speakers did superbly. Particularly good was the harpsichord on Tartini's Violin Sonata and the choral Gloria by Monteverdi.

The Mission 774s have plenty of virtues: smooth frequency response, excellent imaging, the ability to play loud and clean on material with reasonable amounts of bass, and top-rank looks and craftsmanship. By themselves, they'd be an excellent choice in situations where strong bass output isn't a governing factor. And where it is, they would be very capable performers if used with a subwoofer. (Mission's suggestion is the 700AS powered sub, which costs $500.) I would, however, play the 774s with their grilles off. A

EQUIPMENT PROFILE

EDWARD J. FOSTER

ADA CINEMA REFERENCE A/V PREAMP

The ADA (Audio Design Associates) Cinema Reference reminded me of arguments my wife and I used to have about what car to buy. Back before Volvos and Saabs were status symbols, she used to say she would not be seen in anything so ugly, with black dashboards that were just too dull to mention. It did no good to point out that these cars were solid and reliable and their controls easy to understand. We compromised and did it her way, buying a Renault with a shiny plastic fake-wood dash; it was neither reliable nor solid.

So I'm sure my ex-wife wouldn't like the Cinema Reference. It's big and boxy, with knobs that look like they came off old General Radio test equipment and a vectorscope array of 10 x 14 LEDs that reveals the amount of bass and surround information in the input signal. And although you can get the Cinema Reference with a brass front panel, my review sample came in black. Just my cup of tea.

The knobs' illuminated legends are large enough to read from across the room. Ditto for the two-line display and six backlit symbols that indicate the operating mode. More than one of these symbols (which represent Dolby Digital, Dolby Pro Logic, THX, DTS, digital, and LFE) can be lit at a time. For example, the Cinema Reference enables you to apply THX processing to DTS as well as to Dolby Digital and Pro Logic decoding, and you need multiple symbols to show whether a Pro Logic signal's source is a Dolby Digital two-channel mixdown, PCM, or analog.

Lots of processors and receivers have illuminated legends; the difference here is that you can actually see the ADA's. In its full glory, the Cinema Reference lights up like a Christmas tree, though you can adjust the brightness of its legends and display and kill the vectorscope if its dancing lights get annoying.

Dimensions: 19 in. W x 5¼ in. H x 16½ in. D (48.3 cm x 13.3 cm x 41.9 cm).
Weight: 19 lbs. (8.6 kg).
Price: $7,999, remote included; limited edition with brass panel, $8,499.
Company Address: 602-610 Mamaroneck Ave., White Plains, N.Y. 10605; 800/432-8346; www.ada-usa.com.

Photos: Michael Groen

You turn the Cinema Reference on by pressing "Volume" and turn it off by pressing "Volume" twice. (The first press mutes the sound.) When the preamp is off, turning or pressing any knob other than "Volume" brings up "Push Volume for Power On" in the display. To turn off the muting, turn the volume control or turn or press any other knob.

THE CINEMA REFERENCE WAS A GEM TO TEST AND EQUALLY DELIGHTFUL TO LISTEN TO.

The ADA's other controls are really neat. Turning any knob except "Volume" changes only the second line of the display, which shows what setting corresponds to that knob position; your selection doesn't take effect until you press the knob you're diddling with. The "Input" and "Record" knobs select the signal that will be sent to the main and recording output jacks. (The latter can also be used to send signals to a second zone.) The "Channel" knob selects channels for setup adjustments.

That leaves one knob, "Mode," which I left for last because you can select a slew of processing modes with it. I counted 28 in all, 22 dedicated to movie sound and six to music. There are seven variations on Dolby Digital, four on DTS, and three on Pro Logic (not counting four "Phantom" and two "3-Channel" choices) plus the half-dozen music modes and enhancements that can be applied to stereo and mono programs. (The Cinema Reference's "Auto-

mode" circuit, which is defeatable, automatically recognizes the input signal's format.) You can apply full Home THX enhancement or only front-channel THX re-equalization to Dolby Digital, DTS, and Pro Logic signals. The "Phantom" and "3-Channel" modes can be used with or without front-channel re-equalization, and "Phantom" also offers the options of full THX enhancement and a full-range decorrelated signal feed to the surround channel.

The Cinema Reference's generous mix of audio and video connections, 15-position input selector, and extraordinary flexibility enable it to accommodate very complex and unusual home theater systems. You can link any audio and any video input to any input label (including the 15 input labels provided, such as "DVD" and "Tuner," and any you enter yourself) and to whatever surround processing and bass level you like. You can cut the number of input choices shown to match the number of sources in your system. And to save you from facing all these choices at the outset, the Cinema Reference is preprogrammed for up to 10 different components. (These factory settings can all be changed; they're a convenience, not a restriction.)

In practice, it's unlikely you'll be able to use 15 sources; in the event you do need that many, you might find you need, say, more coaxial digital and fewer analog inputs than the ADA provides. Not that the Cinema Reference chintzes on inputs: For audio there are eight pairs of analog jacks plus four coax and three Toslink digital connectors, and for video there are eight composite-video, four S-video, and—wonder of wonders—two sets of color-difference (component-video) jacks. Topping that off, ADA included an RF demodulator and switcher so the Cinema Reference can accommodate Dolby Digital signals from two laserdisc players. (Rather than waste an input by reserving it for those rare systems with Dolby Digital laserdisc players, the Cinema Reference feeds the demodulated AC-3 bit stream to a coaxial jack that can be linked to any of the coaxial digital audio inputs.) Further, although the Cinema Reference handles all three consumer-video formats, it doesn't convert between them (few home theater devices do); this might force you to use more than one video input for a program source. I'm not pointing that out as a defect of the Cinema Reference (which is one of the few products that can handle color-difference video at all) but only to explain why it's impossible to tell how many program sources this preamp/processor can accommodate without knowing what they are.

THE CONVERTERS AND ELECTRONICS IN ADA'S CINEMA REFERENCE ARE AMONG THE BEST I'VE MEASURED.

So much for the input side of the ledger. As for outputs, the Cinema Reference has three composite-video main outs (one of which carries on-screen displays), one S-video output, and one set of color-difference outputs. There also are S- and composite-video recording outputs. For audio, there's the usual complement of six RCA jacks for 5.1-channel sound plus a stereo pair for recording or to feed a second zone.

Having only one pair of audio recording outputs isn't a problem, since their low output impedance enables you to fan the signals out with "Y" cables to feed audio and video recorders and a second zone simultaneously. But having only one S- and one composite-video record output can be awkward if you need to feed two VCRs or a VCR and a second zone. Signals from composite-video sources aren't fed to the S-video outputs, and vice versa, so using different output types for each video destination is not workable. And video signals don't fare well when fed to multiple loads in parallel. All RCA jacks are gold-plated except, oddly enough, those for color-difference video.

The Cinema Reference's rear panel also holds two 12-volt DC trigger outputs, a four-wire ADA Bus connector, and male and female IEC line-cord connectors. The trigger ports are used for activating external devices; by associating them with specific inputs you can, for example, use them to lower a projection screen and close your home theater's drapes whenever you select a video source. The ADA Bus can be used to network ADA components to each other and to infrared sensors and transmitters. Because it uses standard RS-232 signals, it can also link the Cinema Reference to personal computers (for device control and software updates) and to controllers from Crestron, Phast, AMX, and others; these, in turn, command other components and devices. The male IEC power-cord connector is very common, but having a female version to feed power to other equipment is rare. You'll need a special cable to mate with the latter, but the preamp's jack is rated to handle 10 amperes so it can be used with a fairly powerful amplifier.

The ADA Cinema Reference can be programmed to choose a specific input on power-up or to start with the input you used last. Turn-on volume can be set as you wish, and you can also associate different modes with different inputs so that, for example, selecting "DVD Player 3" always engages Dolby Digital with THX re-equalization while "DSS Receiver" always defaults to Dolby Pro Logic with full Home THX processing. Of course, you can change modes after a source is selected or program the system to adopt the last mode used. In "Pro Setup" (which ADA's manual warns that you enter at your own risk), you can adjust the signal delay to each speaker, restrict the number of input choices as mentioned above, and defeat the front-panel infrared receiver. You can also perform such esoterica as resetting the Cinema Refer-

MEASURED DATA

STEREO MODE

Output at Clipping (1% THD at 1 kHz): 4.95 V at all gain settings.

Maximum Voltage Gain: 7.5, 10.5, 13.5, or 16.4 dB (selectable).

THD + N at 2 V Output, 20 Hz to 20 kHz: Less than 0.00035% with 22-kHz measurement bandwidth.

Output Impedance: 56 ohms.

Frequency Response: 20 Hz to 20 kHz, +0.02, –0.15 dB; –3 dB below 10 Hz and at 23.35 kHz.

Subwoofer Crossover Points: High-pass, –3 dB at 77.6 Hz and –6 dB at 58.3 Hz; low-pass, –3 dB at 66.1 Hz and –6 dB at 81.8 Hz.

Nominal Crossover Slopes: High-pass, approximately 9.2 dB/octave; low-pass, 24 dB/octave.

Sensitivity for 0.5 V Output: 210, 150, 105, or 76 mV, depending on the gain setting.

Muting: Total.

Noise: A-weighted, –89.6 dBV; CCIR-weighted, –80.5 dBV.

S/N re 0 dBFS: A-weighted, 95.8 dB; CCIR-weighted, 86.7 dB.

Dynamic Range: Unweighted, 93.1 dB; A-weighted, 96 dB; CCIR-weighted, 86.7 dB.

Quantization Noise: –91.8 dBFS.

Input Impedance: 47 kilohms.

Input Overload (1% THD at 1 kHz): 2.11, 1.49, 1.06, or 0.756 V, depending on gain setting.

Channel Separation: Greater than 71.7 dB, 100 Hz to 10 kHz.

Channel Balance: ±0.05 dB.

Recording Output Level: 495 mV in for 0.5 V out.

Recording Output Impedance: 58 ohms.

DOLBY PRO LOGIC MODE

Output at Clipping: 4.95 V or higher for main, center, and surround channels at 1 kHz.

THD + N at 2 V Out: Main and center channels, 0.01% or less from 100 Hz to 20 kHz; surround channel, less than 0.009% from 100 Hz to 7 kHz.

Frequency Response: Main channels, 60 Hz to 20 kHz, +0, –0.2 dB (–3 dB at 27 Hz and 23.28 kHz); center channel, "Large" speaker setting, 70 Hz to 20 kHz, +0.06, –0.12 dB (–3 dB at 20 Hz and 23.32 kHz); surround channel, below 10 Hz to 7.02 kHz, +0.04, –3 dB.

A-Weighted Noise: Main channels, –89.2 dBV (–95.4 dBFS); center channel, –89.3 dBV (–95.5 dBFS); surround channel, –90.4 dBV (–96.6 dBFS).

Channel Separation at 1 kHz: 64.3 dB or greater.

DOLBY DIGITAL MODE

Channel Balance: ±0.04 dB re left front channel.

Frequency Response: Main channels, 21 Hz to 20 kHz, +0.04, –0.11 dB; center channel, 21 Hz to 20 kHz, +0.09, –0.06 dB; surround channels, 21 Hz to 20 kHz, +0.11, –0.13 dB; LFE (low-frequency effects) channel, 20 to 66 Hz, +0, –1 dB (–15.3 dB at 120 Hz).

THD + N for 0-dBFS Signal: Main, center, and surround channels, 0.00417% at 1 kHz; LFE channel, 0.364% at 30 Hz.

THD + N at –10 dBFS, 20 Hz to 20 kHz: Main, center, and surround channels, 0.0091%.

Channel Separation: 74.4 dB or greater, 100 Hz to 10 kHz.

D/A CONVERTER SECTION

Frequency Response: 20 Hz to 20 kHz, +0.06, –0.12 dB.

THD + N at 0 dBFS, 20 Hz to 20 kHz: Less than 0.0064%.

THD + N at 1 kHz: Below –93.9 dBFS from 0 to –90 dBFS and below –95.9 dBFS from –30 to –90 dBFS.

Maximum Linearity Error: Undithered signal, 0.86 dB from 0 to –90 dBFS; dithered signal, 0.1 dB from –70 to –100 dBFS.

S/N re 0 dBFS: A-weighted, 101.9 dB; CCIR-weighted, 92.9 dB.

Quantization Noise: –94.9 dBFS.

Dynamic Range: Unweighted, 96.1 dB; A-weighted, 98.5 dB; CCIR-weighted, 88.9 dB.

Channel Separation: Greater than 73.5 dB, 125 Hz to 16 kHz.

ence's ADA Bus address, setting the scale factors for Dolby Digital's "Night" compression mode, and readjusting the PCM scale factors that establish Dolby Digital and Pro Logic channel levels (it's not a good idea to mess with these!). Home THX re-equalization, timbre matching, and decorrelation also can be toggled on or off for each input.

For the bass, "Pro Setup" has an adjustable limiter (in case your subwoofer distorts on peaks) and extensive bass-management features. The bass-management settings include 12 routings that should cover any system configuration. The limiter and bass management must, however, be set for each individual input—a needless complication, because these settings are system-dependent, not source-dependent.

Analog sources get some attention, too. The gain applied to each is switchable in 3-dB steps over a 9-dB range. And, though I don't see why you'd want to, you can defeat "Auto Balance" (which compensates for discrepancies between an analog source's left- and right-channel levels) on an input-by-input basis.

The ADA's manual is comprehensive and reasonably clear, but it does contain some rather strange examples. Are there, for instance, laserdisc players that have AC-3 RF output but not PCM out?

These complications don't concern me because, when you pop this kind of coin for a processor, you should expect the dealer to install it for you.

The manual doesn't mention it, but the Cinema Reference comes with a bidirectional remote control. This remote, called The Thing, is large and heavy and is happiest sitting on a table. It replicates the Cinema Reference's front-panel functions with a single knob and five buttons that select which of the front-panel knobs it will mimic. A two-line backlit display on The Thing parallels the main display. If you know how to operate the Cinema Reference from its front panel, you know almost everything about how to operate it from the remote. How simple!

To maximize battery life, The Thing times out when not in use but comes back to life (in volume-control mode) when you press any button or turn the knob. Being bidirectional, The Thing receives information from the Cinema Reference as well as sends commands to it. So, for example, if

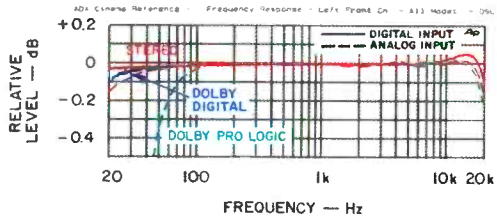


Fig. 1—Frequency response of left front channel for various operating modes.

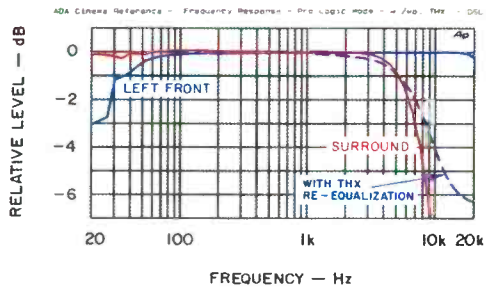


Fig. 2—Effect of THX re-equalization on left front channel and surround-channel frequency response, Dolby Pro Logic mode.

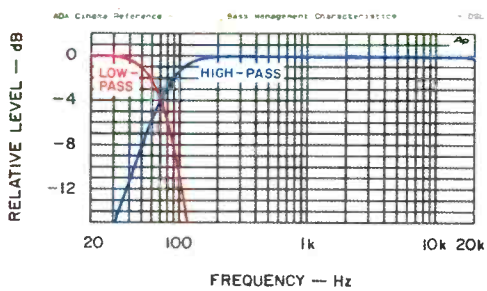


Fig. 3—Crossover response.

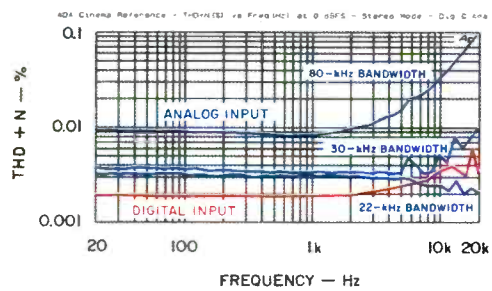


Fig. 4—THD + N, stereo mode; digital input was meosured with 22-kHz bandwidth.

you've changed the maximum number of inputs the system is set up for, The Thing thereafter limits its choices to match. It also has a built-in sound-level meter to help adjust system balance. The Thing is not a learning or universal remote but can operate other components by communicating via the ADA Bus with an auxiliary component, the IRL-3000 ($1,599). This device (whose initials stand for infrared learner) can learn other components' command codes from their remotes or by downloading those codes from a PC.

Measurements

What a gem to test! The ADA Cinema Reference's performance changed so little from mode to mode and channel to channel that I've omitted many curves and combined others. Example: In Fig. 1 is the left front channel's frequency response for Dolby Pro Logic with analog input, Dolby Digital with digital input, and stereo with both inputs. You can hardly tell one curve from the next—and that's the point. Even on this very sensitive scale (0.1 dB per division), it's hard to see a difference except in Pro Logic below 100 Hz, and that should be ignored since it's not cricket to measure Pro Logic bass response with sine waves. Note the absence of high-frequency ripples; this is especially commendable in the curves for analog input, which involve the A/D converter as well as the D/A.

The response curves for the other channels were essentially identical to those in Fig. 1 except where they should not have been, as with surround-channel response in Pro Logic operation and front-channel response with THX re-equalization (Fig. 2). THX re-equalization is accurate within a quarter decibel to 12.5 kHz, and the Pro Logic surround channel is right on the money, down 3 dB at 7.02 kHz.

Considering how flexible the Cinema Reference is in other respects, I find it strange that it doesn't offer a choice of crossover frequency. That said, the crossover point (Fig. 3) is reasonably well chosen and the slope of the low-pass filter is steep enough to keep localizable frequencies out of the subwoofer. The slope of the high-pass filter is neither fish nor fowl—greater than 6 dB/octave but never quite up to 12. I've listed it in "Measured Data" as approximately 9.2 dB/octave.

THE CINEMA REFERENCE CAN ACCOMMODATE VERY COMPLEX AND UNUSUAL HOME THEATER SYSTEMS.

Figure 4 shows stereo THD + N versus frequency at 0 dBFS, with the volume set to produce as close to 2 volts out as possible. The curve taken using the digital input essentially reflects the THD + N of the D/A converter under standard test conditions (including a 22-kHz analysis filter). The other three curves were taken using an analog input and thus include the A/D converter's THD + N, too. For some unexplained reason, THD + N above 8 kHz measured with a 22-kHz analysis bandwidth actually was lower through the A/D and D/A converters in tandem than through the D/A alone; noise in the analog input electronics probably explains why the 22-kHz analog curve lies above its digital equivalent in the bass and midrange. What's notable about both these curves is how minuscule the THD + N really is and how free of artifacts the ADA's converters are. A measured THD + N of 0.002% (below 2 kHz) is darned

good for any D/A; a maximum THD + N of less than 0.0035% through both A/D and D/A conversion is fantastic!

