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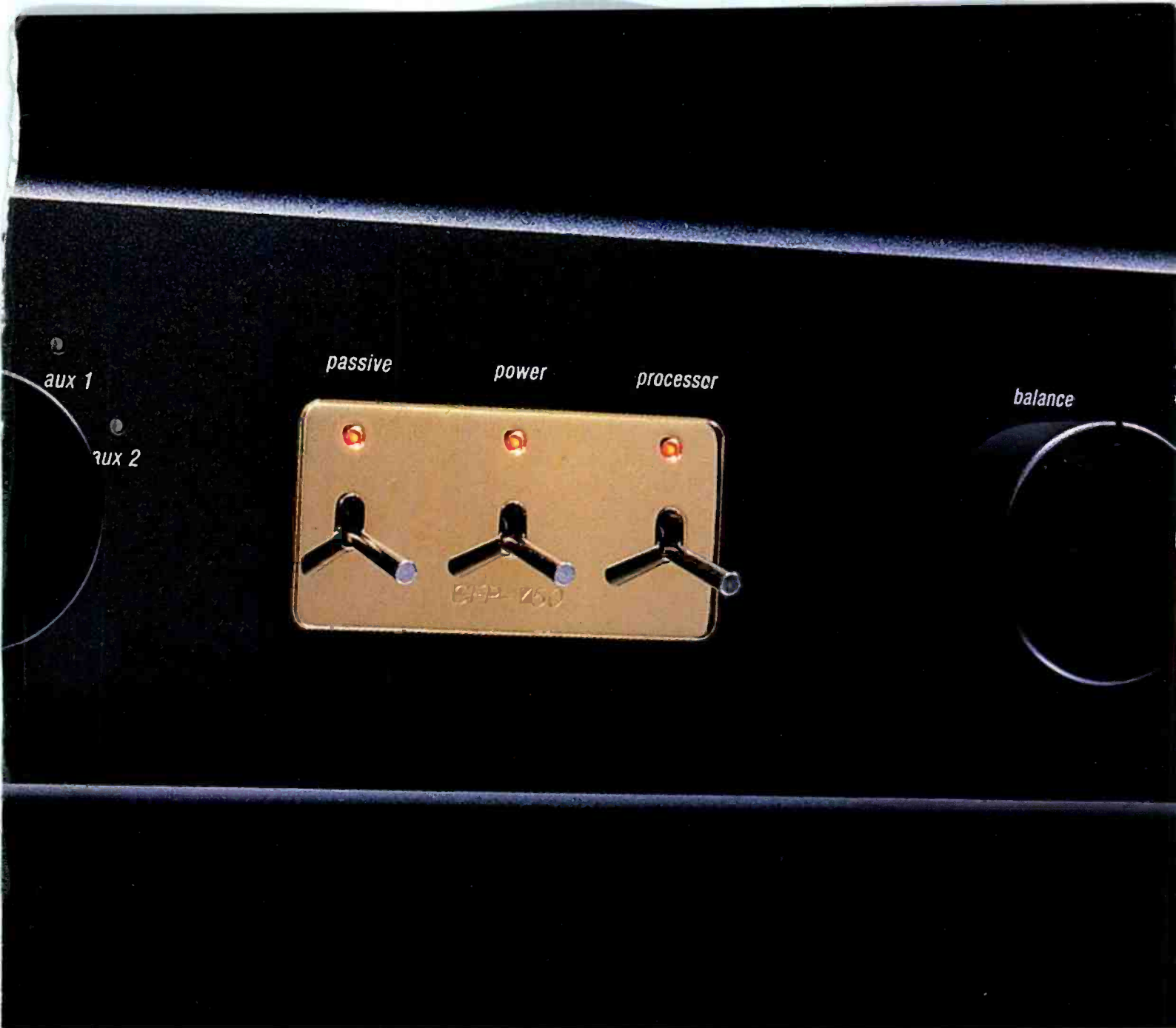
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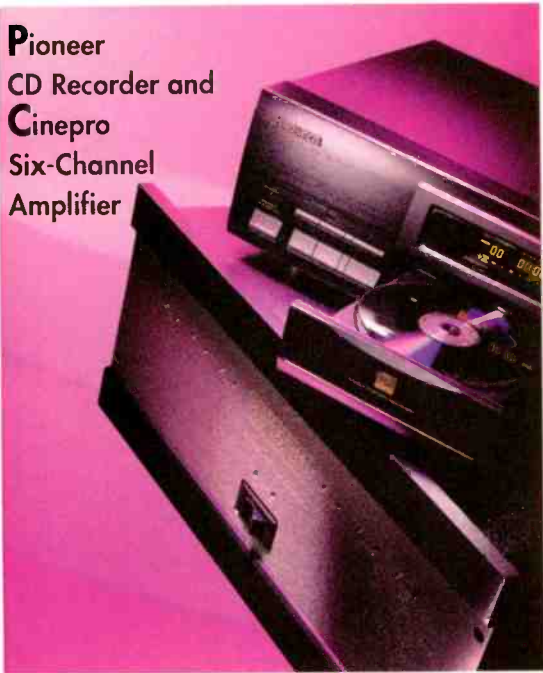
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THE EQUIPMENT AUTHORITY



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Pioneer
CD Recorder and
Cinepro
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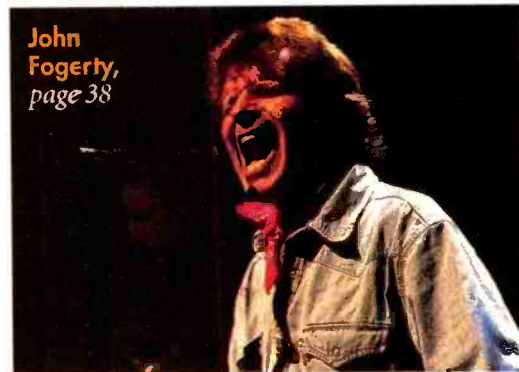
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1633 Broadway, New York, N.Y. 10019
Editorial E-Mail: audiomag@aol.com

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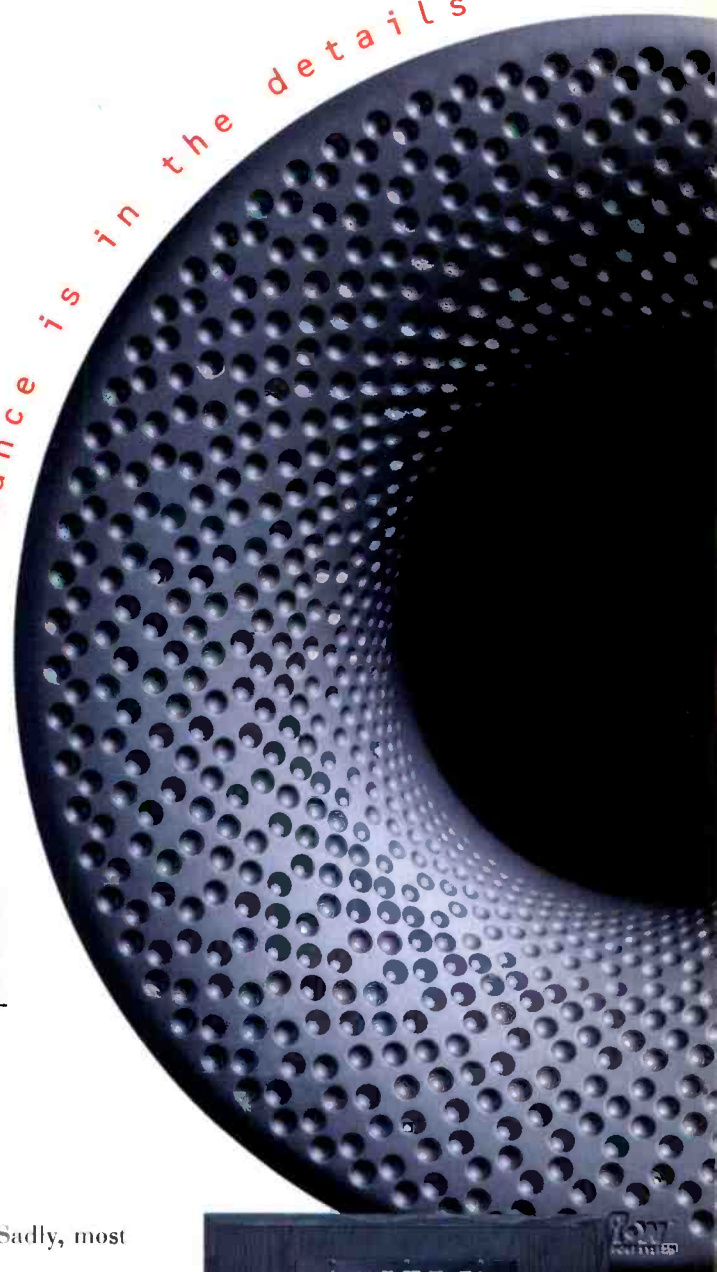


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I had an unusual opportunity this summer to attend the world's largest consumer electronics exposition, the legendary Funkaustellung, held every other year in Berlin. I say legendary because I had heard for so many years about this show—its size, the lavishness of the manufacturers' exhibits, and the hundreds of thousands of people who pass through its gates during its nine-day run. It did not disappoint.

The show was indeed gargantuan, with some major exhibitors, such as Philips and Thomson, occupying entire halls. And for someone accustomed to American shows, which are primarily trade-only affairs, it is fascinating to see an electronics show of the Funkaustellung's proportions directed mainly to consumers. With great success, I might add. On the Saturday I was there, the subway was packed with people headed to the convention center, many accompanied by young children. Some go out of curiosity, I assume, others to shop. I'm told that although nothing is actually sold at the show, many people decide what to buy later based on what they see and hear there.

Naturally, a lot of what is on display are things people really could go out the next day and buy, but not all. There are more prototypes, works in progress, and concept pieces in the exhibits than you would see at an American show—including products painted with special designs created just for the event. Some of the big companies even put on rather elaborate live performances. The main point is to get people in the door and excited about what they see and hear.