The curve in Fig. 4 taken using the analog input and 30-kHz analysis bandwidth has a few more spikes than the curve with 22-kHz bandwidth, but these artifacts lie somewhere between 22 and 30 kHz and are not audible. The difference between the 30- and 80-kHz curves in the bass and midrange is due to ultrasonic noise; the rise in the 80-kHz curve above a few kilohertz suggests increased high-order distortion, whose products lie in the far ultrasonic (and therefore inaudible) region. I'm *really* impressed with the performance of the Cinema Reference's A/D and D/A converters.

THE BIDIRECTIONAL REMOTE KNOWS WHEN YOU CHANGE SETTINGS ON THE ADA'S FRONT PANEL.

The results in Fig. 5 for THD + N versus frequency in Dolby Pro Logic mode, taken at 0 dBFS with analog input and 22-kHz bandwidth, mostly replicate those seen in Fig. 4 for the same signal conditions in stereo mode. (There are differences below a few hundred hertz, but as I mentioned above, Pro Logic operation should not be tested with low-frequency sine waves.) From 200 Hz up, THD + N is less than 0.0038%; clearly, ADA's Dolby Pro Logic decoder adds little noise or distortion of its own in the midrange and treble.

With Dolby Digital decoding, THD + N versus frequency (Fig. 6) looks higher than it did in stereo or Pro Logic. But that's because the only suitable sweep-frequency test track available on DVD is at –10 dBFS rather than the 0 dBFS used in other tests; this causes THD + N percentage readings to be 3.16 times higher. If you take that into account, this curve suggests performance is as good in Dolby Digital mode as in any other mode—not just in the left front channel (shown) but in all channels. What a terrific processor!

Figure 7 shows THD + N versus level in stereo with a 1-kHz test tone. The curves made with a digital input reflect noise and distortion for the D/A converter and output electronics only; note how the two channels' results overlap almost perfectly. The curve for analog input (taken on the left front channel) includes the noise and distortion of the input electronics and A/D converter as well as the D/A and output circuit. That all three curves fit between –90 and –100 dBFS is truly amazing. The ADA's converters and electronics are among the best I've measured.

As you can see from Fig. 8, D/A converter linearity error is nonexistent with dithered signals, which covers all digital recordings nowadays. Even with analog input, linearity error is less than 0.5 dB, worst case—simply great performance! (I have omitted the fade-to-noise linearity-error plot because it would contribute nothing new to the discussion.)

Figure 9 shows ⅓-octave spectrum analyses of a 1-kHz signal at –60 dBFS and of residual noise in the absence of signal, each in stereo mode. With the 1-kHz tone, the curves for analog and digital input overlie each other almost perfectly, suggesting that the A/D converter is near perfect in this regard. The residual-noise curves differ because of noise in the analog input circuitry. Through most of the audio range, the noise is about 6 dB higher via the analog input than the digital (this also shows up in the S/N listed in "Measured Data"). But all of these results are outstanding, in light of the fact that the ADA's converters do not mute under zero-signal conditions. As you can see in "Measured Data," the Cinema Reference's dynamic range and quantization noise are equally impressive.

Stereo channel separation was fine with analog or digital signals. Pro Logic channel separation, tested with a steady-state 1-kHz

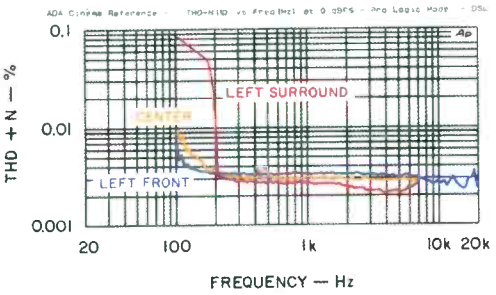


Fig. 5—THD + N vs. frequency, Dolby Pro Logic mode.

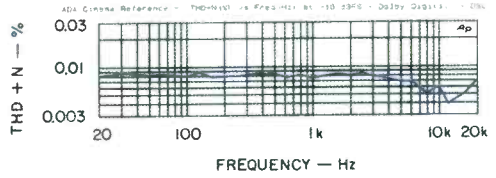


Fig. 6—THD + N vs. frequency, Dolby Digital mode.

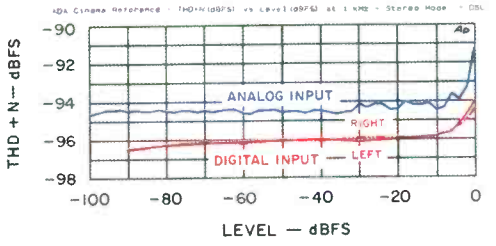


Fig. 7—THD + N vs. level, stereo mode.

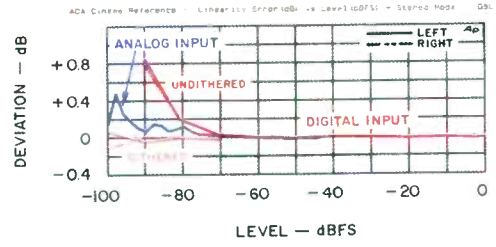


Fig. 8—D/A converter linearity.

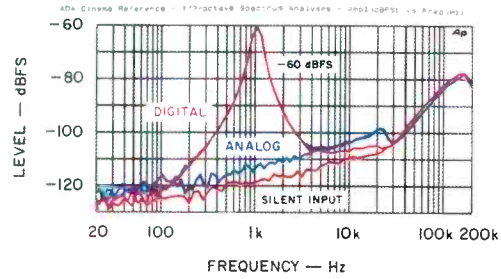


Fig. 9—Noise analysis, D/A and A/D sections.

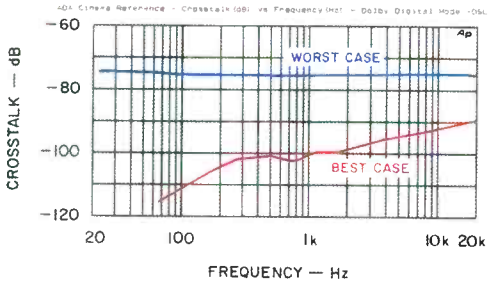


Fig. 10—Crosstalk, Dolby Digital mode.

signal, ranged from 64.3 to 90.4 dB and was generally closer to the top of that range than to the bottom. Dolby Digital channel separation (Fig. 10) is even better.

All channels were balanced exceptionally well in every mode, which was really nice to see. Apparently, LFE (low-frequency effects) signals flow through the crossover's low-pass filter, as the LFE response curve rolled off like the filter's.

There was plenty of output drive and output impedance was low, so the Cinema Reference should work well with any power amp. There are four gain choices for analog signals, individually selectable for each source, which differed by almost precisely 3 dB per step. The input overload point shifted down as gain increased and was only marginally adequate even when I used the lowest gain setting. That was one of the few technical shortcomings of this extraordinary processor. Nonetheless, if you pay attention to the signal level coming from your source components and pad it down if need be, you shouldn't have a problem.

Use and Listening Tests

The ADA Cinema Reference was as delightful to listen to as it was to test. Yes, it has its peculiarities. Having to set up functions for each input instead of all at once made initial setup almost Byzantine. But once past that hurdle I found the ADA processor pretty easy to use. And you should insist on dealer assistance anyway, considering the Cinema Reference's price.

The Thing is a big and klutzy remote, but I like the way it tries to bring the front panel's controls to your coffee table so that there's not much new to learn. I was, however, annoyed that its one-page instruction sheet didn't document the differences between its controls and those on the Cinema Reference itself. For example, although you turn the preamp off by pressing its volume control twice, that doesn't work with the remote (nor does any other method I tried). And you turn the Cinema Reference on by pressing its volume control once, but you have to press The Thing's knob twice to do it. Weird.

On the other hand, The Thing's built-in sound level meter was darned helpful, and I had the system balanced in short order. But except for a few setup modes (such as system balancing) during which The Thing stays on, it powers down too quickly for my liking. That's especially annoying because it always powers up in the volume mode and needs to update itself with the current volume setting before you can do anything else. It also seems to take forever to make a change. This got frustrating when I was trying to compare the sound quality of different operational modes, which I was trying to do for this review. In normal use, I might not be so critical.

The Thing also needs a pretty straight shot at the Cinema Reference's front panel to communicate reliably with it. If it can't, it keeps telling you it's trying to update until it gives up and turns off. All too often, I had to pick the remote up and point it straight at the chassis to get the two talking with each other. That's not the way The Thing is meant to be used, and I think an additional infrared sensor will be a virtual necessity with it. Since I didn't have an IRL-3000, I can't comment on how well The Thing controls CD players and other source components; its having only five transport buttons strikes me as a potential limitation.

The 140-LED vectorscope was useful during my evaluations because it gave an idea of what the program material contained, but I found it distracting in normal use and gladly turned it off.

But enough bitching. The sound of this processor is as good as it gets. It's always difficult to make direct comparisons in a home theater, but in an A-then-B shootout between my reference EAD TheaterMaster Ovation and the ADA Cinema Reference, I'll declare a draw. I couldn't reliably distinguish one from the other in any standard mode: stereo, unenhanced Dolby Digital, Pro Logic, and so on. Whichever processor I used, images were stable, bass was solid, the highs were brilliant without being edgy, and noise was conspicuously absent.

IMAGES WERE STABLE, BASS WAS SOLID, HIGHS WERE SMOOTHLY BRILLIANT, AND NOISE WAS NOTABLY ABSENT.

The Cinema Reference does offer a number of modes not available on the EAD Ovation. I compared these against each other as best I could, but the time it took to make changes frustrated my efforts. The results are subjective anyway. Suffice it to say that I preferred plain-vanilla ("Standard") or "RE-EQ" (THX front-channel re-equalization) Dolby Digital above the others, although I would agree with ADA that, if you want to muck with dialog normalization (which adjusts the volume to hold average dialog levels constant when you change Dolby Digital sources), "AC-3 Ultra" (normalization done in the analog domain) sounds better than "AC-3 Max" (normalization done in the digital domain). Of course, if you really want to muck around, you can go into "Pro Setup" and diddle the factors that control the compression in Dolby Digital's "Night" mode.

The ADA Cinema Reference is no plastic-dash Renault. It's the real McCoy, an extraordinarily flexible workhorse that produces magnificent sound. It may have its quirks, most of which I've documented, and it's big (way too deep for my rack), but it sure does sound great. A

EQUIPMENT **PROFILE**

EDWARD M. LONG

COINCIDENT TRIUMPH SIGNATURE SPEAKER

The Triumph Signature is Coincident Speaker Technology's only bookshelf speaker. The company also makes six floor-standing speakers (the Conquest series) and a Mini Subwoofer.

A two-way system, the Triumph Signature has a 1-inch silk-dome tweeter and a 6½-inch woofer, both with large magnets (the woofer's is about 3½ inches in diameter and nearly ¾ inch thick). The woofer has a polypropylene cone, a rubber surround, and a cast frame. Its effective cone diameter is about 4¾ inches, typical for a driver this size, and its 1½-inch voice coil gives it good power handling. Both drivers are flush-mounted, the tweeter with five self-tapping cap screws and the woofer with four cap bolts and Tee nuts. Center to center, the distance between the drivers is 5⅝ inches.

FROM THE START, I WAS IMPRESSED BY THIS SPEAKER'S WIDE-RANGE SOUND.

The vented enclosure is tuned to about 43 Hz, but the Triumph Signature's bass response actually starts rolling off at about 60 Hz. The enclosure's interior volume, which seems to be the optimum size for a 6½-inch woofer, is 931 cubic inches (15.25 liters) augmented by a small amount of polyester damping fiber that makes it act like a slightly larger box. The front baffle's edges are bevelled at a 45° angle. The cabinet's medium-density fiberboard (MDF) walls, which are 1 inch thick, are veneered inside as well as out, an expensive—and welcome—touch that prevents uneven moisture absorption and possible warping.

Photos: Michael Groen

Rated Frequency Range: 48 Hz to 20 kHz.
Rated Sensitivity: 90 dB SPL at 1 meter, 2.83 volts applied.
Rated Impedance: Nominal, 8 ohms; minimum, 6 ohms.
Recommended Amplifier Power: 20 to 80 watts.
Dimensions: 16 in. H x 9 in. W x 11 in. D (6.3 cm x 3.5 cm x 4.3 cm).
Weight: 26 lbs. (11.8 kg) each.
Price: $999 per pair in black lacquer, $1,099 per pair in cherry veneer; grilles, $35 per pair if ordered separately but no charge if ordered with speaker.
Company Address: 51 Miriam Crescent, Richmond Hill, Ont. L4B 2P8, Canada; 905/886-6728; http://home.ican.net/~coincid/cst1.htm.

The outside veneer, which covers all six sides of the cabinet, was cherry on my samples, stained a light red. The speakers are available with or without grilles (none came with the pair I received for testing). The grilles attach with Velcro tapes; they are free if ordered with the speakers and cost $35 if ordered separately.

On the rear are gold-plated terminals, with red and black bands to indicate polarity, mounted on a black acrylic plate. The holes in these terminals are not large

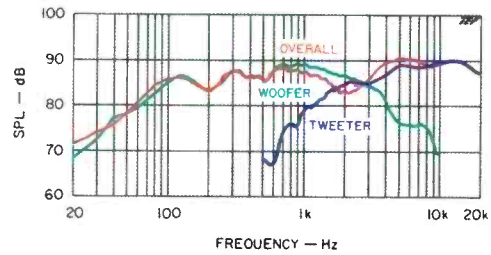


Fig. 1—Frequency response.

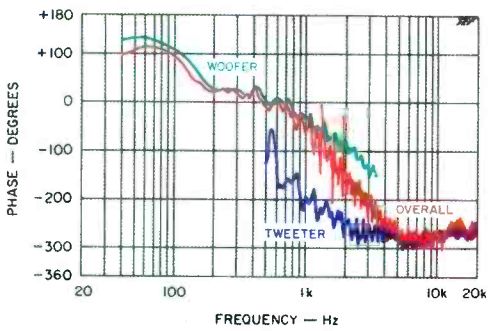


Fig. 2—Phase response.

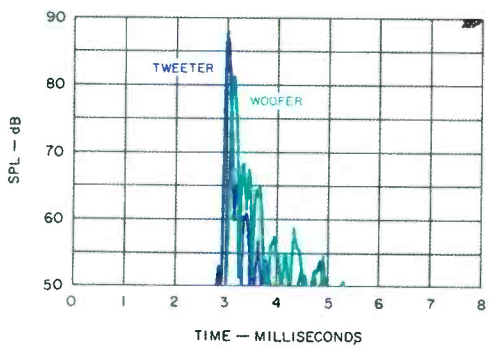


Fig. 3—Energy/time response.

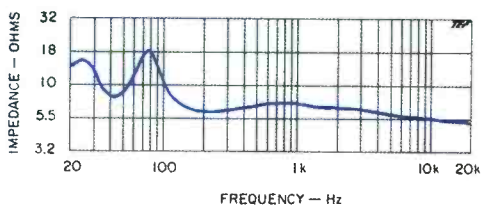


Fig. 4—Impedance magnitude.

enough to accept cables thicker than 18-gauge. The terminals will accept single-banana plugs but are too far apart for double-bananas.

The crossover's low-pass network has an air-core inductor in series with the woofer and a shunt capacitor across its terminals; nonetheless, it could be classified as a first-order network because a resistor in series with the shunt capacitor negates much of the capacitor's influence. The high-pass network feeds the tweeter through a capacitor, a resistor dividing network to reduce the tweeter's output, and finally a series resistor bypassed by a capacitor to boost extremely high frequencies. The woofer and tweeter are connected so as to produce an outward diaphragm motion for an initial positive DC input.

Measurements

The Coincident Technology Triumph Signature's rated sensitivity is 90 dB for 1 watt input at 1 meter, but based on its on-axis frequency response (Fig. 1), its sensitivity—except in the low bass and in the treble—is actually between 84 and 88 dB. This is still very good, however. The woofer's and tweeter's outputs overlap substantially in the crossover region. That's to be expected of a speaker whose low- and high-pass filters are essentially first-order, and it makes the exact frequency of the acoustical crossover very difficult to determine. Near 2 kHz, in the crossover region, the Triumph Signature's overall output is lower than the output of either of its drivers alone; this indicates that some cancellation is occurring.

The reason for this cancellation can be gleaned from Fig. 2, the Triumph Signature's phase response. The tweeter and woofer outputs are 180° out of phase at 1,950 Hz, which is in the crossover range. This corresponds to a difference of 256 microseconds, a half wavelength; it is also equivalent to a displacement between the drivers of almost 3½ inches. Although the woofer and tweeter are connected to produce a positive acoustical output for a positive electrical input, Fig. 3 reveals that the first energy from the tweeter arrives at the test microphone 110 microseconds before the first energy from the woofer.

You might wonder why I said that there was a 256-microsecond difference between the drivers' outputs at 1,950 Hz when the energy/time curves (ETCs) in Fig. 3 indicate only 110 microseconds. There is no inconsistency: The 256-microsecond result derives from the phase angle at a specific frequency, whereas the ETC reveals the time difference between all the frequencies produced by the tweeter and all those produced by the woofer. The 110 microseconds represents the time difference between the peak of the tweeter's ETC and the peak of the woofer's ETC.

THE SPEAKERS' RESPONSES MATCHED CLOSELY, WHICH SHOULD HELP KEEP IMAGES VERY STABLE.

The Triumph Signature's impedance is rated at 8 ohms nominal and 6 ohms minimum, but at 20 kHz it drops to about 5.4 ohms (Fig. 4). The peaks at 25 and 77 Hz are about 15 and 18 ohms, respectively; above 200 Hz, the impedance curve is very uniform. The Signature's impedance characteristics should make it a relatively easy load for any modern amplifier whose internal impedance is low, and this speaker should sound pretty much the same with most such amplifiers.

Even at the relatively high level of 100 dB SPL, the Triumph Signature's second- and third-harmonic distortion is very low (Fig. 5). The highest relevant distortion products are only 2% second harmonic and 1.8% third harmonic at 60 Hz. This is very good performance, as distortion in the bass is generally less annoying than midrange distortion. (You can safely ignore the distortion peaks at 20 Hz. Measurement resolution is poor down there, and the speaker's rolloff and the scarcity of program material near that frequency means you'll rarely hear distortion anyway.) Above 60 Hz, distortion is mostly less than 1.8%. The Signature's excellent performance in this regard means that instrumental timbres will not be adversely affected by harmonic distortion.

Figure 6 shows the Triumph Signature's on- and off-axis frequency responses. Off-

axis response is most uniform when the speaker's cabinet is upright (Fig. 6A). The curves are close together, even at 45° off axis, up to about 5 kHz; from 60 Hz to 18 kHz, the response varies only ±5 dB up to 30° off axis. When the Triumph Signature must be used on its side, which I don't recommend, its sound will vary with the angle of your listening position. The best compromise may be to place these Coincident speakers so that their tweeters are to the inside and their woofers to the outside (Fig. 6B), but you should also try it the other way

All six sides of the Coincident Triumph Signature's cabinet, including its rear panel, are finished.

VOCALS WERE CLEAR AND ARTICULATE, DRUMS WERE TIGHT, AND DEPTH WAS EXCELLENT.

(Fig. 6C). Because these speakers weigh just 26 pounds apiece, this experiment should not be too difficult.

The 300-Hz and 1-kHz square waves in Fig. 7 further attest that the Coincident speaker's treble energy arrives ahead of its bass energy. (I have found that this tends to soften transient attacks somewhat; transient sounds seem sharper when the fundamental and harmonics arrive together.) At 3 kHz, there is still energy coming from the woofer but even more coming from the tweeter, confirming what you see in Fig. 1. Although not perfect, the Signature's square-wave reproduction is reasonable.

In the 20-kHz cosine pulse test (Fig. 8), the base of the acoustical output's peak is just slightly wider than that of the electrical input pulse—another sign of excellent high-frequency response. The output curve's undershoot indicates that the speaker is rolling off in the bass yet is well damped. (For the output pulse to be identical to the input pulse, a speaker would have to have uniform response down to DC.) The lack of high-frequency ringing tells us that the tweeter is well damped.

As usual for vented speakers, I measured the output of the port and the woofer separately. The port's maximum output was constant, within 1 dB, from 40 to 60 Hz. The woofer's output began rolling off at 100 Hz; there was a dip at 43 Hz, the system's tuning frequency. The two Triumph Signatures' responses matched within 1 dB across the entire audio spectrum, which should help keep images very stable. Tests of cabinet vibration turned up nothing that might contaminate the sound, thanks to the solid, 1-inch MDF enclosure walls.

Use and Listening Tests

From the start, I was impressed by the Coincident Triumph Signature's relatively high output and wide-range sound. Bass reproduction was very impressive, considering that it came from a single 6½-inch driver. The treble was very impressive, too. The midrange was clear but a little subdued, making some recordings with hyped instruments and vocals much more listenable.

I use a listening panel to evaluate the sound quality of components that I review, because the panelists often hear things from a different perspective than I do. The panel members write down their comments, which I review with them after the listening session. I've described my reference speaker system in previous reports, so I will just say that it is a compact speaker whose bass response extends down to 30 Hz and whose midrange and treble response is time-coherent.

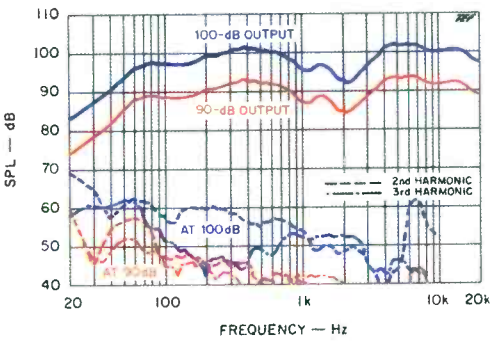
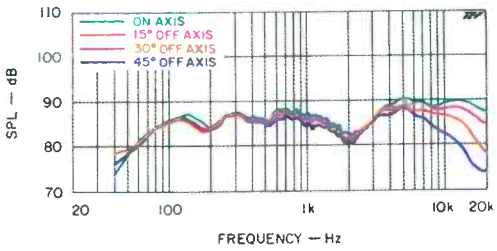


Fig. 5—Ground-plane frequency response (top curves) and second- and third-harmonic distortion.



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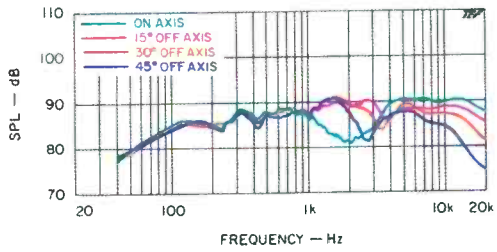

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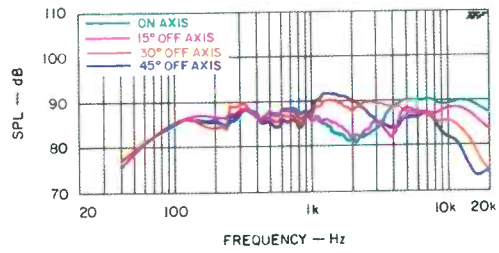


C

Fig. 6—Horizontal on- and off-axis frequency response for speaker upright (A), for speaker on its side and measured from the tweeter end (B), and for speaker on its side and measured from the woofer end (C).

For the listening sessions, I placed the Triumph Signatures next to and at the same height as the reference speakers and adjusted the references' output level to match the Signatures'. The acoustic environment was relatively dead, and all the speakers were about 4 to 5 feet away from the listening position; I have found that this enables people to focus on the sound quality of small loudspeakers without the distracting effects of room reflections and standing waves. Each panel member listened alone to the same four musical selections through both sets of speakers.

For vocal material, I selected a fabulous, as yet unreleased, CD titled *I'll Never Forget You*. It features Debra Holly, who sounds a little like June Christy, singing with a band that reminds me of Stan Kenton's. I found the vocal to be clear and articulate on both the reference and the Coincident speakers. When listening to "Oh, What a Beautiful Mornin'," the panel's comments about the Triumph Signatures were: "vocal very clear," "vocal good but a little recessed," "brass overtones less bright," "drums tight and punchy," "bass solid but not as deep," and "clarinets and saxes are more mellow."

For the song "Windswept," performed by the Lynne Arriale Trio on *With Words Unspoken* (dmp CD-518, an excellent disc engineered by Tom Jung), comments were: "piano less forward," "piano less bright," "drums very tight," "drums very good," "snare drums have less snap," "cymbals excellent," and "cymbals very smooth and clear."

Comments for "A Celtic Medley," by Bela Fleck and The Flecktones on *Three Flew Over the Cuckoo's Nest* (Warner Bros. 9 453282), were: "banjo more mellow," "banjo slightly recessed," "banjo less forward and bright," "banjo sounds slightly veiled," "sax very good," "sax less irritating," "percussion has less snap," "percussion sounds are very extended," "bass is more mellow," "bass has less overtones," and "bass not as deep." (I made a spectral analysis of this recording, which showed that it has content down to 36 Hz and that, from about 150 Hz down, the bass is boosted 12 dB above the midrange level! This made it useful in differentiating my reference speakers' extended bass from the more limited bass range of the Triumph Signatures.)

The orchestral selections "Dance of the Firebird" and "Infernal Dance" from Stravinsky's *Firebird Suite*, with Erich Leinsdorf conducting the Los Angeles Philharmonic (Sheffield Lab 10052-2-G), elicited these comments: "woodwinds brighter," "upper bass stronger," "bass slightly less deep," "celesta subdued," "harp more mellow," "harp less bright," "excellent sense of depth," "good instrument placement," "brass less bright," "smoother brass sound," and "brass further back."

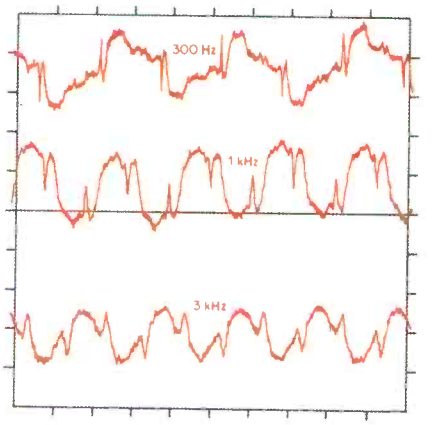


Fig. 7—Square-wave response.

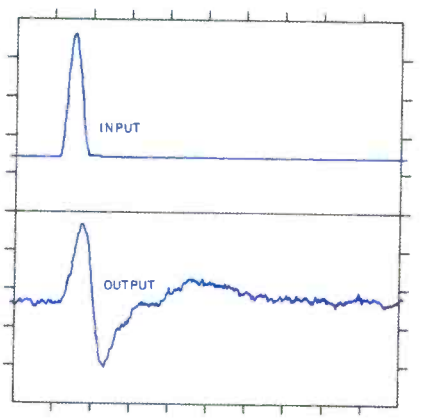


Fig. 8—Response to a 20-kHz cosine pulse.

The Triumph Signatures have good off-axis treble response. Therefore, they will sound brighter than they did in my setup if they're in a larger room whose acoustics are more live.

I enjoyed listening to Coincident's Triumph Signatures with a wide variety of program material over an extended period. If you like a less aggressive, less in-your-face sound, you should audition them—even on recordings you think are a little too forward and bright. I think that you will find these speakers to be excellent. A

AURICLE

EDWARD J. FOSTER

MIRAGE OM-8 SPEAKER

I've been living with a pair of Mirage OM-8 speakers for quite a while—so long, in fact, that I've gotten more than one gentle nudge from the Mirage publicist asking me whether I'm ever going to review them. "Yeah, sure I'm going to," I thought as he nudged me one last time, "but how do I go about reviewing old friends and keep the review honest?" It takes a while to get to know the OM-8s, and to place and adjust them just the way you want, but once you do, they get real friendly real fast!

At $2,200 per pair, the OM-8 sits on the second rung of Mirage's "Omnipolar" ladder. Like the OM-6 that perches on top, the OM-8 is a three-way system whose six drivers are arranged to encourage uniform radiation at all angles (that's where the Omnipolar monicker comes from). And, like the OM-6, the OM-8 has an internal power amp to drive the woofers. Lesser lights in the Omnipolar series don't have the power amp and are rather more conventional in appearance.

Mirage's engineering philosophy has embraced nondirectional speaker designs for as long as I've known the company, and that goes way, way back. I can remember testing the Mirage M-1 many years ago and being impressed with how it performed. Mirage called the M-1 a *bipolar* speaker. It had an essentially identical complement of drivers on the front and back of a fairly tall, relatively narrow, fairly shallow cabinet. These drivers radiated reasonably uniformly in the horizontal plane, with some "pull in" at the sides. The so-called bipolar concept was soon imitated, but changes were afoot at Mirage. The new Omnipolar series takes bipolar one step further. (If all this tech talk is confusing, check out "Loudspeaker Sound Dispersion 101.")

Photo: Michael Groen

Though the OM-8 looks quite similar to a one-piece tower (okay, a rather weird-looking tower), it's really two speakers in one. The top is an Omnipolar radiating column, the bottom a powered subwoofer with two 6½-inch drivers (one on each side of the box) and an internal 100-watt MOS-FET amplifier to power them. The bass base (ugh! a pun!) is narrower than it is deep (9⅝ x 16½ inches) and has removable grilles on the front and sides. These are wrapped in a black fabric that matches the nonremovable covering on the upper column.

On the back of the bass module are a fuse holder, a socket for an IEC two-wire line cord (supplied), and two sets of heavy-duty gold-plated multiway binding posts, one for the subwoofer and one for the drivers in the upper column. These are normally linked via gold-plated straps that can be removed to bi-wire the system. Can't say I see any reason to bi-wire, given that the woofers are powered by the internal amp, but what the hey! There's no power switch nor need of one; the OM-8 comes to life when it senses a signal and goes back to sleep when things have quieted down for a while. A red LED shines through the front grille when the system is alive.

The subwoofer stands 23 inches tall in front and—except for a 4½-inch horizontal plateau to support the upper column—slopes to a 14¾-inch height in back. A black cloth grille covers the sloped portion. Removing it reveals two controls. One

Company Address: c/o Audio Products Intl., 3641 McNicoll Ave., Scarborough, Ont. M1X 1G5, Canada; 416/321-1800; www.miragespeakers.com.

of them adjusts bass "Level" over a nominal range of ±6 dB. The other control, "LF EQ," adjusts the amount of bass boost before rolloff, i.e., the system's "Q"; it is calibrated from +3 to –3 dB. Removing the front grille reveals two ducted ports that, together with the equalized amplifier, tune the system.

The OM-8 comes with spikes and gold-finished discs that screw into the front part of the base and tilt the entire system back at a graceful angle. With the disc supports in place, the OM-8 stands about 45 inches tall in front.

A high-gloss black plate separates the lower and upper halves. The tower—the mid/upper frequency enclosure—is 9⅝ inches wide, 4½ inches deep, and 20 inches tall. It's wrapped in a black cloth sock and capped by a removable ⅝-inch-thick high-gloss black cap. Installed in the column are two 1-inch PTH (Pure Titanium Hybrid) dome tweeters and two 5½-inch midrange drivers. One set of drivers is mounted on the front, the other set on the back. The tweeter sits above the midrange driver on the front, which puts it approximately at ear height for a seated listener. On the back, the orientation is reversed. I presume that Mirage did this to minimize the depth of the cabinet.

Mirage's specifications are rather sketchy. Frequency response is listed at 28 Hz to 22 kHz (no tolerance given), with sensitivity at 91 dB (presumably at 1 meter with a 1-watt drive). Impedance is stated as "8 ohms compatible" (whatever that means). Mirage recommends that the OM-8 be used with power amps rated at 30 to 200 watts.

Bipolar speakers are thought to produce a deeper image than conventional direct-radiating speakers and to produce a wider image over a broader listening area than either direct-radiating or dipole systems. The same should be true in spades for an Omnipolar speaker. Indeed, spherical (point-source) and cylindrical (pulsating-column) speakers have been the acousticians' Holy Grail for as long as I can remember. This is not to say that they're an unmitigated blessing. The sound of omnidirectional speakers is likely to be more dependent on the nature of the listening room and their placement in it than that of directional speakers. They also are not supposed to produce as precise an image as direct-radiating speakers do.

Direct-radiating speakers are designed to produce a high ratio of direct-to-reflected sound, which, ipso facto, makes the reflected sound less important in establishing timbral character. A high ratio of direct-to-reflected sound also reduces smearing of the image caused by reflections from nearby surfaces—another reason why so many people favor them. But is this really desirable? All told, headphones are the ultimate direct-radiating transducer; they radiate straight into the ear canal, and you can't get more direct than that. But headphones do weird things with stereo recordings. The images may be precise and stable, but they pop up inside your head instead of in front of you, where you expect them to be. (I'm not speaking of binaural recordings, which are made for reproduction over headphones, but of stereo recordings, which are mixed for reproduction over speakers.)

THE OM-8'S SOUND FIELD AND IMAGING ARE EXTRAORDINARILY NATURAL, LIKE THE SOUND OF A CONCERT HALL.

An Omnipolar system is quite different from a direct radiator. It delivers a higher ratio of reflected sound at the listening position, which means that the room enters the equation quite strongly. Although radiation from the front and rear of an Omnipolar speaker is initially in phase, cancellation of the front and rear waves (after the latter reflect from the wall behind the speaker) ultimately occurs and produces a comb-filter effect. The filter's characteristics depend on the speaker's placement vis-à-vis the wall, the wall's reflectivity, and so forth.

Ultimately, every real speaker in every real room produces multiple comb filters. This occurs when sound waves bounce around and reinforce each other at specific frequencies and locations while cancelling each other at others. It is a perfectly natural event that occurs with every sound source in every room; our ears are accustomed to dealing with it. It's not "bad" in and of itself, but ideally, one wants to arrange things so as to maximize the naturalness of the sound and to avoid placements that cause anomalies. Indeed, that was the story of my life with the Mirage OM-8s.

After some initial experimentation, I placed the OM-8s about 2 feet away from the wall behind them and much further from the walls on either side. Both speakers were the same distance from the wall behind them, but I positioned them asymmetrically with respect to the walls on either side. The sound was well balanced in the midrange and treble, but the bass was too heavy for me with the "Level" and "EQ" controls centered. (Amazing, the amount of bass these little drivers pump out!) Cranking "Level" most of the way down and backing off about halfway on "EQ" seemed to help.

With orchestral music, the OM-8s' image had great depth and was far more precise than I had expected. The OM-8s don't produce the pinpoint images that some direct-radiating speakers do, but their sound field and imaging are extraordinarily natural—more like the sound of a concert hall. When you get right down to it, you can't pinpoint instruments in a concert hall. You think you can, but that's because of visual clues. Close your eyes and see how well you do! The OM-8s give you more aural clues than you get in a concert hall (they have to, because you don't have visual input), but they don't go overboard. They're really quite amazing in this regard.

On many CDs—Mahler's Symphony No. 5, recorded live at the Meyerson Hall in Dallas (Dorian DOR-90193); Kodály's *Háry János Suite*, recorded in Orchestra Hall, Chicago (Chandos CHAN 8877); Schubert's Symphony No. 9, recorded at the Lucaskirche by the Staatskapelle Dresden (RCA Victor Red Seal 09026-68547); and the magnificently engineered recording of Nielsen's Symphony No. 3 with the Swedish Radio Symphony Orchestra in Berwald Hall, Stockholm (Sony Classical SK 46500)—I felt I was getting the overall experience I would hope to have had in those halls. That, and no more than that!

And I didn't have to lock myself into a sweet spot to get a decent image. The image certainly was best midway between the speakers, but I could move quite far off center and still hear good results. In fact, I could even move beyond the speakers, and in most cases the image would stay between them. It might be shallower and sort of tilt-

LOUDSPEAKER SOUND DISPERSION 101

Speakers can be classified into three broad categories based on the way they disperse sound. There are front- or direct-radiating speakers, dipole radiators, and what I call the bipole/Omnipole variety. I expect that Mirage prefers to view the latter as separate categories, but I think they're similar enough to be considered together. Besides, in the real world, radiation patterns vary with frequency, so real speakers don't fall exactly into one category or another at all frequencies, despite their designers' intentions.

Front radiators are designed to disperse sound over a relatively narrow horizontal angle into the front hemisphere. The drivers may be arranged to encourage broader radiation in the horizontal plane than in the vertical, to minimize reflections from the floor and ceiling, but no attempt is made to radiate sound to the sides and rear. Radiation in those directions is deemed unwise by the proponents of these speakers because, to their way of thinking, reflections from the walls beside and behind the speakers confuse the image and bring the characteristics of the room into the picture more than need be. Indeed, controlled-dispersion speakers like these are as room-independent as a speaker can be. They can create an extremely well-defined, almost holographic, image in the area between them if the listener sits in the sweet spot and the acoustical and electrical system is well balanced. More speakers fall into this category than into any other.