Well, it certainly seems to work, so the question then springs to mind: Could it be done here? I am constantly reminded of how difficult it is for most people to find and audition all the various A/V gear they might be interested in or to gain exposure to all the latest technology. Would a national A/V fair every couple of years help? Would enough people come to make

it worthwhile for the manufacturers who would have to support it?

I don't know. The German show succeeds in part because it is so heavily promoted before and during the event (there's a fair amount of television coverage, for example). There's also the fact that Europe is relatively compact geographically compared to the United States. Nor does it hurt that so many Europeans have six weeks or so of vacation to play with. So maybe it wouldn't work here. Still, I think it's worth some further thought.

In case you were wondering, I didn't find a whole lot at Funkaustellung that was both new to me and of immediate interest. (Not surprising in light of how different the U.S. and European markets are. Home theater played a relatively small role in the show, to take the most obvious example.) Polk Audio seized the opportunity to announce replacement models at the top of its RT speaker line, including some with powered woofers. You will be seeing more about those in our pages in months to come. The big news locally was the launch announcement for DVD in Europe. And I was very impressed with a prototype 16:9 plasma television display in the Thomson exhibit—beautiful, vivid picture quality with none of the obvious motion artifacts that have plagued other plasma displays I've seen.

I doubt I will ever go to another Funkaustellung, but if you happen to be near Berlin a couple of years from now when the show is on, I encourage you to make a visit. You'll have fun.



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V.P./GROUP PUBLISHER
Tony Catalano 212/767-6061

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

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CIRCLE NO. 4 ON READER SERVICE CARD

Miles-Long Mistake

Dear Editor:

Jazz reviewer John Diliberto erred in his review of the Miles Davis early electric period reissues (November 1997) when he stated that 1974's *Dark Magus* is "a poor, concert recording response to the superior *Agharta* and *Pangaea* studio albums." The latter two were both recorded on February 1, 1975, before live audiences in Japan. Thus, they were not studio albums. And they could hardly have served as the basis for a *Dark Magus* response, since it was recorded in Carnegie Hall the year before.

I do agree that the 1975 Japan recordings are superior to 1974's *Dark Magus*.

Richard P. Clancy
Ashland, Mass.

Editor's Reply: You're right. An editing error was made in Diliberto's review. He originally wrote that *Dark Magus* was "a poor relative to the superior *Agharta* and *Pangaea* albums from the same period." So these were not a "response" to *Dark Magus*. Diliberto also never referred to the latter as "studio albums." Our apologies to him and to our readers.—D.H.

More Awards

Dear Editor:

In all likelihood I am the 2,369th reader with complaints about product omission from an otherwise wonderfully nostalgic 50th anniversary issue (May 1997). Nevertheless, I insist on being heard.

The "most successful failure" award goes to the National Company of Malden, Mass., for its unique and innovative line of 1954: the Criterion AM/FM tuner, the Horizon push-push amplifier, and the Horizon 5 preamp, which could be plugged into either of the aforementioned units. What was most remarkable about the tuner was that it was an FM and an AM tuner simultaneously. That meant that on Sunday nights I could tune into WQXR-FM and WQXR-AM for Chester Stanton's "Adventures in Sound" and produce stereo in my own home—to the delight of all my neighbors,

who clamored to be admitted. The tuner was designed with a cascode front end, gated-beam tube limiters, and a detector that defied description (other than to note that it comprised two sections totally independent of each other). That tuner was capable of being altered by me (an electronic engineer with an M.S. degree) to total stereo FM compatibility with an H. H. Scott multiplex adaptor, even though Scott disclaimed any liability for use with any tuner other than its own. That tuner and adaptor are still viable today.

Another product worthy of note is my Ampex F-44 stereo open-reel recorder, which any audiophile could afford and not sacrifice the standards that the larger and more expensive Ampex units were known for. That unit is still in my array.

One final note of nostalgia. It was in 1952 at an audio show in midtown Manhattan that I first heard the Klipschorn and McIntosh 20w-2 hooked up. The wire used to connect the two was plain old zip cord. And Paul Klipsch himself oversaw the demonstration and made it known that all "control settings" on the preamp were at "zero." He knew what he was doing then, and he would still be correct today.

Mel Rosenberg
Roslyn, N.Y.

Terrific Tubes

Dear Editor:

I found George Nussbaum's September 1997 letter ("Tubes: Why Bother?") a fascinating insight into what I hope is not the mentality of the majority of *Audio* readers.

Nussbaum decries the perceived trend back to tube amplifiers as a step backward into the use of "old" circuitry, with its presumed need for frequent rebalancing and tube replacement.

He tacitly acknowledges that some people like the "warm" sound delivered by electron tubes (as well he should, for tube audio continues to deliver a more natural, less sterile sound than solid-state devices, despite their improvements and related circuitry advances over the years), but he loses credibili-

ty when he states that to duplicate tube sound all one need do is buy a graphic equalizer, "diddle around with the levers, and presto, they'll get the warm tube sound."