Dipole speakers radiate in a figure-eight pattern, which resembles the numeral "8" if you were to look down on the speakers from a point overhead. Sound is dispersed over a relatively broad angle to the front and to the rear, but little or no sound is radiated to either side (the null in the 8) or upward or downward. Dipoles theoretically eliminate interference caused by sound bouncing off the floor and ceiling, but sound does bounce off the wall behind them. Moreover, sound emitted from the rear of a dipole is out of phase with the sound emanating from its front, which means that the rear-wall bounce is out of phase, too. Finally, the acoustical energy is not uniform at all front angles. It diminishes as you move off center (according to the cosine of the angle, if you wish to get technical about it), and at 90° there's no sound at all.

Dipoles are thought to produce deeper (if less precise) images than direct radiators, but placement relative to the listener and to the surrounding walls plays a major role in determining the result. In theory, electrostatic panels are dipole radiators; in reality, their radiation pattern varies with frequency and is modified by the shape and size of the panel. In the deep bass, where sound wavelengths are long, forward and rearward radiation begin to cancel, so a conventional cone woofer (with a non-dipole pattern) is usually used to reinforce the low end.

Bipoles are like dipoles in that they disperse sound over a relatively broad horizontal angle to the front and rear. But unlike dipoles, bipoles produce sound that is in phase fore and aft. Therefore, there's no bass cancellation, and the sound reflected from the wall behind them is in phase with that from the front over a reasonable band of frequencies in the bass and lower midrange. Bipoles, such as the old Mirage M-1, use similar (usually identical) drivers on the front and rear baffles. The drivers are wired in phase so that their cones move in and out together and form the equivalent of a column whose front and back surfaces move together.

You can also look at bipolar radiators as a combination of two direct-radiating speakers placed back to back and wired in phase. Sound radiates over a reasonably wide horizontal angle in the front and to the rear, with less sound radiated to the sides because of the directivity of the individual drivers. Besides driver directivity, the physical displacement of the front and rear drivers affects the radiation pattern.

Bipolar speakers are usually relatively narrow and deep. Thus, in the midrange—certainly in the upper midrange—the front and rear drivers are quite far from each other in terms of wavelength. Because of the difference in path length from the front and rear drivers to the listener, the radiation from the front and rear drivers may not add up at the ear in phase.

To my way of thinking (perhaps not to Mirage's), the major difference between its new Omnipolar speakers and its older bipolars is the shortening of the front-to-rear path length. Whereas the cabinet depth of a bipolar speaker is likely to be a foot, give or take a few inches, the portions of the OM-6 and OM-8 that house the midrange drivers and tweeters is only 4½ inches deep. That means these speakers can function in Omnipolar fashion to frequencies perhaps three octaves higher than a typical bipole. *E.J.F.*

ed to one side, but it didn't collapse to the nearer speaker—as it usually does with a direct radiator. Quite amazing! And quite natural.

I could cite other musical examples—and, of course, you don't get the same imaging with every recording. The simpler the recording technique, the more natural the results seemed to be with these Mirage speakers. (But since I don't know how every recording was made, I'm speculating here.)

The OM-8's timbral balance was excellent. Upper woodwinds were graceful, lower woodwinds rich. Reeds were, well, reedy. Brass was sharp, and violins were not. On *Dawn Upshaw: Forgotten Songs* (Sony Classical SK 67190), Upshaw's voice was light as a feather and utterly transparent. All was just as it should be. Transients were decent, but the OM-8s did not attack as sharply as some. I'm not put off by this; they were fast enough for me, and I'd rather do without edginess, thank you.

Everything was ducky until it came to solo piano, an instrument of which I'm particularly fond and of whose reproduction I'm particularly critical. Some piano discs played through the OM-8 sounded okay—e.g., Ivor Pogorelich's rather dry recording of Chopin preludes (Deutsche Grammophon 429227), made in the Friedrich Ebert Halle in Hamburg—but on others, the bottom was tubby. The bass register of Murray Perahia's recording of Chopin ballades, made in the Salle de Musique, La Chaux-de-Fonds, Switzerland (Sony Classical SK 64399), was woody and had a sort of swallowed-up sound, almost as if you'd puffed your mouth and tried to capture the music inside. On the other hand, the tenor, alto, and soprano registers were nothing short of terrific, and the image had great depth. (Yes, a solo piano recording can have depth, which is affected by the action of the damper.) The OM-8s were also terrifically clean and detailed; I could even hear the dampers rise from the strings when the *una corda* was on and Perahia slowly released the damper. (A perfectly adjusted instrument doesn't do that, but many instruments are not perfectly adjusted!)

Thomas Labé playing transcriptions of Bach suites and partitas on an American Steinway D (Dorian Discovery DIS-80117) is heavy to start with. The Troy Savings Bank Music Hall (one of this label's favorite recording venues) is reverberant, and Dorian tends to mike fairly far back to take advantage of the natural acoustic. The results can be spectacular; they also can be overpowering. I diddled and twiddled with the knobs, trying to bring this recording under control, but I was never satisfied. This became rather frustrating, because I really liked the sound and imaging of these speakers on orchestral music and even on piano over most of its range.

I switched to some of my own solo-piano recordings made using a very simple microphone placement in concert halls that I know pretty well. Same sort of thing: The better the acoustic (and the better I had captured it!), the heavier the bottom end sounded. For a while, I chalked up my dissatisfaction to the fact that the OM-8s are vented. I've usually been unhappy with the way vented speakers handle the bottom octaves of the piano, and although there have been exceptions, it was rather easy to lump the OM-8s in with other vented speakers that had proved disappointing. Yet why should the ambience in the recording have such an effect if this were simply a matter of bass resonance?

Finally the light dawned: This was a matter of room interaction that could not be corrected with the OM-8's controls. So I went back into the speaker-moving business. After lots of trial and error, I ended up with the speakers 45 inches from the wall behind them, about 9 feet apart, and angled in toward me. Voilà! The bass tightened up!

THE MIRAGE OM-8s PRODUCE A SOUND THAT IS TERRIFICALLY CLEAN AND DETAILED.

In fact, the level now seemed a little low, so I centered the "LF EQ" control and raised the "Level" control to about 10:30. Don't take these positions and settings as gospel; they worked in *my* room but won't necessarily work in yours. I relate the story only to suggest that, despite how good the OM-8s may sound where you first place them, they'll appreciate tender loving care and lots of experimenting.

With the final placement and settings (well, maybe they're the final placement and settings!), the image has even more depth. I can't go quite so far off axis before damaging that depth as I could before (probably because the speakers are now angled in more than they had been), but that seems a small price to pay for tighter bass. And the room still fills with sound in a most natural way. Put it this way: I live with a concert pianist whose Steinway B shares the listening room. She records many of her practice sessions using a pair of omni mikes I leave set up for that purpose. Next to the listening room, there's a family room where I am wont to sit and read the paper at the end of the day. Lately, I've been sticking my head into the listening room to see whether it's Diane playing her Steinway—or the Mirage OM-8s playing back Diane's recording. Now, is that real, or what? A

AURICLE

ANTHONY H. CORDESMAN

PASS LABS X600 MONO AMP

Nelson Pass has produced some truly great solid-state power amplifiers, but the X600 is by far the best thing he has ever done. It handily outclasses Pass Laboratories' mono Aleph 1.2, which is among my references. I have never heard a better amplifier or seen a more attractive one. This amp has no weaknesses, and its nuances took me as far into musical realism as any amplifier I've heard.

Photo: Michael Groen

The X600, a mono power amp rated at 600 watts into 8 ohms and 1,200 watts into 4 ohms, costs $8,000 each, but an audiophile who can afford two ($16,000) will feel they're worth every penny. If you think you need more power, Pass Labs makes the X1000 ($12,000 each), rated at 1 kilowatt into 8 ohms. But 600 watts is more than enough power for all but the most inefficient speakers. And the X600 has several practical advantages over the X1000: Each weighs 150 rather than 250 pounds, a pair works well on an ordinary 20-ampere AC power line, and you save enough money to get yourself a third X600 to power a center channel or a subwoofer.

The X600's industrial design is a major breakthrough. The look of the Pass Aleph series of amps, a black cube with heat sinks, reminded me of the alien monolith in *2001: A Space Odyssey*. By contrast, the X600's front panel made me remember that good industrial design is really art. Even the power switch has style. And the meter! Why doesn't every amp have a meter like this? Why can't every amp have the same subtle front-panel lighting? (If you think I'm going overboard on the cosmetics, go down to your dealer and look as well as listen.)

Company Address: P.O. Box 219, Foresthill, Cal. 95631; 530/367-3690; www.passlabs.com.

The X600's circuit topology has an elegant simplicity that you usually find only in single-ended tube amplifiers. There are just two gain stages, an input stage that provides all of the voltage gain and a high-current output stage comprising 48 power MOS-FETs. These are said to be capable of safely handling more than 7.2 kilowatts.

The X600 operates in Class A to roughly 300 watts (into 8 ohms) and then goes into Class-AB operation, which keeps your electric bill and room temperature within reasonable limits. You can see this happening on

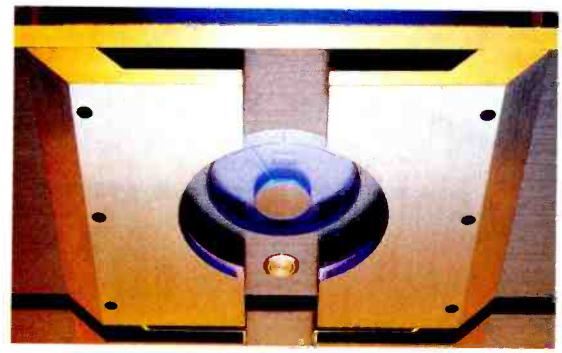
the front-panel meter, which reads current draw rather than output power. The meter's needle stays more or less mid-scale until the transition occurs from Class A to Class AB, where the output stage begins drawing more than the 600 watts it consumes at idle. This doesn't happen often, but when it does, the added punch and excitement from all this power make you grateful for the extra reserve that Class-AB operation affords.

You needn't worry about the power supply: It has a massive toroidal transformer rated at 4 kilovolt/amperes and a high-current rectifier; storage capacitance is said to be more than 150,000 microfarads. The X600 does not rely on feedback, and Pass Labs claims its performance is consistent from DC to beyond audibility. The company also says the X600 is unconditionally stable into any speaker load. This proved true with all of my speakers: the very low impedance of an early full-range Apogee Ribbon, the Spendor BC-1, and the Quad ESL-63. The only minor cavils that arose during my auditioning were that the X600's input and output are direct-coupled and the amplifier accepts only a balanced (XLR) input.

The key aspect of the X600 is its Super-Symmetry circuit, which Nelson Pass developed for the X1000. Pass says Super-Symmetry, a patented design, exploits the complementary characteristics of precision-matched balanced circuits to differentially reject distortion and noise.

The company maintains that previous balanced amplifier designs have been some variant of a pair of operational amplifiers (op-amps). Super-Symmetry does not use op-amps as building blocks. Instead, the circuit has two negative inputs, two positive outputs, and two matched gain blocks coupled together at a central point, where voltage would be zero in a perfect amplifier. Because the amplifier is not perfect, however, distortion and noise appear at this point. These components are coupled to the output of each gain block, where they appear out of phase with the distortion in that block and therefore cancel. In other words, the distortion and noise of each half of the circuit appear identically and cancel each other out.

Pass Laboratories claims this design can almost totally eliminate unwanted signal components (i.e., distortion) without use of negative feedback. Moreover, it is substantially easier to tweak the two halves of the circuit into symmetry (necessary for generation of identical distortion products) than to eliminate the distortion in each half of the circuit. Pass notes that although the



THE PASS X600'S FRONT PANEL MAKES YOU REALIZE THAT INDUSTRIAL DESIGN IS ART.

circuit actually does very little to reduce measured distortion and noise in each circuit half on its own, it's been a long time since high-end solid-state amplifiers had much measured distortion to reduce.

I had been using the Pass Aleph 1.2 as a reference because its sound emulates a good tube amp's. It is still a great amp and has a warmth and consistency of timbre characteristic of triode tube amps. But it does have some imperfections. The deep bass is a bit limited, the mid-bass is a bit warm and lacks the control that some speakers require (those that need a lot of help from an amplifier), and its upper octaves are a bit warm. Also, the Aleph 1.2's dynamics do not quite match its sweetness, air, and transparency. Though scarcely major sins, they are colorations nevertheless.

I found the X600's sound really glorious. Though some Krell amps are better in the low bass, few amplifiers go as low and do as well as the X600. It offers a great deal of control over difficult speaker loads. If you hear more than the slightest touch of looseness in the deep bass with the X600, move your speaker. You have a room interaction problem, not flawed electronics.

At any frequency above the deep bass, I simply could not fault this amp. In terms of transparency, natural timbre, and sheer musical life (even at listening levels no sane person would endure), the X600 is as good as it gets. Dynamics are superb, and complex musical textures are clear. Solo male and female voice and demanding solo instruments (guitar, violin, cello, piano, harpsichord, clarinet, and flute) are as natural as anything I've heard. Midrange performance is remarkably neutral. I kept anticipating midrange coloration, but it never appeared. Indeed, the X600 is the ideal amp for a reviewer when evaluating the midrange of other components. You never hear this Pass Labs amp; you hear what's on the recording—as well as any colorations in your program sources, speakers, and cables. (I'm sure someday some new amp will materialize that will reveal there is coloration in the X600, but it's not here yet.) The top octaves have all the energy, life, air, and detail demanded by the most persnickety audiophiles—no edge or harshness, no touch of excess. (In all fairness, I must state that the Aleph 1.2 is more forgiving.) The X600's freedom from upper-octave coloration means there is no warmth, softness, or euphonically forgiving nature. You'll hear everything in the upper octaves, including recording faults and front-end or tweeter flaws. What you will *not* hear are problems in the amplifier.

The X600 is as revealing of the soundstage as any power amp I've ever heard; indeed, it may be the most revealing in terms of low-level detail. This amp is too neutral for any vestigial coloration to be audible; your recordings or other components will dictate soundstage width and imaging. Perhaps some tube amps provide a bit more depth, but whether that's accurate is anyone's guess. The X600's superior transparency and resolving power open up and define the soundstage as well as the recording permits. I found it a real joy to use this amp with recordings of live performances and recordings where the apparent soundstage has real musical credibility.

In terms of dynamics, power is telling. Give the X600 an exciting and demanding orchestral passage, and it rises to the occasion. Push the sound of pipe organs or

Continued on page 67

WE HEAR YOU!

Come September, AUDIO magazine will be *INTENSIFIED*, *ENERGIZED*, and *REDESIGNED*. Why? You asked for it! Our surveys tell us you want a bigger, better AUDIO, with more product reviews, a fresh editorial style, and a bolder package.

INTENSIFIED

Each issue of AUDIO will contain 10 to 12 equipment reviews in a concise new format — almost twice the coverage you're getting today. We'll be covering a wide range of high performance audio products plus exciting new technologies, such as multichannel digital audio, Internet music delivery, and home studio recording and editing.

ENERGIZED

The best writing staff in the audio biz is getting better, with the addition of Willie Gluckstern, Doug Newcomb, Paul Tatara, and James Willcox. Together, they'll be reporting on the latest gear with lively commentary that's opinionated and fun to read, though still grounded in the science that makes AUDIO *"The Equipment Authority."*

REDESIGNED

Each issue of AUDIO will have more pages and an eye-catching design that's easy to read and pleasing to look at. Deluxe paper used throughout the magazine will bring products and graphics alive.

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AURICLE

JOHN GATSKI

WESTLAKE AUDIO SURROUND SPEAKER SYSTEM

Several years ago, when I auditioned Westlake's Lc8.1 two-way speaker ("Playback," June 1997), I liked it a lot; its sound was detailed and revealing, with tight, low bass. Since then, the company has designed a dedicated subwoofer (the Lc8.1SW) and center-channel speaker (the Lc265.1) intended to be used with the Lc8.1 in a home theater setup. (It's not quite a 5.1-channel system, but more on that later.)

The Lc8.1s ($2,199 per pair, in satin black or $2,339 per pair in satin walnut veneer), a magnetically shielded version of the Lc8.1, has an 8-inch woofer and a 1-inch tweeter. Constructed of medium-density fiberboard, the 31-pound, ported enclosure is 18 inches tall, 10 inches wide, and 12 inches deep. The cabinet's two ports are located just below the tweeter. The woofer portion of the front baffle juts out about 1 inch in front of the tweeter section (for better time coherence, says Westlake). On the back panel is a single pair of five-way binding posts. (The Lc8.1s is also available in an unshielded version, the Lc8.1 for $1,999 per pair in satin black or $2,175 per pair in satin walnut veneer.)

For center-channel chores, the magnetically shielded Westlake Lc265.1 ($1,799 each, in satin black or $1,875 each for satin walnut veneer) is designed to operate in a horizontal position (it also may be oriented vertically, if desired, to fulfill left- and right-channel duties). The speaker uses dual 6½-inch woofers and a 5-inch midrange, inside of which is a coaxially mounted, 1-inch dome tweeter. Four ports are located on the front baffle between the woofers and the midrange. Minimum impedance of the Lc265.1 is specified at 3 ohms, with frequency response rated at 48 Hz to 18.5 kHz, ±2 dB. The rear baffle carries two sets of input jacks for bi-wiring (a wire jumper must be used for conventional hookup). Oriented horizontally, the Lc265.1 is 8½ inches tall, 22 inches wide, and 11 inches deep and weighs a hefty 42 pounds.

Conceived as a pedestal stand for the Lc8.1s, the dedicated Lc8.1SW subwoofer ($5,695 per pair in satin black and $5,999 per pair in satin walnut veneer) contains two front-mounted 10-inch woofers with twin ports on the front baffle. The 68-Hz passive crossover, which includes 17 components and contributes about 20 pounds to the weight of each sub, is designed to work specifically with the Lc8.1s, with the crossover frequency and slope said to be opti-

Company Address: 2696 Lavery Court, Unit 18, Newbury Park, Cal. 91320; 805/499-3686; www.westlakeaudio.com.

Photo: Michael Groen

mized for "a seamless transition from the subwoofer to the main speaker while improving system headroom and resolution." Frequency response of the Lc8.1SW sub combined with the Lc8.1s main speaker is rated at 36 Hz to 18.5 kHz, ±3 dB. By itself, the Lc8.1s main speaker's low-frequency extension is rated at 55 Hz. The Lc8.1SW subwoofer is 28 inches tall, 14 inches wide, and 15 inches deep. Incidentally, you'll need help moving them around—each weighs 100 pounds.

The Lc8.1SW subwoofer has bi-wiring facilities with five-way binding posts for the high- and low-frequency inputs. A set of high-pass binding posts sends the crossed-over signal to the Lc8.1s. For those who do not bi-wire, heavy-duty 12-gauge jumper cables are provided. A set of port plugs and a T-handle wrench to install them are included with the subs; the plugs are meant to be inserted into the Lc8.1s main speakers' ports to further "tighten" the bass of the subwoofer/mains combo system.

NO WONDER THE PROS ARE MIXING WITH THESE WESTLAKE SPEAKERS.