Man, if that does it for him, he must be hard of hearing. Who in his right mind would want to manipulate the sound, to say nothing of introducing a distortion and noise-producing device into the system, with the effect of degrading it, in order to make it sound more lifelike?

Apparently Nussbaum is unaware that vinyl records are enjoying a renaissance. (In England alone the pressing plants are working 24 hours a day to meet demand, and the price of raw vinyl has skyrocketed.) Why? Because digital has yet to match the realism of analog. (It may, when it incorporates the digital audio specs of DVD.) Moreover, there is considerable opinion that when electromechanical devices (microphones and loudspeakers) are connected to electron valve devices (tube preamps and tube power amps), the sterile sound of solid-state amplification is mitigated. There's something to the adage that "the old ways are the best ways," even in audio. Try it. You'll like it.

Oliver Berliner
Beverly Hills, Cal.

Reduction Redux

Dear Editor:

I thoroughly enjoyed the nostalgic issue on 50 years of *Audio* (May). It brought back fond memories of reading your magazine during my childhood in Japan and finally making electrical engineering my career, working for companies such as Onkyo, Nikko, and Marantz until I started my own audio business more than 10 years ago. However, if my memory serves me right, there was one discrepancy in Robert Long's "50 Years of Home Recording." I believe the first open-reel tape recorder with a built-in Dolby circuit was the KLH Model 40. I remember that model being sold (as discontinued) at Musicraft in Chicago back in the early '70s. At that time, I was still a student at the Illinois Institute of Technology and was fascinated by the noise-reduction circuit. However, the salespeople at Musicraft recommended that I not buy the deck because it never worked well. When the KLH Model 41 became available, I snatched it up because of its low price. However, this deck was a lemon also. I never got it to work

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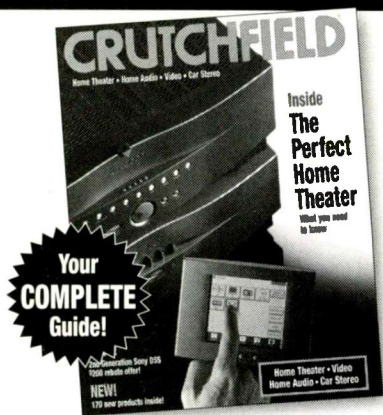
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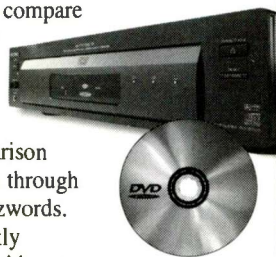
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CIRCLE NO. 9 ON READER SERVICE CARD

right and finally took it back to exchange it for the Tandberg Model 6000. I believe the reason why KLH decks were a failure was because they never worked properly and not because people didn't embrace Dolby noise reduction. Ironically, I remember opening the guts of the Model 41, and the boards inside read "Nakamichi." Mind you, this was long before the days of the first Nakamichi 1000 and the Nakamichi 700!

The article also failed to mention one great step in tape recorder technology. I was always impressed by the sonics of the cross-field head that was incorporated in the Tandberg and Akai (Roberts) decks. It really extended upper frequency response and to me had a greater sonic impact than Dolby noise reduction. I also would like to credit the patent of the cross-field head to the late, great Marvin Camras (God rest his soul!), from whom I learned so much at the Illinois Institute of Technology.

When comparisons were made between the lower-priced Tandberg 6000 with the cross-field head versus the well-made and expensive Teac and Sony decks, the Tandberg sounded unbelievably better!

As mentioned in Long's article, a lot of Japanese decks were sold here in the U.S. by distributors like Superscope, Roberts/Rheem, and Concord. However, the article states that Teac eventually came after the rest of the Japanese companies, but in reality, its products were being sold as Astrocom/Marlux decks in the '60s.

Tom Ishimoto

President, Northridge Electronics
via e-mail

Dolby Digital vs. DTS

Dear Editor:

I was very disappointed with the recent announcement by Delos Records that it is introducing audio-only DVDs using Dolby Digital for 5.1-channel surround sound. There are two reasons for my reaction. First, there has been no standard decided on for audio-only DVDs; second, why select Dolby Digital for music? My god, what are John Eargle and Amelia Haygood thinking?

Dolby Digital may pass muster for movie soundtracks, but for high-quality music recordings, it just doesn't work. With a 12:1 compression rate, way too much information is lost, regardless of the number of bits

Delos says it's using. And with only 384 kilobits/second of data, it can't possibly come anywhere close to the quality of standard CD, much less surpass it.

I'm in favor of using DTS surround on the standard CD format. Only DTS can preserve the full integrity of the music and the recording by using much gentler compression than Dolby Digital. DTS's compression rate of 3:1 and data rate of 1.411 megabits/second means that DTS lets a lot more of the music reach your ears. With its 20-bit, 48-kHz sampling rate, DTS is completely transparent, yielding better-than-CD quality. It doesn't come between you and the music.

Any CD player that has a standard S/P DIF digital output—coaxial, optical, or what have you—can be connected to a DTS decoder and provide 5.1-channel sound at its best. There are already millions of these players in use today, and even the car audio industry is gearing up for DTS. Several hardware manufacturers—including B & K Components, Angstrom, and Theta Digital—offer DTS-equipped components, and more are sure to follow. There are also some very fine add-on adaptors available.