Westlake says it designed this system as a surround setup for both video and music. Already familiar with the Lc8.1s as music transducers, I wanted to find out how well the system worked with the pair of dedicated subs to reproduce the bottom octave. I also was curious to test its home theater capabilities with the addition of a center channel and two Lc8.1s as surround speakers.

Now, because the two subs are designed to work in tandem with the Lc8.1s main speakers, setting up a 5.1-channel system with a single, dedicated subwoofer was not in the cards. The tandem operation produces optimum phase as well as performance, according to the company, so the mains and the subwoofers should not be separated. My Carver Dolby Digital DD 5.1 preamp/processor has a feature that enables the low-frequency effects (LFE) channel to be mixed into the the two front channels. Therefore, I was able to test the speaker ensemble as a five-channel Dolby Digital system with the low bass completely intact.

I single-wired the Lc8.1SW subs to the left and right outputs of a three-channel Carver A-760X THX amplifier (rated at 250 watts per channel) with 12-gauge MIT speaker cables. Then I connected each subwoofer's high-pass outputs to the Lc8.1s mains using the supplied jumpers. I wired the Lc265.1 directly to the Carver's center-channel output, again using MIT cable. I placed it on top of my Toshiba direct-view TV monitor with the front of the speaker angled down to compensate for the screen height.

I wired the pair of surround-channel Lc8.1 speakers via MIT cables to a Carver A-500X stereo THX amp (also rated at 250 watts per channel) and positioned them against the side walls, approximately five feet behind the listening seat, aimed into the listening area.

Next, I set the Carver processor's main speaker selector to "Large" and turned off the dedicated subwoofer channel switch, thereby routing all the bass from the front left and right and LFE channels to the Lc8.1SW subs. I also configured the surround and center channels to run full-range by selecting "Large." The channels were balanced using the processor's noise calibration feature and a SPL meter.

A downside of operating subwoofers in the same location as the front speakers is that many subwoofers are not magnetically-shielded—and that includes the Westlake subs. Consequently, it is almost impossible to eliminate screen interference when the subwoofer is close to a TV. In my room, my Toshiba TV was not happy until the subs were moved seven feet away from the screen. That is greater physical separation than usual for my front speakers, but I was able to compensate by shifting my listening position.

I auditioned the Westlake speakers using DVD releases of *Lost In Space* and *The Fifth Element* and the laserdisc release of *Star Trek Generations*, which has a Dolby Digital soundtrack. The system turned out to be an excellent home theater performer. For starters, the Lc8.1s mains are so clean and detailed (e.g., the background sounds in *Lost In Space*) that I heard low-level treble effects more clearly than on other speakers. And because the speakers are so clean-sounding, I was able to take advantage of the dynamic range of Dolby Digital soundtracks and listen at much higher volumes without fatigue.

The Lc8.1SW subs did a very good job delivering the low end. I couldn't make a valid comparison to my normal setup because I run my Velodyne sub (which measures flat to 20 Hz) three feet behind the listening position, whereas the Westlakes were 10 feet in front of me. But I still felt the bass impact of explosions, gunfire, and the like. Moreover, the sounds were deep and quick without the boominess I have encountered using many dedicated subwoofers. No wonder the pros are mixing with this speaker.

The center-channel Lc265.1, with its ability to kick out a good deal of bass on its own, as well as clean midrange and treble, was as good as I have heard. Voices were full, clear, and natural, without boominess (male) or excessive sibilance (female). By the way, the shielding on the center speaker and the two front Lc8.1s was 100% effective.

I also listened to music, in stereo, on the Lc8.1SW sub/Lc8.1s combo, using a Pass D1 20-bit DAC/preamp, a Legacy high-current amp, and Alpha Core flat, single-conductor silver speaker cables. Listening to Johnny Frigo's *Debut of a Legend* (Chesky JD119) and *The Guitar Artistry of Charlie Byrd* (Riverside OJCCD-945), I felt the Lc8.1SW/Lc8.1s combo supplied excellent detail and low-bass oomph. These subs are fast, delivering satisfying low-octave clout for classical, jazz, and pop music.

The only negative aspect to the Westlake system is the difficulty of setup. For home theater use, the subwoofers have to be placed with the left and right main speakers. Thus, you cannot experiment with placement as you can with a dedicated sub. And the subs can be very problematic when postioned close to TV sets; video interference is almost certain within six feet of the screen.

If you can optimize this system for your room, I believe the Lc8.1SW subs/Lc8.1s mains, Lc8.1 surrounds, and the Lc265.1 center channel can serve as a high-quality surround sound system for movies. And for monitoring music, the Lc8.1SW subs/Lc8.1s mains are just as impressive. A

AURICLE

KEN KESSLER

ARCAM ALPHA 9C PREAMP

Running one's thumb down the price column in the "Preamplifier" section of *Audio*'s Annual Equipment Directory exposes a shocking dearth of models costing less than $1,000. Closer study reveals that, though there are still stalwart American firms that manufacture preamps selling for less than four figures (such as Mondial, with its Acurus brand), there are a lot of listings for expensive imports. And given the strength of the pound, I was amazed to discover that the British still have anything to offer in this sector.

Aah, you're thinking, ol' Kessler must have forgotten that the British—who still think in terms of postwar frugality and gas-ration coupons—have mastered the art of minimalism. That mindset is also why one British company, Musical Fidelity, produces the X-PRE cylinder and another, Creek, serves up a line of teensy black boxes that resemble moving-coil step-up transformers or wall warts. But Arcam long ago abandoned the hair-shirt market after mastering it with the hugely successful A&R Cambridge A60 integrated amp.

WITH THE ALPHA 9C, ARCAM DELIVERS FINE SOUND AND FLEXIBILITY AT A SANE PRICE.

For some years, Arcam has not seen its United Kingdom-based, audiophilic colleagues as its competitors but has set its targets on Asian and pan-national brands, such as Denon, Marantz, NAD, and Rotel. These are companies whose products have mass-market prices, handsome finishes, and good ergonomics yet good sound quality. It wasn't an unconscious decision on Arcam's part to style its Alpha series like any of a hundred charcoal-gray, 17-inch-wide McAmps.

Given the sheep-like mentality of consumers, it's no wonder that Arcam, like any sensible manufacturer, opted for what has become the standard size and color of mid-priced hi-fi gear. But it has still managed to carve out an identity for the Alpha products. The moderately priced, $799 Alpha 9C preamp, while looking as sinister and stealth-like as many of its rivals, does have quasi-organic touches—like curved edges and a general softening—that distinguish it from mechanoid alternatives. Its front panel also has some minor sculpting that leaves a special spot for the logo at the extreme left, and it's here that Arcam showed some real creativity: The logo is also the infrared sensor.

Did I say "infrared sensor"? Yup, input selection, muting, and volume can all be controlled via the Arcam Alpha 9C's supplied remote. As you would expect of a company that makes CD players and tuners, this remote also operates Arcam's source components. (Conveniently for me, it also worked with Krell's KAV-300cd CD player, which I used during the listening sessions.)

Remote control is but one attribute that distances this solid-state

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preamp from its forebears. Going wa-a-ay beyond the on-off/source-select/volume-control-only mentality of the purists, the Alpha 9C accepts four line-level inputs and two tape decks through its gold-plated jacks (the second tape inputs are also marked as a processor loop). Sealed off on the back panel of my line-level-only review sample were apertures for an optional MM/MC phono stage ($100).

In addition to a record-out facility for both decks, Arcam's Alpha 9C has two primary preamp outputs, useful for speaker biamping, and two pairs for use as the heart of a limited multiroom installation. Labeled "Zone 1" and "Zone 2," these line-level outputs will drive fairly long cable runs. They're activated by small pushbuttons on the front panel; you change their sources with the "Listen" selector for zone 1 and the "Send" selector for zone 2. (The "Listen" and "Send" selectors also enable you to listen to one source while recording another.) You can't change either zone's volume, so you'll need integrated amplifiers, such as the Arcam Alpha 7 or 9, rather than basic power amps.

To purists' eyes and ears, Arcam has committed the cardinal sin of giving the Alpha 9C balance and tone controls. However, you can bypass them by using the preamp's "Direct" selector. If you think that tone controls will be transparent when they're at mid-rotation, think again. Just press "Direct," and you'll hear, as I did, an immediate improvement in low-level detail and in clarity.

Arcam avoids any accusations of the Alpha 9C being little more than a stripped-down version of the Alpha 9 integrated amplifier because the 9C uses "a completely redesigned and relaid glass-fiber circuit board that minimizes signal paths and crosstalk." A low-noise toroidal transformer serves the two-stage regulated power supply. There's a separate regulated supply for another non-minimalist frill: a high-performance headphone amplifier with a ¼-inch jack on the front panel for *real* headphones.

And, yes, the headphone amp was robust enough to drive a selection of Grado cans, often regarded as "difficult" or power-hungry, despite being specified for headphones with higher impedances than are Grado's wont. I wasn't surprised to find that the Alpha 9C's volume control swerved closer to the 12 o'clock mark with the Grados than it did with Sennheisers or Sonys, but at no point did the headphone amp sound like it was working hard. Indeed, so good is the internal headphone amp that it rivaled stand-alone models. Even though home headphone usage has never been a hot topic except among those who suffer life in apartments and condos with thin walls, Arcam still deserves credit for not treating the headphone section as an afterthought. Its decidedly full-range sound is clean, clear, and coherent, and its bass is crisp and solid. Indeed, the sound is impressive enough to inspire you to rediscover headphones rather than treat them merely as an answer to family complaints or hostile neighbors.

Universality tends to be the province of less-expensive equipment (it sometimes seems that blatantly high-end components suffer most from mismatching), so it's no surprise the Arcam proved to be exceptionally amp-friendly. (The main outputs are specified as having a nominal level of 800 millivolts and a maximum level of 8 volts, and output impedance is said to be 10 ohms.) Nothing I could do made the Alpha 9C blow up, belch, or scream in pain. I tried this preamp in my system with an old push-pull tube amplifier from Radford, with a new one from GRAAF, with a pair of single-ended triode monoblocks from Unison Research, with an affordable solid-state stereo amp from Acurus, and even with some outrageously expensive solid-state monoblocks courtesy of Sutherland. Some quite clearly "worked" better than others, but none suffered what I would deem a terminal mismatch. In fact, you could use the Alpha 9C to add some upper-frequency sparkle and zip to soggy-sounding tube amps of a pensionable age, but I would avoid mating it with a solid-state amplifier whose top end sizzles.

THE 9C'S DESIGNERS REALIZED THAT THE MIDBAND IS THE MOST IMPORTANT ELEMENT IN THE MIX.

I used a Krell KAV-300cd and Musical Fidelity's X-RAY as CD-spinning sources and connected them to the Alpha 9C with Musical Fidelity cable. I had the Arcam drive the assortment of amplifiers through Discovery interconnects and used ART speaker wire to hook up Aliante Pininfarina and Quad 77-10L loudspeakers. I selected these speakers for their relatively sane prices, but I also auditioned the lot through a Wilson WATT/Puppy System V.1 and Sonus Faber's new and spectacular Amati Homage.

Although modern U.K.-manufactured solid-state electronics, with a couple of exceptions, have moved away from the strictures created by an anti-soundstage, anti-stereo, anti-wide-bandwidth cult, there remains a distinct Britishness that owes a lot to the standards set forth by the BBC. Maybe it's in the water, or maybe it's one of the few things that the culture-and-tradition-destroying current government can't erase. Whatever it is, let's be grateful that, even at the Alpha 9C's price, its designers realized the midband is the most important sonic element in the mix. You can roll off the treble, cheat a bit on the bass, but the midband is the heart of the music. And BBC engineers—and, by extension, all British hi-fi designers—know this.

The Alpha 9C has a clearly definable personality, and it certainly wasn't what I expected. Its lush, natural midband caresses textured voices and seems to favor acoustic instruments. This was evident on DCC's recent exercise in vocal bliss, *Nat King Cole: The Greatest Hits* (DCC Compact Classics GZS-1127). This disc serves up many of the singer's best-recorded works, his voice surrounded by great choral backing and magnificent studio orchestras. The Alpha 9C is gloriously free of the edginess and artifice that could cause one to disbelieve that Nat's *Hits* were once state-of-the-art analog recordings on vinyl. There's warmth aplen-

ty and a seamlessness that allows the voices to mesh as required, but there's also enough precision to keep them separated—blending, not blurring.

And yet the frequency extremes slightly betray a midsection that made me think time and again of the BBC LS3/5A mini-

THE ARCAM 9C IMPARTS A TOUCH OF TUBE GENTILITY TO GEAR KNOWN FOR SOUNDING TOO SOLID-STATE.

monitor. As demonstrated by Arcam's move to 17-inch-wide components and the sort of finish that would match the products of Sony or Technics, the company is pragmatic. Modern listeners favor crisp treble over sweet or soft and dry, taut bass over anything that Charles Mingus would recognize. The Alpha 9C places an almost retro midband between modern frequency extremes, and it renders all manner of too-transistory, too-analytical products (including most budget CD players) somewhat more "analog"-sounding.

This near-schizophrenia is actually an asset rather than a liability, because it imparts a touch of tube gentility to components often known for sounding too solid-state and artificial. At least, that's how I see much of what's available in the budget sector. What's so surprising is that in the Alpha 9C, Arcam has delivered fine sound, a surfeit of features, practicality, and flexibility for a sane, sensible price.

If, in the post-Diana world, there are still any Anglophiles among you, the Alpha 9C should be a welcome touch of Merry Olde England, with a decidedly New England price tag. A

PASS LABS, *continued from page 60*

bass drums to absurd volume levels, and you'll hear your speaker limit the sound long before this amp runs out of gas. With the X600 in my system, the swell of the most complex, dramatic passages in grand opera vividly came to life. Jazz and blues took on an added touch of realism, and good rock really moved. There was nothing bashful or modest about the dynamics of this amp. Low-level percussion transients leapt out with the speed and definition of the real thing. And complex dynamics of well-recorded solo instruments, such as a close-miked flute, were also remarkably lifelike.

I should note that nuances of the X600's dynamics differ from those of the best high-power tube amps. There's not quite as much warmth, and the Pass amp seems to preserve more differences between soft and loud sounds. I don't know whether tube amps slightly compress dynamics or the solid-state X600 slightly expands them, but the details are not quite the same. The X600's dynamics, among other things, make the listening position seem a bit more forward than it is with tube amps or my solid-state Krell reference amp. The Pass has a touch more midrange and upper-octave energy than those amps. In fact, with

THE X600 IS BY FAR THE BEST THING THAT NELSON PASS HAS EVER DONE.

respect to musical life, it's rather like the Classé Audio CA-400, but the Classé amp has a bit less upper-octave information.

It is obvious I have fallen in love with—or at least in profound admiration of—the Pass X600. You may, however, wish for something that has a bit more warmth and depth. There are other amps whose nuances are remarkably realistic. I know from my experience with the Krell that there is still solid competition, and I haven't heard the latest solid-state amps from several other front-rank amplifier manufacturers. But if superb isn't good enough for you, what is? A

AURICLE

ANTHONY H. CORDESMAN

HALES TRANSCENDENCE EIGHT SPEAKER

For all of the changes occurring in digital engineering, surround sound, and recording technology, the most important revolution in audio may well be the one taking place in speaker design. During the last year, I have auditioned a number of extraordinary speakers capable of very wide frequency response, from the lowest bass to the highest treble. And they deliver it with remarkable smoothness, excellent dispersion, and very low audible distortion—even at very high listening levels. Further, several of these speakers are single-enclosure systems that require just one amplifier. In fact, a few of these one-cabinet speakers provide a better and more integrated musical listening experience than some far more expensive competing systems that use separate bass enclosures and satellites and need more than one amp.

If your curiosity is roused, I am currently using two of these speakers, the Dunlavy SC-V and the Thiel CS7.2. Had I an infinite amount of money and space, I'd add Hales Design Group's Transcendence Eight. It represents yet another advance in sound quality and one that deserves serious consideration by any audiophile looking for the finest speakers.

Priced at $9,790 per pair in sapele, oak, or black, the Transcendence Eight is not inexpensive (no reference-quality speaker is). It is, however, superbly assembled and styled, and there are good reasons for its cost. Like most current high-quality dynamic speakers, it has an exceptionally rigid enclosure, with cabinet walls made of medium-density fiberboard of 1- and 2-inch thicknesses. Indeed, its front baffle ranges up to 4 inches thick. The faces of the cabinet are designed to minimize resonances and colorations, and the front panel is sculpted to reduce diffraction effects. Each speaker is 48 inches tall x 12 inches wide x 21 inches deep and weighs 152 pounds.

Fortunately, the sloping cabinet and narrow front of the Hales Transcendence Eight give it a much lower and more pleasing visual profile than its size and weight might imply. Besides the aforementioned standard finishes, the Hales is available in a number of optional finishes: natural cherry, stained cherry, and pau ferro. (I'm not exactly sure what that last finish is. Is it a wood from an exotic tree that grows only in Bali? Is it a new color that's been invented by the design world?) The point is that you can get these speakers in a finish that will blend in with virtually any shade and style of furniture.

The Hales Transcendence Eight contains an advanced crossover network that routes signals to a pair of 10-inch, proprietary aluminum-cone woofers, a 5¼-inch magnesium-cone midrange, and a 1-inch, aluminum-dome tweeter with low distortion.

Hales believes that its aluminum-cone woofers ensure excellent pistonic performance throughout their operating range. And the magnesium midrange cone was chosen because of its extremely high resonance frequency, which enables clean response within its designated bandwidth. Likewise, the aluminum-

Company Address: 16812 Gothard St., Huntington Beach, Cal. 92647; 714/841-6884; www.halesdesigngroup.com.

Photo: Michael Groen

dome tweeter is said to provide very extended, detailed treble with little or no audible grain or ringing.

The passive internal crossover contains metalized-film polypropylene capacitors, air-core inductors wound with oxygen-free copper wire, Vishay Dale resistors, and Cardas wire and connectors. The circuit topology is fourth-order Linkwitz-Riley; its electrical filter characteristics combine with the inherent rolloffs of the drivers to yield 24-dB/octave slopes.

Paul Hales uses essentially the same crossover in all his designs because he believes that a 24-dB/octave alignment is critical in achieving the most neutral timbre and best dynamic performance. Hales feels first-order, 6-dB/octave alignments may provide a theoretical advantage in terms of time and phase coherence but that they have real-world limitations that degrade timbre and dynamics. A 6-dB/octave slope necessitates significant sharing of program material by the various drivers in the system, which produces different driver dispersion patterns and consequent irregularities in off-axis response. Hales believes room reflections shape so much of the perceived timbre at the listening position that the smoother off-axis response of a properly designed 24-dB/octave crossover yields more genuine sonic benefit as well as better power-handling ability.