If it sounds like I believe highly in DTS, you're right; it is clearly superior to Dolby Digital for music reproduction. Delos needs to rethink its strategy. I implore all major record companies to jump on the DTS bandwagon today. Do it right the first time!

Jay Rudko
via e-mail

Editor's Reply: Many of your points are addressed in last month's issue—specifically, John Eargle's "Currents" column, my "Fast Fore-Word" column, and in the feature "The Science of Listening"—so I will try not to be too redundant here. I think the primary reason for the Delos DVD is to demonstrate to a relatively wide audience what can be done with a discrete five-channel medium. Nobody expects that DVD-Video will be a long-term delivery vehicle for audio-only, or primarily audio, recordings (though there is a growing catalog of music video and concert recordings on DVD-Video).

The DTS CDs really perform a similar function, but to a smaller potential audience. They are not a long-term solution, ei-

ther, however, as they require stores and consumers to maintain dual inventories: DTS CDs for discrete multichannel audio through appropriately equipped systems and regular CDs for playback in the much, much larger universe of two-channel CD gear. What's needed is a way of supporting ordinary CD playback and an advanced multichannel system on the same carrier. Eventually, that need should be met by DVD-Audio; near-term, it might be met by something like Lexicon's Logic 7 matrix encode/decode system.

Finally, I don't think there is any foundation for the idea that Dolby Digital (also a 20-bit, 48-kHz system, by the way) is a grossly deficient format for music reproduction or that it is substantially inferior to DTS. You can't assume that a higher data rate will automatically yield better sound quality (or a lower one worse); the performance of the coding algorithm is at least as important. People I know who have had an opportunity to compare the two systems under properly controlled conditions have consistently reported no audible difference or, at most, very occasional and inconsequential differences.—M.R.

Good Berger

Dear Editor:

Ivan Berger's "You Say You Want a Revolution," about new and unusual speaker technologies (November 1997), was both exciting and informative. Regarding the ATC HyperSonic Sound speaker that beats two ultrasonic tones together to produce sound in the audible range, I share Berger's concern about possible hearing damage, especially since listeners won't hear the frequencies that might be causing the damage and thus will have no warning. Like all music lovers, I greatly fear any degradation in my hearing. I hope this is proven not to be a problem, because this technology has amazing potential.

Berger's comment that the ATC speakers theoretically should be very linear because they operate over a range of only about a tenth of an octave (say, from 200 to 220 kHz) is logical, but wouldn't they have to be tremendously precise for the difference frequencies to be reasonably accurate? If the reference frequency is 200 kHz and the variable frequency is set at 201 kHz (to produce an audible tone of 1,000 Hz), an error

of 0.00005 (0.005%, or 10 Hz) in the variable frequency would result in an error of 10 Hz (0.01, or 1%) in the audible frequency. You would hear 1,010 or 990 Hz instead of the desired 1,000 Hz.

By the way, there was nothing in the article about the Soundstick speakers rumored to be coming on the European market soon. Has *Audio* received any information on how they work, their price, or when they will appear in the United States?

David Y. Miller
Riverdale, Utah

Editor's Reply: You're right that precision is a potential problem with ATC speakers, but even more precise modulation is required by radio stations, which are modulating far higher frequencies, and they manage it all the time.

News about Soundstick technology reached me too late to include in my November article, but I hope to do an update that will include it. The information I have so far is all technical (and a bit sketchy, at that), with no word on products or availability.—I.B.

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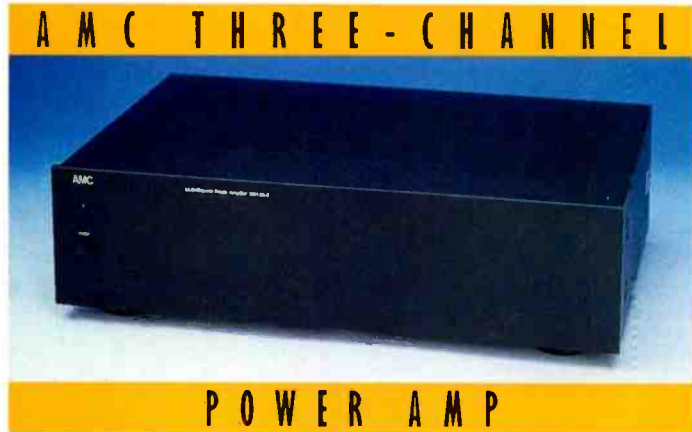
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Fisher Home Theater System

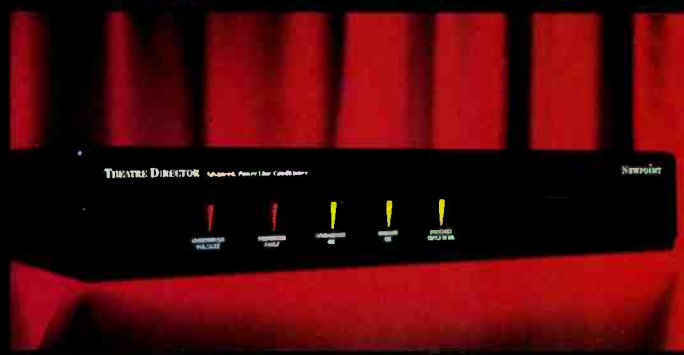
To make installing home theater easy, the SoundStage HTP-S740 includes everything except video source components. Audio/video inputs and switching functions, along with an on-screen display, are integrated with the amplifiers and Dolby Pro Logic decoder

built into the powered subwoofer. The amps feed 30 watts each to the three compact front speakers and to the surround speakers; it feeds 60 watts to the sub. The sensor for the supplied remote is in the center-channel speaker. Price: \$399.95. (Fisher, 818/998-7322) For literature, circle No. 102



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for feeding an external 5.1-channel Dolby Digital decoder. Video resolution is specified at 500 lines, and special effects capabilities include fast forward, slow motion, still frame, and frame advance. Price: \$749. (Samsung, 201/229-4000) For literature, circle No. 104



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(Co-Motion Design, 415/512-1043)

For literature, circle No. 106

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With four audio inputs, five audio/video inputs (three with S-video), and RF, coaxial, and

optical digital inputs for Dolby Digital (AC-3) sources, plus built-in Dolby Digital and Dolby Pro Logic decoders, the AVR85 will accept and amplify virtually any stereo or multichannel source extant. Each of the five

built-in high-current amplifiers is rated to produce 85 watts into 8 ohms. The AVR85 also has a learning remote, front-panel A/V inputs, and a 30-preset AM/FM tuner section. Price: \$1,699. (Harman/Kardon, 800/645-7484) For literature, circle No. 107



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Seven different mechanical damping materials inside each of three Delrin support pillars are said to entirely isolate the Delphi Mark V's platter and tonearm suspension from outside vibration. Now built in Magog, Quebec, the belt-drive turntable uses dual current-drive circuitry for improved start-up torque and maximum speed stability. Wow and flutter is specified at 0.015% (DIN unweighted), rumble at

-84 dB (unweighted), speed stability at $\pm 0.047\%$, and long-term speed drift at $\pm 0.014\%$. Price: \$2,775 without tonearm. (Oracle, c/o Agence Commerciale ACI, 819/868-0284) For literature, circle No. 105



Using proprietary 5-bit, 64-times oversampled processing, the Elgar D/A converter is said to achieve nearly 24-bit resolution with excellent jitter rejection. Besides sampling at 32, 44.1, 48, and 88.2 kHz, the Elgar will sample at 96 kHz. Moreover, because the design is software-based,

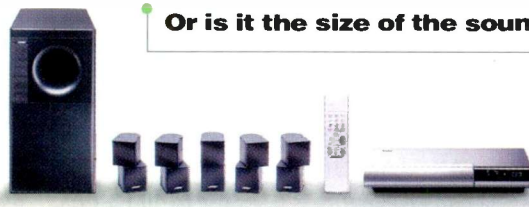
it is easily upgradable to future digital standards. Digital inputs include AES/EBU and S/P DIF (BNC, RCA, Toslink, and AT&T), and there are balanced and unbalanced pairs of analog outputs. Price: \$12,000. (dCS, c/o Canorus, 615/252-8778) For literature, circle No. 108

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CIRCLE NO. 6 ON READER SERVICE CARD

Buying Binaural

Q *Years ago, I had an LP that had some binaurally recorded tracks. Is there anywhere I can get binaural recordings now?*—Ben Shepherd, Fanwood, N.J.

A Binaural recordings, which are optimized for headphone listening rather than playback through speakers, are hard to find. You might try The Binaural Source (P.O. Box 1727, Ross, Cal. 94957; 800/934-0442; www.btown.com/binaural.html).

Equalizer Yields Fuzzy Bass

Q *When I use my new equalizer, the bass sounds fuzzy, as does the sound from my tweeters and midrange driver. It usually happens when I have the bass EQ set too high, but it also occurs at low volume. My speakers have woofers that handle 150 watts. My amps are only 50 watts per channel. Do you think my problem might be caused by underpowered amps?*—Carlos Nunez, via e-mail

A I believe your equalizer is overloading the input stage of your amp, because the distortion remains audible at low volume as well as at high settings. (If the amps were clipping, the distortion would be audible only at high volume levels.) Moreover, the fuzzy nature of the distortion is more characteristic of input stage overload than amplifier clipping.

If the equalizer has a master output level or unity gain control, reduce the setting and see if the distortion disappears. Alternatively, be more cautious setting bass EQ levels, to prevent the equalizer from delivering excessive output to the amplifier. (Boosting bass frequencies by 10 dB increases the signal level reaching your amplifier by a factor of 10; the amp is required to deliver 10 times as much power at those frequencies. Consequently, it's smart to use bass EQ with restraint.)

Your equalizer should have a bypass switch: Try various settings of bass EQ while you switch the equalizer in and out of the circuit (or connect it to a tape monitor loop so you can do the same thing) to determine how much EQ you can apply before distortion develops.