The Transcendence Eight's enclosure is a sealed box, tuned to 31 Hz. Specifications list a moderate sensitivity of 88 dB, a nominal in-room bandwidth of 22 Hz to 26 kHz, and a frequency response of 32 Hz to 26 kHz, ±1 dB. The MLSSA frequency response curve supplied by Hales shows a speaker that is virtually flat from 150 Hz to beyond 20 kHz, with a gradual downward slope in the bass extending to 20 Hz. This is designed to ensure flat in-room response. The manufacturer's cumulative spectral-decay response curves for the Transcendence Eight look excellent and suggest that the upper octaves are exceptionally clean.

The system's nominal impedance is 4 ohms, and the impedance curve is fairly complex. Coupled with its moderate efficiency, this means that the Hales Transcendence Eight requires a high-power, high-current amplifier.

The Hales design team apparently set five major sonic goals in developing the Transcendence Eight: accurate timbre, precise soundstaging and reproduction of even the most complex images, natural and unrestricted dynamics, unaffected and extremely deep bass with excellent transient characteristics, and, finally, fine resolution of detail free of etched or grainy qualities.

My listening tests demonstrated that Hales has done an outstanding job meeting all of these goals. I spent several months comparing the Transcendence Eight to my Dunlavy SC-Vs and Thiel CS7.2s in different listening rooms, as well as to the B&W 801 Matrix Series 3 and the Quad ESL-63. I used an assortment of electronics from Classé Audio, conrad-johnson, Krell, and Pass Labs; a VPI tonearm, TNT turntable, and a wide range of cartridges; and a mix of Mark Levinson and Theta Digital disc transports and D/A converters. Cables used were by Discovery, Dunlavy, Kimber, and Wireworld.

I found the Hales Transcendence Eight to be consistently excellent in virtually every respect. Indeed, I was struck by the fact that a review of this speaker needs to concentrate more on how to use it properly, system interaction, and how it compares to other excellent speakers rather than on the usual list of inherent design problems and timbral colorations.

I GOT SOME OF THE BEST BASS I HAVE EVER HEARD WITH THESE HALES SPEAKERS.

Let me begin with the bass. The Transcendence Eight may not be the biggest speaker around, but it can cleanly reproduce any bass spectacular I know of at levels high enough to meet any real-world listening needs. The physical characteristics of my listening rooms did more to shape and color the sound of the deep bass than the speaker itself.

There is nothing new about interactions between speakers and rooms. Most audiophiles are all too aware that listening rooms have a major impact on bass response even at frequencies well above 100 Hz. Further, I have discovered that room interaction is far more noticeable with those modern speakers that are able to deliver massive output and flat response down to the levels of the best subwoofers. While I still got some of the best bass I have ever heard with the Transcendence Eights, I could hear (and often feel) the impact of standing waves with each change in speaker location and listening position when the music had powerful content below 40 Hz.

As with all speakers possessing this kind of bass power, you need to carefully place the Transcendence Eights to obtain the smooth, deep, fast bass they are capable of producing. Hales provides some useful initial placement suggestions on its Web page, but I would recommend experimenting at length.

The deep bass performance of the Transcendence Eight is unusually amplifier-dependent; speakers like this require exceptional control from the amplifier to deliver top-notch response. The Transcendence Eight, however, is more amplifier-sensitive than the speakers mentioned above. If the amplifier doesn't have enough power and ability to maintain tight control in the deep bass, the Transcendence Eight's overall timbre can shift from rich to too warm. This, too, is an area that calls for experimentation on your part.

You also need to be a mite careful about speaker wire. I had no problems with Discovery, Kimber, and Wireworld cables, but some brands with matching networks or unusual impedence characteristics did affect amplifier/speaker interaction, sometimes reducing bass tightness and imparting excessive warmth or overhang. I'd use cables whose designers favor engineering basics rather than exotic design concepts.

The Transcendence Eight does, however, provide some compensations for this amplifier/cable sensitivity. I have never been able to determine from audio engineering handbooks why some speakers are more placement-sensitive in the deep bass than others. Thankfully, the Transcendence Eight is significantly less sensitive in this respect than the Dunlavy SC-V and VMPS Super Tower III Special Ribbon Edition; indeed, it's closer to the Thiel CS7.2—one of the easiest speakers to place that I have encountered. Life is a mix of trade-offs; you win some and lose some with even the best speaker systems.

The Transcendence Eight is remarkably clean and transparent. I could hear musical nuances in my recordings and in my components to a degree I have rarely heard before. And this was the first time I heard them without feeling they were a product of colorations rather than of improved resolving power. This transparency and musical resolution are among the real rewards conferred by recent improvements in speaker design. And the pleasure is compounded by the fact that the Transcendence Eights have so little apparent variation in vertical and horizontal dispersion in reasonable listening locations. Some of the most transparent speakers of past years have had radiating characteristics that severely limited where the listener could sit and greatly reduced imaging accuracy.

With the Transcendence Eight, I could exploit the resolving power and soundstage potential of my recordings and electronics to a level that had previously been possible only in parts of the frequency spectrum. The Hales achieved the amazing synergy of high-end electronics and program sources you get from speakers having exotic ribbon or electrostatic drivers. And it did so without the sudden changes in sound character that often occur in speakers that mix such drivers with dynamic woofers.

This is not to say that the Transcendence Eights are perfect or that other speakers do not compete in transparency and neutrality. Every top-quality speaker offers a slightly different range of musical details. You need to listen very carefully to a variety of such speakers to determine exactly which is the most musically convincing. I found that the Hales speakers were able to bring out additional information from recordings—in subtle ways that blended smoothly with the music's structure rather than the more obvious ways of other speakers.

The Transcendence Eight is similar to other reference-quality speakers in that its soundstage is significantly more neutral than that of earlier speakers. It reveals the soundstage present in the recording rather than imposing one of its own. Conversely, the Eight gives you more flexibility in creating the soundstage you like.

In the past, most speakers had dispersion characteristics that significantly restricted listening distance, listening height, or how far apart you could place them without getting a hole-in-the-middle effect. Design limitations also determined whether speakers' back panels should be parallel to the wall behind them or angled in toward the listening position. Most of today's systems let you fine-tune the soundstage by changing the distance between the speakers and the walls behind and to the sides of them, by altering the damping of the walls behind the speaker and behind the listener, and by adjusting the spacing and angle of the speakers.

I experimented with a variety of placements and discovered I could tighten or stretch the soundstage and get very different imaging by altering the angle of the Transcendent Eight's front panel. As I said above, Hales provides useful placement suggestions on its Web page, but experimention is always worthwhile. You may be surprised at how quickly you can achieve your notion of an ideal soundstage.

WITH THE HALES, I COULD HEAR MUSICAL NUANCES I HAD NEVER PREVIOUSLY HEARD.

And finally, we get to this speaker's timbre. The Hales Transcendence Eight is the fourth speaker I have reviewed in the last year—the others being the Thiel CS7.2, the Dunlavy SC-V, and the VMPS Super Tower III Special Ribbon Edition—that actually sounded as smooth and extended as the manufacturer's frequency response graphs suggested.

Each of these speaker systems has a distinctive timbre. The Hales Transcendence Eight's is warmer than the others'. This did not affect the smoothness of its response, its upper-octave clarity, or its musical detail. Its upper octaves were excellent and filled with musically natural information. Nevertheless, the Transcendence Eight's timbral balance and upper-octave energy tilted noticeably down relative to those of the VMPS, slightly down relative to the Thiel's, and moderately down compared to the Dunlavy's.

All else being equal, the effect of these timbral differences is somewhat similar to the effect you get by moving from the front to the back of a concert hall. But all things are not equal, especially when we're talking about recordings. The Transcendence Eight has a rich, full timbre that works well with recordings that have lots of upper-octave energy but may be slightly too warm with other discs. The practical problem is that there is no "right" timbre for music recordings. I can find plenty of discs in my collection whose inherent timbre is a perfect match for one or the other of these four speakers. For the same reason, no speaker sounds ideal with all my recordings.

This is good news in the sense that with today's best speakers, you are afforded the opportunity to choose the timbre you find most appropriate without having to sacrifice other aspects of performance. There is no reason one audiophile should choose the same timbre as another. Anyone who spends time listening to music in different halls and in different listening positions knows the variety of timbres present in live music and how changes in listening distance affect timbre regardless of the speaker. The bad news is that no reviewer can predict which speaker will be right for you. Nor will a quick and undemanding audition at a dealer give you an accurate picture of how the Transcendence Eight or any other reference-quality speaker will sound with a wide range of material.

I don't mean to exaggerate these issues. I don't see how you can go wrong with a speaker as excellent as the Hales Transcendence Eight. It is so good that it will likely perform well in any decent high-end system and especially well in a really good one. Of course, choosing between the Transcendence Eight and other first-rate speakers in the "year of the speaker" will require plenty of careful listening with a variety of different recordings.

Personal involvement is simply a fact of life if you want to build a great audio system. The better high-end equipment gets, the more your personal taste must dictate which mix of nuances is the most musically satisfying. As far as I know, God has never whispered which component is "right" into my ear, the ear of any other reviewer, or the ear of any dealer. Even if He or She did, there would be no reason to expect that message would apply to you. A

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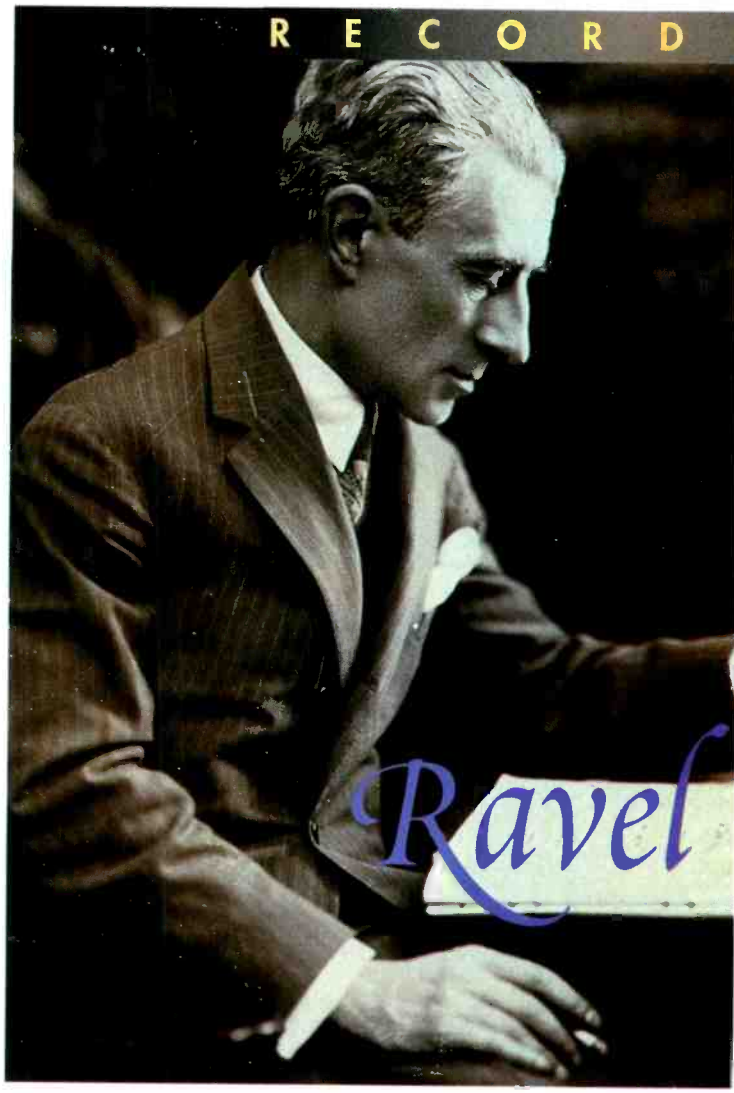

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Ravel: Piano Concerto in G Major, Valses Nobles et Sentimentales, and Piano Concerto for the Left Hand in D Major

Krystian Zimerman, piano; the Cleveland Orchestra (G Major and Valses) and the London Symphony Orchestra (D Major), Pierre Boulez
DEUTSCHE GRAMMOPHON
289 449213, DDD, 61:06
Sound: A, Performance: A

Maurice Ravel's (1875-1937) two major instruments were the orchestra and the piano. Although he composed for voice and created a few excellent pieces of chamber music, his greatest works were either for solo piano or large orchestra. Yet it was not until the 1930s that he composed the Concerto for Piano and Orchestra in G Major and the Concerto for the Left Hand in D Major. These were to be Ravel's last important compositions and what he considered his finest pieces.

Ravel toured America in 1928 and was strongly influenced by the jazz music he heard everywhere. So much of this can be heard in his G Major Concerto that many have dubbed it an homage to George Gershwin, who borrowed freely from jazz for his music. The first movement, in particular, contains many jazz elements, while the slow movement is more conservative and stately. The jazzy rhythms of the finale again remind us of Gershwin. (An oft-told story is that Gershwin so admired Ravel that he entreated the Frenchman to give him lessons. Ravel asked the American, "How much do you earn a year from your compositions?" When Gershwin answered, "About $100,000," Ravel's retort was, "In that case, you give me lessons.")

The Concerto for the Left Hand has a more serious genesis. Pianist Paul Wittgenstein lost his right arm in World War I but was determined to continue his concert career. He commissioned a number of prominent composers, including Richard Strauss, Sergei Prokofiev, and Benjamin Britten, to create works for the left hand alone. The greatest outcome from his campaign was the Ravel concerto. But its premiere was marred by Wittgenstein's tinkering with the music. When he insisted to Ravel, "Performers must not be slaves," the composer responded, "Performers *are* slaves." Ravel's "left-hand concerto" is dramatic and suspenseful, from its mysterious opening of basses and contrabassoon to its many passages of skillful interplay between the piano and orchestra.

This disc gives the listener an opportunity to compare two orchestras and two different concert halls. The Concerto for the Left Hand was recorded in Watford's Colosseum with the London Symphony Orchestra, whereas the Concerto in G Major used the Cleveland Orchestra in that city's much larger Masonic Auditorium. The constants are Ravel's music, the excellent pianist Krystian Zimerman, and that great interpreter of French music, conductor Pierre Boulez.

The engineers at Deutsche Grammophon skillfully minimized the differences between the two concert halls by using a large number of microphones placed close to the instruments. The sound is remarkably clear, and even the most delicate piano passages are never drowned out by the large orchestras. Although some listeners might prefer a more natural ambience and fewer microphones, many of Ravel's intricacies, often lost in live performances, are captured here. *Patrick Kavanaugh*

LIONHEART

Paris 1200
NIMBUS NI 5547, DDD, 73:54
Sound: A, Performance: A

Lionheart, a New York City-based a cappella sextet, travels back in time from its debut album (which was devoted to Tudor music) to perform the music of Paris when the Cathedral of Notre Dame was being built. The result is hypnotic and quite spiritual, the singing unforced and beautiful, and the recording appropriately warm and spacious. The CD's informative program booklet discusses the forms used: organum, motet, and conductus. Overall, an appealing, handsomely performed introduction to an ethereal repertory. *Rad Bennett*

HEAVENLY SPHERES

Heavenly Spheres

Studio de Musique Ancienne de Montreal, Christopher Jackson
CBC RECORDS MVCD 1121
DDD, 63:21
Sound: A–, Performance: A

As the Gregorian chant craze continues unabated, a substantial market for medieval and Renaissance music is blossoming. This disc, a fine example of the genre, captures the skill of Canada's premier Early Music vocal ensemble. These 13 singers from Montreal display the superb blend that results from long and diligent practice. Their expressive interpretations of Palestrina, Gombert, and Lassus are very convincing. They obviously perform these works because the music is beautiful, not because the pieces are academic examples of Early Music. The recording may contain too much reverberation for some listeners, but the richness of the choral sound makes up for the sporadic lack of clarity. *Patrick Kavanaugh*

Béla Bartók: Concerto for Orchestra, Three Village Scenes, and Kossuth

Slovakian Folk Ensemble Choir; Budapest Festival Orchestra, Iván Fischer
PHILIPS 456 575, DDD, 66:21
Sound: A–, Performance: A

The three orchestral works on this recording roughly correspond to three distinct periods of Béla Bartók's writing career. The 1903 symphonic poem "Kossuth" is a product of the composer's youth. Two decades later, a mature Bartók wrote "Three Village Scenes" for female voices and piano, orchestrating the work a few years later. Finally, the sublime Concerto for Orchestra is one of his last and greatest works. This popular showpiece for the modern orchestra often is performed with great enthusiasm but little interpretive thought. However, this performance, by the Budapest Festival Orchestra, brings out the authentic folk nature of Bartók's melodies and rhythms. Though he composed the work for an American orchestra (the Boston Symphony), this ensemble clearly remembers and celebrates Bartók's Hungarian roots. *Patrick Kavanaugh*

Donizetti: Lucia di Lammermoor

Andrea Rost, soprano; Bruce Ford, tenor; Alastair Miles, bass; London Voices; the Hanover Band, Charles Mackerras
SONY CLASSICAL S2K 63174, DDD, 2:16:47
Sound: A, Performance: A

This recording may completely change the way you think of *Lucia di Lammermoor*, Gaetano Donizetti's most famous work: It breaks through layers of moldy tradition to reveal a much better piece than what's usually found. It's a real groundbreaker, in the same league as Erich Leinsdorf's *Turandot* or Georg Solti's *Ring*. Original instruments are used to play the written notes, with little interpolation by the orchestral players or the members of the assured, youthful cast. Andrea Rost uses her considerable technique and lovely voice as a means to present a three-dimensional Lucia, a real character rather than the usual demented showoff. Everyone—and everything else—is just as right, with all bases covered on stage and in the pit. This makes *Lucia* a much better piece of music while still remaining good theater. The sound is on a par with the performance, exhibiting excellent clarity, good stage depth, and intelligent dramatic movement of characters. I'll still pull out Sutherland and Moffo for their stunning vocals, but when I want to hear the entire opera, I'll go straight to this magnificent recording. *Rad Bennett*

Field: Piano Concertos, Nos. 1 and 2

Benjamin Firth, piano; Northern Sinfonia, David Haslam
NAXOS 8.553770, DDD, 51:56
Sound: A–, Performance: A

Irish-born Romantic composer John Field (1782-1837) enjoyed a considerable reputation as both composer and pianist during his lifetime. He wrote seven piano concertos that bubble over with good humor and gentle spirit. With this release, Naxos starts a complete series of these concertos. Benjamin Firth, an ideal choice as soloist, provides readings that are gracious and genteel yet never frivolous; the slow movements are quite heartfelt but never banal. Firth is ably supported by David Haslam and the very good Northern Sinfonia. The recording, from something of a mid-hall perspective, is warm and transparent. *Rad Bennett*

J. S. Bach: French Suite No. 6 in E, Italian Concerto in F, The Well-Tempered Clavier, Book 1, and Prelude and Fugue in C; Bach (Arr. Liszt): Prelude and Fugue in A Minor; Bach (Arr. Busoni): Chaconne in D Minor

Fazil Say, piano
ATLANTIC 26124, DDD, 58:51
Sound: A, Performance: A+

This may seem like just another Bach recording for solo piano, but the careful selection of pieces reveals the composer's many facets. Most of these works were written for the harpsichord or clavichord, but the famous Chaconne was originally a violin solo. Although most are directly from Bach's pen, two are transcriptions of renowned pianists and Bach interpreters, Franz Liszt and Ferruccio Busoni. The unifying factor in this recording is Fazil Say's outstanding touch. His playing is so natural that he seems to be enjoying himself throughout these demanding works. His interpretations are unpretentious, but he makes sensitive use of a very wide dynamic range. Some may desire Bach with an arsenal of baroque super-ornamentation, but for those who prefer a graceful touch to hundreds of grace notes, this recording is superb. *Patrick Kavanaugh*

Mahler: Symphony No. 2 ("Resurrection")

Dallas Symphony Orchestra and Chorus, Andrew Litton
DELOS DE 3237, two CDs, DDD, 82:55
Sound: A, Performance: A

Gustav Mahler's symphonies are exhausting to perform and enigmatic to record. To balance the gargantuan orchestra of his Second Symphony—which includes many additional woodwinds and percussion plus organ, chorus, two solo singers, and offstage brass—is a major challenge for any conductor. To clearly differentiate between all these forces is also a formidable task for a recording engineer. Here, both conductor Andrew Litton and engineer John Eargle produce excellent results and are further supported by the remarkable acoustics of McDermott Hall in Dallas. The orchestra (especially the brass) plays the work with gusto, but the greatest moment of the recording occurs when the chorus enters. The effect is ethereal, almost otherworldly, a fitting interpretation of Mahler's spiritual opus. *Patrick Kavanaugh*

ROCK~POP RECORDINGS

Photo: ©Olaf Heine

Who Else!

Jeff Beck
EPIC EK 67987, 53:59
Sound: A, Performance: A+

Jeff Beck has been the most consistently imaginative and exciting guitarist in rock since Jimi Hendrix. Beck is a genuine virtuoso, and his playing is always so proficient and adventurous that it truly results in the "sound of surprise" that every jazz artist aspires to. The fact that he records and tours so infrequently has only added to his growing mystique.

As Beck's first solo recording project since 1988's *Jeff Beck's Guitar Shop*, *Who Else!* surfaces as an astounding six-string showcase that goes well beyond chops to a place where conviction, vision, and technical mastery meet. It is every bit as vital and refreshing a statement as his breakthrough solo release, *Truth*, was more than 30 years ago.

Beck works his signature licks into a variety of contexts on this album. He's clearly been invigorated by the energy and pulsating rhythms of the drum-and-bass techno movement, as heard on raging tracks like "Psycho Sam" and "THX138." On "Blast from the East" there's a tinge of the Middle Eastern influence that has marked his solos since 1966's "Over Under Sideways Down" with The Yardbirds. He returns to those same Yardbirds roots with a scorching "Brush with the Blues," which is full of bravado bends, swooping whammy bar inflections and glissandi, and biting finger-picked statements as idiosyncratic as Hubert Sumlin.

The performer's legato, lyrical approach to the ballad "Angel (Footsteps)"—every bit as poignant as his classic reading of "Because We Ended As Lovers"—carries a depth of emotion and a sense of organic phrasing normally associated with jazz saxophonists, not rock guitarists. Beck's playing on the Celtic-flavored "Declan" is wistful, while his ferocious fretboard work on the adrenaline-pumped opener "What Mama Said" and on "THX138" stands with the best of younger rock guitar virtuosos Steve Vai, Eric Johnson, Joe Satriani, and the like.

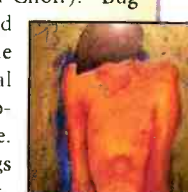
With the beautiful unaccompanied "Another Place," Beck closes out this dynamic collection in a rather subdued but still dramatic fashion. Awesome. *Bill Milkowski*

THE BLUE ALBUM

13
Blur
VIRGIN 7243 4 99129, 66:50
Sound: A–, Performance: A–

There is no pop band more ambitious than Britain's Blur. Consistently challenging itself and changing its approach to its humble craft, Blur has been a trippy Manchester group, a provincial Brit-pop band in the quaint Kinks tradition, a Pavement-inspired guitar ensemble, and now an experimental outfit modeled after '70s German avatar Neu. All filtered through the snot-nosed antics of singer Damon Albarn, who has a keen sense of melody and an even keener sense of mischief.

Produced by William Orbit, *13* is a schizophrenic album. It begins with the nearly Queen-esque "Tender," which is stacked with thick harmony clusters (provided by the London Community Gospel Choir). "Bugman" follows and changes tack, as the guitars marshal real force and Albarn's vocals are left in space. "Coffee & TV" chugs with a Velvet Underground rhythm that loosens up to swing once harmonies from the Crosby, Stills, and Nash songbook are added. By what would be in the old days the album's second side (for as experimental as they are, these guys are traditionalists at heart), Blur abandons strict song structure and goes swimming in a saucy mix of "lo-fi" guitar tones and atmospheric jams.



It is with great pleasure that I say, Blur, we hardly know you.

Rob O'Connor

Up Up Up Up Up Up

Ani DiFranco
RIGHTEOUS BABE RECORDS
RBR 013, 61:58
Sound: B+, Performance: A–

Ani DiFranco, 28-year-old queen of indie folk-punk, is a phenom. Thanks to her tremendous talent and feisty determination, she managed to sell more than 2 million CDs through her own tiny record company, Righteous Babe Records. Go, grrrrl!

Up Up Up Up Up Up marks a departure for DiFranco, as she's finally put together an actual working band. Perhaps that gave her the confidence to record live in the studio, with minimal overdubbing, and still crank out a disc full of electrically charged patterns and sounds. Though her attitude is usually turned up to "11," the more annoying extremes of her hyper edge are gone and her goofy side is held in check. She lets her guard down on "Angry Anymore," which isn't so much about rage as humility and letting go. DiFranco's signature jagged rhythms are cradled in thick, funky keyboards and a supple rhythm section, so she's looser and having more fun than ever.

DiFranco's vocals are immersed in the mix, yet she's really stretching her whisper-to-a-scream voice. *Up Up Up Up Up Up* finds her belting out songs of sexual politics, anger, and love. She's trying to make sense of the world around her—and doing a damn fine job of it, too. *Steve Guttenberg*

The Unauthorized Biography of Reinhold Messner

Ben Folds Five
EPIC/550 MUSIC, 40:35
Sound: A–, Performance: A–

Young fans of the raucous, fun-loving Ben Folds Five should know this: The group's latest album isn't the ivory-pounding, bass-guitar-thumping pop of previous efforts. Instead, *The Unauthorized Biography of Reinhold Messner* (see the CD booklet for an explanation) is filled with layered arrangements, lush orchestration, and, generally, a more—and this is tough to say—"mature" feel.

The opener, "Narcolepsy," starts out in typical Ben Folds fashion, with a classical piano riff that is soon joined by Robert Sledge's booming bass. But then the violins kick in, and it becomes apparent that things are a bit different. The next track, "Don't Change Your Plans," couples a simple melody with textured strings and Burt Bacharach-style horns.

Even the group's usual smart-ass lyrics are muted, as on drummer Darren Jesse's downright romantic "Magic": "You're the magic that holds the sky up from the ground/You're the breath that blows these cool winds 'round." Switching gears midway, "Your Most Valuable Possession" is an electric-piano jam set behind an intriguing answering-machine message from Folds's father (which kind of makes you wonder about Pop).

Overall, *Reinhold Messner* is a satisfying set that should broaden this talented trio's appeal. *Scott Van Camp*

Shades, 1968-1998

Deep Purple
RHINO R2 75566, four CDs, 5:02:46
Sound: B to A–, Performance: B+

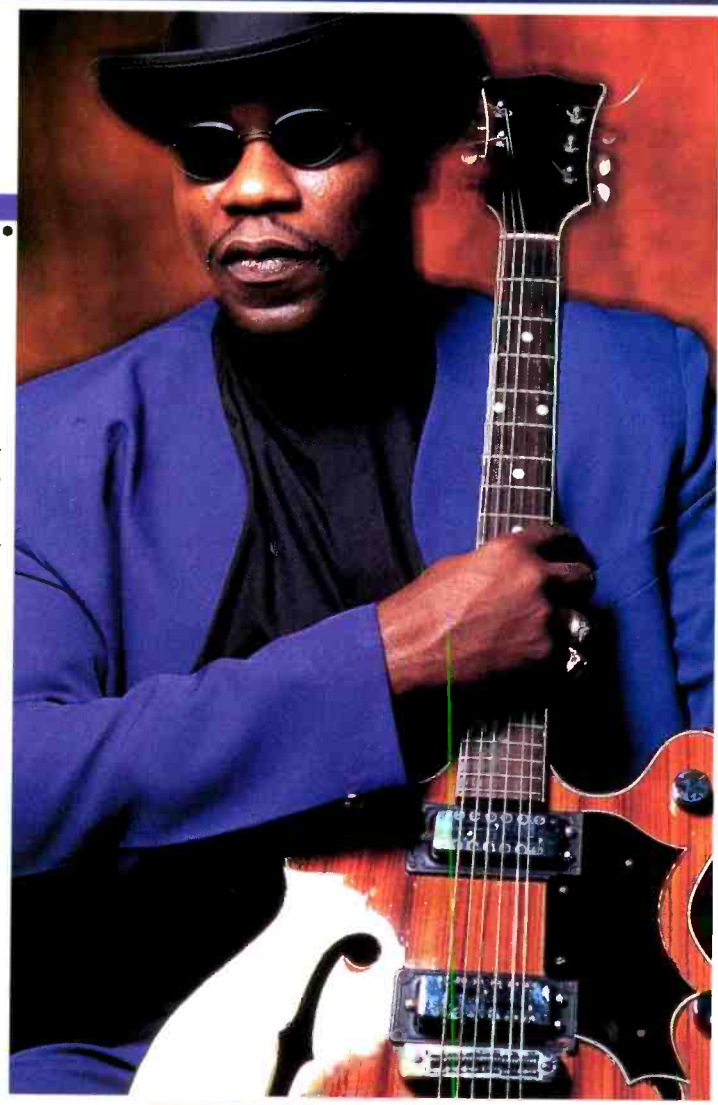
In its '70s arena heyday, Deep Purple earned the dubious distinction of being cited as the "World's Loudest Rock Band" by the *Guinness Book of World Records*. And undoubtedly, no other stentorian rock 'n' roll band—including Led Zeppelin and Black Sabbath, with whom Purple drafted the blueprint for heavy metal—deserved the *Guinness* citation more than this classic five-piece group. The net result of guitarist Ritchie Blackmore and Hammond organist Jon Lord's constant battle for more stage volume was something akin to 120-decibel paeans for the ol' horned one himself. Or so it seemed.

Through the din, however, it is Deep Purple's headbanger-friendly stylings—and seemingly odd mix of Lord's R&B roots and Blackmore's neoclassicism—and not so much its amplitude that serve the band's legacy best. Rhino's retrospective, *Shades, 1968-1998*, encapsulates Deep Purple's 20-album, 30-odd-year career on four discs probably as well as could be expected. As is typical of Rhino, hits, highlights, and rarities (including two little-known tracks acknowledged as the band's oldest recordings) are included, and every incarnation of Purple (personnel changed often) is represented. Unfortunately, Blackmore's mid-'70s replacement, the late and equally virtuosic Tommy Bolin, is heard on only two tracks; unquestionably, his talent warrants more than footnote-size representation.

Overall, *Shades, 1968-1998* and its accompanying book of excellent essays and photos are excellent and enjoyable testimony to Deep Purple's talents. *Mike Bieber*

JAZZ & BLUES recordings

Rising Son
Big Bill Morganfield
BLIND PIG
BPCD 5053, 42:48
Sound: A–, Performance: A



Did you follow in your daddy's footsteps? Take over the old man's business? Try your hand in his field? Big Bill Morganfield did. The 43-year-old son of McKinley Morganfield, a.k.a. Muddy Waters (one of postwar blues' most enduring talents), would make his daddy's heart swell with pride were he alive today. Why? Because the younger Morganfield's debut, *Rising Son*, is one of the most enjoyably diverse and entertaining deep blues records of the year.

Oddly enough, it was not until after his father's death in 1983 that Big Bill, a teacher by trade, even considered music as a line of work. Though he hadn't been brought up by his daddy, the blues had smoldered within him, and when he started writing his own songs six years later, that heat poured forth like molten steel. From that pool, Big Bill began forging gritty, dignified blues. His songs are, like his father's, full of the classic Chicago and Delta styles' spirit, heritage, and depth.

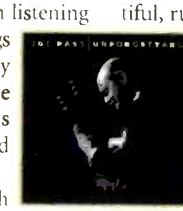
Fifteen years after picking up the guitar, Big Bill has released *Rising Son*, supported by The Muddy Waters Band—Pinetop Perkins on piano, "Big Eyes" Smith on drums, Bob Margolin on guitar, and Paul Oscher on harmonica—and Chicago blues legend Robert Stroger ("Sunnyland Slim") on bass. Recorded in Chicago and produced by Margolin, the record features an array of ragged chestnuts, from Willie Dixon's desperate classic "The Same Thing" and Chester Burnett's growling "Baby How Long" to Muddy's own cheeky, finger-poppin' "Champagne & Reefer" and his gorgeous ensemble blues "Screamin' & Cryin'."

Throughout, Big Bill's vocal delivery is scrappy and genuine, as is his guitar playing, especially on the screaming-slide title ballad that closes the record. Equipped with his father's guitars and touring rig, Big Bill embodies the same dusty spirit of his forebears. If there's any doubt about that, check out his own composition "Left Hand Blues." Here, he sings with the same quivering depth and bone-chilling bass moan his daddy made famous on "Mannish Boy" and "Hoochie Coochie Man" and with the same kind of sentiment ("Standin' at the crossroads, fell down on my knees") you'd have heard back in 1940. Credit also certainly

JOE PASS

Unforgettable
PABLO PACD-2310-964, 58:12
Sound: A, Performance: A

Nary a guitarist exists who hasn't come close to experiencing nirvana when listening to Joe Pass's recordings. His voicings and uncanny ability to place melody on top of chord on top of bass line put him in a class by himself. He was responsible for elevating jazz and pop guitar to a new level.



Pass (1929-1994) recorded with small groups and large orchestras. But it was as a solo artist that he set the standard. Throughout the 17 tracks on *Unforgettable*, he is lead guitar, rhythm guitar, bass, and drums all rolled into one. His timing is metronomic, while his bursts of melody and harmony—though spontaneous—are perfectly placed. *Unforgettable* captures Pass's romantic side with indelible performances of such standard ballads as "My Romance" (handled in a beautiful, rubato fashion), "I Can't Believe You're in Love with Me" (featuring his signature walking bass line), and "Isn't It Romantic" (as a lilting jaunt).

Collectors will enjoy the quantity of unreleased material now available posthumously through the Pablo label. For those unfamiliar with Pass's solo recordings, *Unforgettable* is as fine a place as any to begin checking out this bona-fide virtuoso.

James Rozzi

goes to The Muddy Waters Band and producer Margolin for fleshing out Big Bill's nascent ideas and adorning his material with all the rickety trappings of an authentic Chicago session. But ultimately it's Big Bill's innate inspiration, his flawless pedigree, that enables him to pull the blues from deep within his soul and lets us have it good. *Bob Gulla*

Jim Hall & Pat Metheny
TELARC CD-83442, 74:01
Sound: A, Performance: A+

This intimate conversation between two of the greatest guitarists of their generations—Jim Hall is 69, Pat Metheny 44—is far more revealing and rewarding than most guitar-hero encounters. The two are on equal footing here and inspire each other to great heights. Their meeting was inevitable and their chemistry profound.

Both guitarists are known for their warm and appealing tone, uncommonly lyrical quality, and willingness to push the envelope into musically adventurous territory. Metheny's penchant for penning poignant, sublimely moving ballads shows up here in "Farmer's Trust," "Don't Forget," and the darkly fragile "Ballad Z." Hall, meanwhile, has a particular fondness for elegant, buoyant jazz waltzes, such as "Waiting To Dance" and "Lookin' Up." The two swing unabashedly on Steve Swallow's "Falling Grace," a particularly good vehicle for Metheny's signature legato solo style, and they take the greatest of liberties with "All the Things You Are," embellishing the familiar theme with endless variations and some near-telepathic interplay while never drifting from the implied swing feel.

There are no real surprises here, save for an original arrangement of "Summertime" driven by Metheny's "Pinball Wizard"-esque power strumming on acoustic guitar. But from start to finish, this summit is superb. *Bill Milkowski*

Lotus Flower
Steve Turre
VERVE 314 559 787, 61:18
Sound: B+, Performance: B+

At the tender age of 18, Steve Turre was already gigging with Rahsaan Roland Kirk; by the early '70s, while in his 20s, he was lending his talents to Van Morrison, Santana, and Ray Charles. Over the next decade Turre's trombone would be heard mostly in a pure jazz context with Art Blakey, Woody Shaw, and The Thad Jones/Mel Lewis Orchestra. In the mid-'80s he began a 14-year stint with the *Saturday Night Live* band. The man gets around.

Lotus Flower isn't just another star-studded studio date; this time Turre's fronting his sextet, which has hung together since 1991. His uncluttered arrangements keep the strings out front, where the graceful presences of Regina

Carter's violin and Akua Dixon's cello consistently roll out a swinging set of pleasures. Just listen to the way the strange beauty of Kirk's "The Inflated Tear" seems to ooze out of your speakers as the strings swoop gently around mysterious turns and Turre's 'bone slithers through the night. The band keeps things nice and dark through much of *Lotus Flower*, but sparks emerge on the strong originals "The Chairman of the Board" and "Blackfoot," when Turre's whimsical growls and joyous leaps curl around his ravishing rhythm section.

Turre's fluency makes it all seem so easy. His uncompromisingly charming music will sweep you off your feet. *Steve Guttenberg*

Jazz in Film
Terence Blanchard
SONY CLASSICAL SK 60671-S2, 68:19
Sound: B, Performance: A

Since hooking up with filmmaker Spike Lee on *School Daze* (1987), trumpeter Terence Blanchard has written the music for a number of films, including highly evocative scores for Lee's *Jungle Fever* (1991), *Malcolm X* (1992), and *Clockers* (1995). Now Blanchard has put together a tribute to movie music with *Jazz in Film*, a set of new arrangements and extrapolations of themes from classic American movies.