There is a remote possibility that your equalizer has an inherent defect. Check for that by removing the equalizer from the system. If the system sounds good, then you know the equalizer is the problem. Have it checked out by the appropriate service shop.

Using a Full-Range Speaker As a Subwoofer

Q *Is there a way I can use my full-range Acoustic Research AR-3a speakers as subwoofers with satellite speakers that are deficient in bass?*—José C. Baco, Mayaguez, Puerto Rico

A I see no reason why you cannot use your ARs as subwoofers. So long as the woofer surrounds haven't deteriorated, the ARs should function well as a sub—the 3a had excellent bass response to 30 Hz or a bit lower. The fact that it is a full-range speaker can be ignored; treat it the same way you would a subwoofer.

You'll need a crossover network—passive or active—to keep highs out of the ARs and lows out of the satellites. The crossover point must be determined by selecting a frequency that is comfortably within the operating range of both the satellites and the subwoofer (the ARs, in this instance). A crossover frequency of 70 or 80 Hz would be a good place to start.

Keeping in mind that the AR-3a is full-range, ask yourself if you really need satellite speakers. You might be able to correct some of the AR-3a's inadequacies with an equalizer. (The output of the midrange and tweeter drivers in the AR-3 and AR-3a tends to "shelve" downward in a smooth, plateau-like manner and hence should be amenable to significant correction with an equalizer.) This approach would eliminate problems that might arise if the satellites have greater sensitivity, and thus more output, than the subwoofers (the ARs have very low sensitivity).

If you use a passive crossover, you may not be able to obtain proper balance between the lows from the ARs and the upper frequencies from the satellites. A bi-

amped system with an active crossover would solve this by separately amplifying the low frequencies fed to the AR-3a speakers. However, this approach would be much more expensive than buying an equalizer.

The Right Stylus

Q *My record collection consists of LPs and 45-rpm singles made in the '60s. In order to accurately track the 45s and the LPs, do I need a separate stylus for each type? Will a single stylus do?*—William Peyser, San Francisco, Cal.

A The stylus you use to play your LPs will also play your 45-rpm singles. (If you owned 78-rpm discs, you would require a special stylus for them.) Still, you may discover that some of your discs won't track or play equally well. This has nothing to do with a need for separate styli; rather, it is a matter of how highly modulated the grooves are. During the '60s, many 45-rpm pop singles and LPs were cut "hot," at highly modulated levels. It almost seemed as though there were a contest among the record companies to produce the loudest-sounding records. Some discs will never sound good because their signal level is so high that the cutting stylus actually damaged the very grooves it was producing. To cope with such discs, set the tracking force for your cartridge a bit heavier than that recommended by the manufacturer. Too light a tracking pressure will result in mistracking of highly modulated discs.

Mistracking means that the stylus, rather than following the undulations in the grooves, will tend to take shortcuts. It will bang against the groove walls, etching the distortion permanently into the walls. Tracking at a somewhat heavier stylus force will produce less damage in the long run than using too light a force.

Speaker Cone Materials

Q *Does it really matter what speaker cones are made of? Some manufacturers use exotic materials like ceramics, Kevlar,*

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

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CIRCLE NO. 53 ON READER SERVICE CARD

or metal, while other builders use treated paper.—Shaleem K. Hosein, Winnipeg, Manitoba, Canada

A Yes, it does matter. A great deal of energy is expended in the quest for the perfect cone material. For the designer, the trick is to find an ideal compromise between lightness, rigidity, mass, and cost.

Consider the work of a speaker cone. It must move the air in accordance with the varying audio signal applied to the voice coil (to which the cone is attached). Now, what would happen if the cone were heavy? A transient signal is applied to the voice coil, and it tries to move the cone. To overcome the inertia of the heavy cone, the driver's motor must be very strong (large magnet, etc.), or else the cone will tend to start and stop more slowly than it should.

What if the speaker cone were made of light material? The voice coil moves the cone, and it readily responds. However, unless the cone material is particularly stiff, there is a strong likelihood that it will not vibrate uniformly. The overall motion of the cone may be fine, but certain parts of the cone may flex at odd frequencies or in a nonlinear fashion compared with the signal applied to the voice coil. This uneven vibration of separate areas of the cone material is called cone breakup, and in all cases it causes coloration of the sound the speaker is trying to reproduce.

Each of the materials you mention represents an attempt at producing the perfect cone. Paper is light, and by itself not very rigid, but by coating, or "doping," a paper cone with various lacquers, it can be made stiffer (which also makes it heavier and less responsive to movement). Polyethylene plastic cones may combine rigidity and economy but usually are heavier than paper. On the other hand, greater cone mass may be preferred by a designer because, depending on the type of baffle in which a woofer is installed, a heavier cone can lower the resonant frequency of the speaker, thereby yielding deeper bass output. In recent years, ceramics, aluminum, and titanium have been used as cone materials. Although rigid, these tend to be expensive and difficult to mold.

The subject of speaker cone materials is complex and encompasses many factors. I hope this simplified answer helps you understand it a bit.