This project reunites the Blanchard/[Donald] Harrison band, which emerged in the early '80s and earned critical acclaim before breaking up by the end of the decade. The band is joined by Joe Henderson on tenor sax, Steve Turre on trombone, and a full orchestra

to perform themes from *A Streetcar Named Desire* (composed by Alex North), *Anatomy of a Murder* (Duke Ellington), *Taxi Driver* (Bernard Herrmann), *The Pawnbroker* (Quincy Jones), *The Subterraneans* (André Previn), and *The Man with the Golden Arm* (Elmer Bernstein). Blanchard's own dark-hued theme from *Clockers* fits in nicely with this lush material.

The late pianist Kenny Kirkland is prominent on the hauntingly beautiful theme from *Chinatown* (Jerry Goldsmith), while Henderson shines on the album's rarest gem, a bit of Ellingtonia entitled "Degas' Racing World," written for a documentary on Edgar Degas' paintings of a French equestrian track.

Dreamy, noirish music with some scintillating, emotive solos. *Bill Milkowski*

DVD REVIEWS

THE PINK PANTHER

The Pink Panther *1963; no rating.* MGM 907041, 115 minutes
Picture: A–, Sound: A–, Content: A–
A Shot in the Dark *1964; PG rating.* MGM 907501, 102 minutes
Picture: A, Sound: A–, Content: A
The Pink Panther Strikes Again *1976; PG rating.* MGM 907503, 103 minutes
Picture: A–, Sound: A–, Content: A
Revenge of the Pink Panther *1978; PG rating.* MGM 907502, 99 minutes
Picture: A, Sound: A–, Content: B

All are two-sided (one side approximately 2.35:1 aspect ratio, other side 1.33:1 pan and scan); English and French Dolby Digital two-channel mono; English and French subtitles; includes trailer; $24.98 each.

Jet Pink: The Pink Panther Cartoon Collection *1960s-90s; one-sided (1.33:1 aspect ratio); English Dolby Digital two-channel mono; English and French subtitles.* MGM 907435, 51 minutes, $24.98.
Picture: A, Sound: A–, Content: B

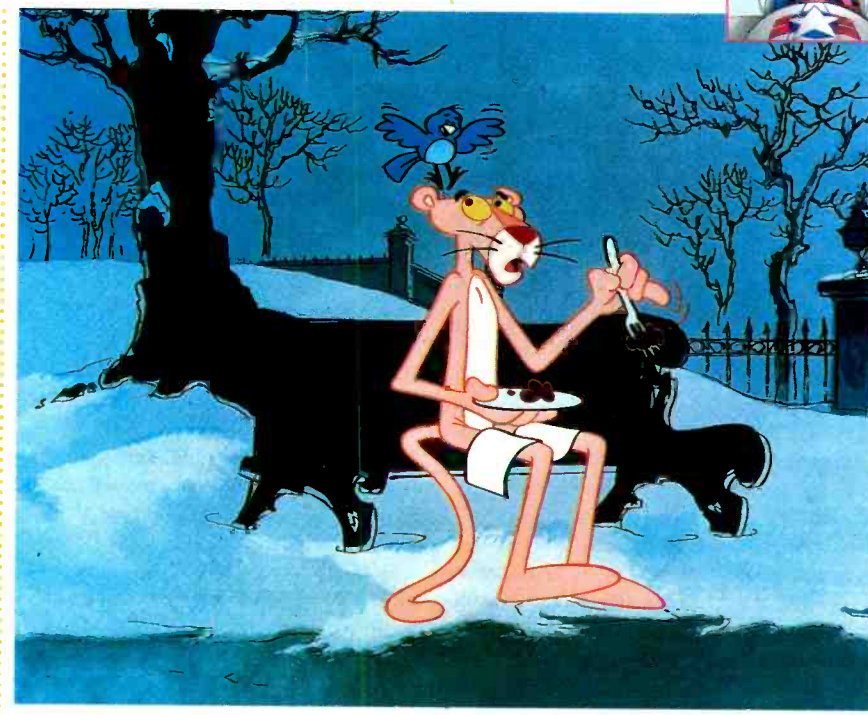


Photo: ©Archive Photos

When director/writer Blake Edwards took on the direction of *The Pink Panther*, a crime caper with an international cast including David Niven, Capucine, Robert Wagner, and Claudia Cardinale, he made three decisions that were to have long-range consequences. One was to hire Looney Tunes animators Friz Freleng and David DePatie to create the Pink Panther cartoon character who would catsonify the shadowy shape of a panther seen in the prized jewel for which the animated feline was named. Then Edwards allowed these animation geniuses to create an opening title sequence that ran 7½ minutes, the average length of animated cartoons of the period. Audiences were so taken with it and the buzz was so enthusiastic that many came to see the movie simply to laugh hysterically at that opening. It was decided that each movie in the series would open with the same sort of extended animated credit sequence. The Pink Panther character is featured in all but *A Shot in the Dark*, where he is temporarily replaced by an animated Inspector Clouseau. The Pink Panther went on to star in more than 175 featurettes of his own, eight of which have been rather haphazardly put together in the skimpy, yet entertaining, 51-minute *Jet Pink* collection.

A second important decision was to hire Henry Mancini as composer. He created a jazzy theme, conveyed by a breathy saxophone solo, that was to become instantly recognizable by what I would guess to be almost 100% of the waking, hearing world. Watching four Pink Panther movies on DVD back to back, I found it fascinating to hear how Mancini was able to use this simple theme over and over yet, by re-orchestrating and rearranging it ever so slightly, have it sound fresh and vital. Mancini and various lyricists also provided a hit song for each movie, which would usually be worked into the soundtrack. Mancini never won an Academy Award for this music, but he did get worldwide recognition and acclaim.

The third consequential choice was the casting of Peter Sellers as the inept French detective Jacques Clouseau. His ensemble role in the first movie as the bungling sleuth was rapidly spun out as a starring one in *A Shot in the Dark*, and over time his name became synonymous with that of the Pink Panther. People forgot the jewel entirely: A Pink Panther movie meant Clouseau, and that meant Sellers; the complete failure of a movie with the talented Alan Arkin playing the role proved that. Viewer acceptance of Sellers' comic genius in the first two movies was so great that most people were willing to forgive the actor's increasingly self-conscious mugging and overdone accents that marred the later films.

MGM has given us a welcome summertime Pink Panther/Peter Sellers/Henry Man-

cini festival on DVD by releasing the first, second, fourth, and fifth in the Blake Edwards series. (To the best of my knowledge, MGM doesn't own the rights to the third movie, *The Return of the Pink Panther*, which in 1975 brought back the David Niven jewel-thief character, this time played by Christopher Plummer.) On DVD, the four movies are in something close to the original PanaVision aspect ratio and in an obviously cropped pan-and-scan version. The prints and transfers for *A Shot in the Dark* and *Revenge of the Pink Panther* proved quite good, but there were some digital artifacts noticeable in *The Pink Panther* and *The Pink Panther Strikes Again* seemed not quite as sharp. The mono sound of all four titles is wide-range and does justice to Mancini's music. The PanaVision trailers for the first two movies are the originals; they were separate productions of their own and contained animated footage not seen in the feature titles themselves.

Full marks to MGM for not issuing *Trail of the Pink Panther* or *Curse of the Pink Panther*. Released after Sellers' death, these sad efforts combined old outtakes with new footage in a blatant attempt to cash in on the series' popularity. *Rad Bennett*

The Abbott and Costello Show, Volumes 1 and 2 *1952-53; no rating; black-and-white; one-sided (1.33:1 aspect ratio); Dolby Digital two-channel mono; no subtitles.* SHANACHIE 401/402, 110 minutes each, $24.98 each
Picture: A, Sound: A–, Content: A–

Bud Abbott and Lou Costello were at the peak of their movie careers as a comedy duo at Universal Studios when they starred in their own half-hour television show. The sitcom, set in a typical TV city neighborhood, served as the forum for some of the team's hilarious sight gags and as a showcase where they could reprise and expand such classic routines as "Who's on First" ("Actor's Home" episode, Volume 1) and "Getting a Job Loafing" ("Getting a Job" episode, Volume 2).

The episodes were preserved on 35mm film and, as transferred to DVD, look just like quality black-and-white film of the period. The sound is robust.

The shows are extremely funny; Abbott and Costello's inimitable comedy is still enjoyable today, almost 50 years later. And the classic routines can be cued quickly using the simple, color-coded menus. *R.B.*

Jerry Lee Lewis: The Story of Rock and Roll *1991; no rating; one-sided (1.33:1 aspect ratio); Dolby Digital 5.1.* PIONEER ARTISTS 98-590-D, 60 minutes, $24.98
Picture: A–, Sound: B+, Content: A

Through performance clips, newspaper headlines, radio broadcasts, and interviews, this short film by D. A. Pennebaker and Chris Hegedus tells the story of Jerry Lee Lewis and his music. Through all the changes in the decades he influenced, the rockabilly music proves timeless and indestructible. The way the audiences dressed in the late '50s is certainly different by the time of the 1969 Toronto Rock and Roll Revival, but everybody reacts to this music with the same unabashed enthusiasm. Good video transfer of the period footage and serviceable location sound further enhance the package. This is one of the most downright enjoyable artist profiles on DVD so far. There's a "Whole Lotta Shakin' " on this release. *R.B.*

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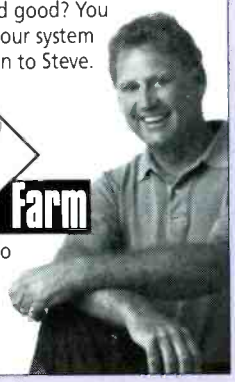

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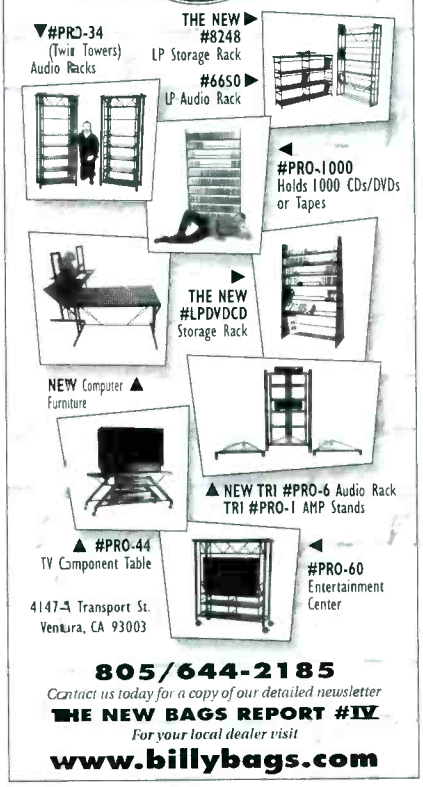

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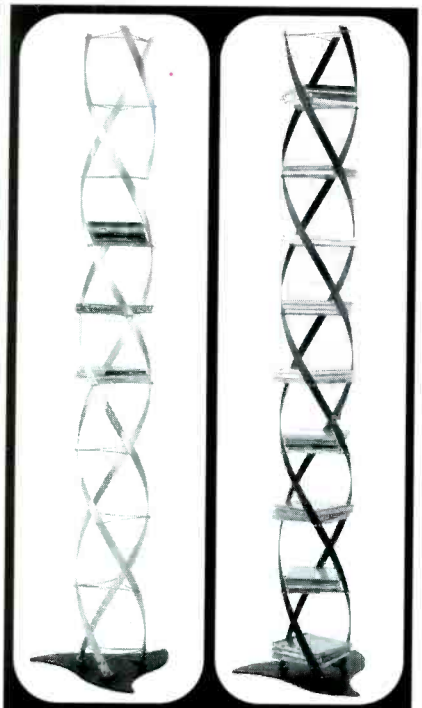

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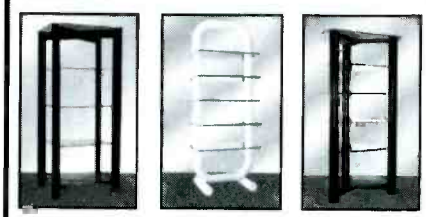

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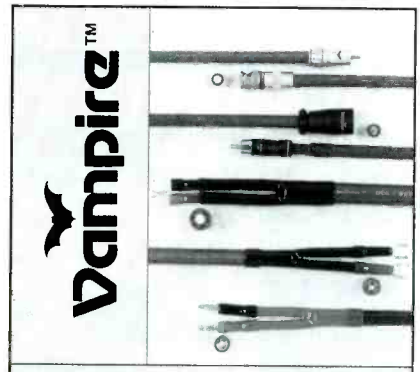

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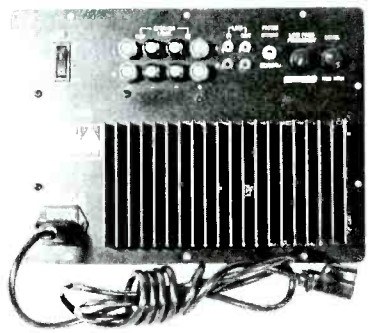

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PlayBack

Polk Audio Signature Reference Surround Speaker

In all the years I've been using Polk's Signature Reference Theater (SRT) home theater speakers, my only complaint has been that its surround speakers did not match its three front speakers' frequency range or their ability to re-create sound fields precisely. With Polk's new Signature Reference Surround Speakers, however, the SRT system can get the best from even the most demanding Dolby Digital and DTS soundtracks.

The Signature Reference Surround Speaker is shallow enough for wall mounting, but its rated response is 3 dB down at a solid 65 Hz and extends above 20 kHz. Its timbre matches that of the SRT main and center speakers because its four 5¼-inch Dynamic Balance woofers and two 2½-inch Tri-Laminate dome tweeters are identical to theirs.

All the drivers are on the front panel, but differences in tweeter phasing produce a broad, stable sound field; this provides the dispersed ambience you need for most surround effects and music. Yet you are also able to get the directionality needed for movie action sequences, thanks to the same Stereo Dimensional Array (SDA) technology Polk uses in the SRT's left and right front speakers. By canceling interaural crosstalk, SDA makes imaging more precise, expands the apparent soundstage, and minimizes room problems. A control box and remote enable you to vary the SDA effect.

Demanding (and very wealthy) audiophiles may be tempted to use the same SRT speakers for surround that they use in their main channels. But the Signature Reference Surround Speakers offer better dispersion and cost considerably less ($1,200 per pair, including SDA controller). It's an excellent choice for anyone seeking the best in surround sound for music or home theater. (**Polk Audio:** 5601 Metro Dr., Baltimore, Md. 21215; 800/377-7655; www.polkaudio.com.) **Anthony H. Cordesman**

B&W WP1 Indoor/Outdoor Speaker

The B&W WP1 is a nice-sounding, versatile loudspeaker that won't take up much space or, at $550 per pair, a big chunk of your budget.

Measuring 11 inches tall x 7 inches wide x 9½ inches deep, each WP1 contains a 5-inch Kevlar woofer and a 1-inch metal-dome tweeter designed for outdoor or indoor use. The cabinet, available in black or white plastic, has a perforated metal grille. Instead of ports, which could admit water, the WP1 has a pair of rectangular passive radiators, one on each side of the cabinet, behind protective grilles. Removable mounting brackets are included. The 8-ohm speaker's rated frequency response is 70 Hz to 20 kHz, ±3 dB, and it's recommended for amplifiers rated at 25 to 100 watts per channel.

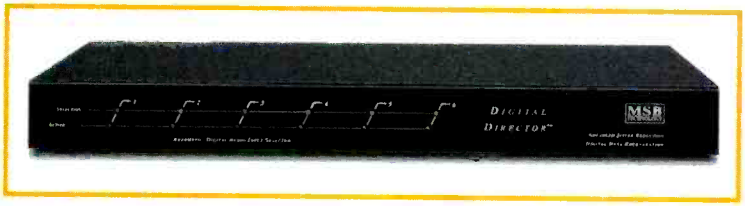
Outdoors, in a bathroom, and in a humid sauna, these B&W speakers worked fine. They sounded definitely hi-fi in my music system, despite their rigid grilles. And the mounting brackets should make it easy to put the WP1s on your room's side walls if you use them in your home theater as surround speakers.

If you want to maintain your audiophile credentials when listening to music in the great outdoors, the B&W WP1 definitely merits your consideration. (**B&W Loudspeakers:** 54 Concord St., North Reading, Mass. 01864; 978/664-2870; www.bwspeakers.com.) **John Gatski**

MSB TECHNOLOGY DIGITAL DIRECTOR

Does your music or home theater system have too few digital inputs? MSB Technology's Digital Director will alleviate that problem and reduce jitter besides, all for a modest price of $199 in silver or $320 in black. A priority switching system automatically selects signals based on which inputs are active. Naturally, you must unplug one of your existing sources to free up a jack for the Digital Director to feed into, but its four coaxial and two Toslink inputs will accommodate that source and four others. The MSB also has three digital outputs, a Toslink and two coaxials, so you can feed a digital recorder as well as your D/A converter or Dolby Digital decoder.

By regenerating the digital clock signal, the Digital Director reduces signal jitter by up to 99.99%, according to MSB. In my system, its sound compared favorably with that of most other affordable jitter-reduction devices I've auditioned—no sonic magic but cleaner low-level transients, better harmonics, and sometimes a bit better bass. This was most apparent with laserdisc players, but I could hear at least a slight improvement with most older CD players and transports. Nice job! (**MSB Technology:** 14251 Pescadero Rd., La Honda, Cal. 94020; 650/747-0400; www.msbtech.com.) **Anthony H. Cordesman**



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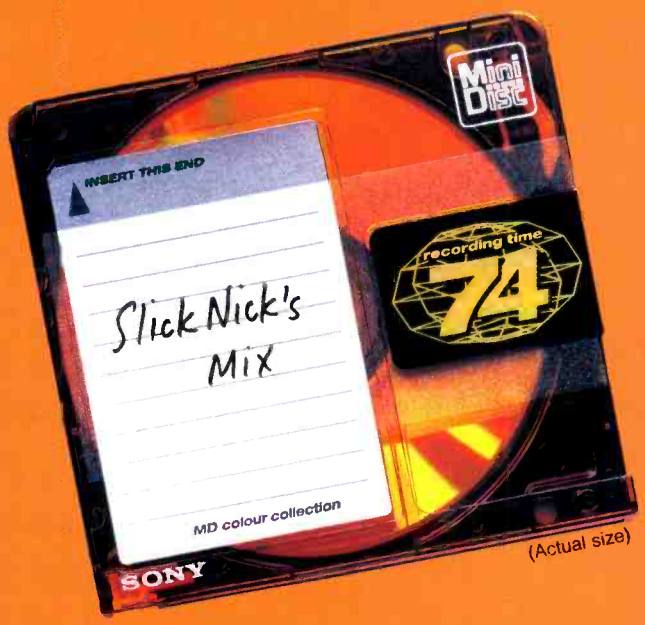

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