Off-Speed Playback

Here are some thoughts with respect to Ken Smith's question about off-speed recordings in the November 1996 issue.

The time reference used in modern analog playback devices is usually more accurate than what might be found in older playback units. Expect to find a difference in the playback time of a cassette made on an older cassette deck and a cassette recorded on a newer machine.

In any event, I would expect discrepancies between the stated running time of a tape and the time actually measured. Several factors are responsible. With any cassette deck, even two- or three-motor models, the tolerance of the pinch roller will change with age because of hardening of the rubber; likewise, the drying out of lubricated tape in the cassette will alter the friction between the capstan, tape, and pinch roller. Consequently, both the running time and the musical pitch of the cassette will be affected.

Unless the device uses a temperature-compensated crystal oscillator (TCXO), which is unlikely to be found in any cassette mechanism, the oscillating frequency of a quartz-locked or other crystal-controlled device will vary as it becomes older. As a crystal ages, it also becomes more susceptible to ambient temperature changes that will affect the speed of the capstan motor.

High-quality equipment usually has some type of adjustable trimmer to compensate for the age of the crystal reference. Calibration of the oscillator must be done by a properly equipped service shop and could cost as much as \$300.

Compact Disc playback times will vary depending on the CDs played. Actual starts or ends may be determined by the presence of audio or data bits (end words). Some machines provide a combination of start-audio and end-of-message (EOM) bits to determine track length. Usually the information reported to the CD player's display panel is derived from an embedded table of contents on the disc—not an actual reading of tracks, which would considerably increase the initialization time of the CD. The aforementioned long-term variability of the crystal reference oscillator also applies here.

Both consumer and professional machines usually allow for a speed variation of $\pm 2\%$. But this is not always a user-adjustable parameter.—Edwin Bukont, Jr., Laurel, Md.

Adding a Turntable

Q *How can I use an old but serviceable turntable with a new audio system that lacks a phono input? The manual says a turntable can be used if it has a preamp/equalizer, which is then connected to the auxiliary input of the system. What is this equalizer and what does it do? Where would I get one and where on the turntable would I hook it up?—Charles P. Silas, Mason, Mich.*

A The auxiliary input accepts voltages that are in the range of 0.3 volt, or about 300 millivolts. By contrast, a phono-graph cartridge produces just a few millivolts. If the turntable were connected directly to the auxiliary input, there would be virtually no signal heard when you played a record. And the sound quality would be tinny and lacking in bass.

The cartridge needs to have treble cut and bass boosted in order for the sound to be smooth and flat. This electronic cut and boost is called RIAA equalization, because its characteristics were set in 1953 by the Recording Industry Association of America. The phono preamp's RIAA circuit restores, or equalizes, the treble and bass frequencies to the proper balance. Greater than 15 dB of treble cut and bass boost are applied by the circuit. Furthermore, the preamp amplifies the tiny cartridge signal to a level sufficient to drive an auxiliary input.

Inexpensive phono preamp/equalizers are available from Radio Shack; other suppliers, such as Parasound, have higher-quality phono preamps that start at \$120. The preamp will have input jacks that accept the leads from the turntable and will have output connections to feed the auxiliary input of your audio system.

Alternatively, you could replace the turntable's magnetic cartridge with a ceramic cartridge (again, try Radio Shack). It will generate enough output to drive the auxiliary input of your system without an extra preamp. However, ceramic cartridges require about 1-megohm load resistance, whereas most auxiliary inputs have far less—typically, about 50 kilohms—which means bass output will be drastically cut. And the stylus compliance of ceramic cartridges is poor compared to magnetic cartridges, so greater tracking force is necessary, which will exacerbate record wear. All things considered, you're better off with an external phono preamplifier. **A**

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CIRCLE NO. 45 ON READER SERVICE CARD

DSD ON DVD?

Sony and Philips believe they have a better idea for delivering high-resolution audio to the consumer than that which may ultimately be proposed by the DVD Forum. It is called Super Audio Compact Disc, and it promises all of the features the record industry has said it would require from a next-generation music carrier.

The two companies announced their collaboration about a year ago but provided no technical details, except that the system would be based on Sony's DSD (Direct Stream Digital) recording process (see "Currents," October 1996). But they provided much more information during the Audio Engineering Society Convention in New York last September (including off-site auditions for members of the press, recording engineers, and record company personnel), to show just how much progress they have made with DSD and with their DVD-Audio proposal in particular.

The Super Audio disc itself, though a hybrid, looks like a standard audio CD. It is single-sided, with two layers. The inner one, a conventional Red Book CD layer, will be readable by any ordinary CD player. Just above that is a semi-transparent, high-density layer, invisible to a CD player's pickup but readable by shorter-wavelength, DVD pickups. The high-density layer will contain the same music as the CD layer, but in two forms, both using DSD coding instead of PCM. One will simply be high-resolution, two-channel stereo; the other will be up to six channels of high-resolution sur-



round sound. An auxiliary channel will carry text, graphics, and other low-data-rate information.

DSD itself is not a totally new process but, rather, an outgrowth of delta modulation, a transmission method that encodes successive differences (or "deltas") in the instantaneous waveform trajectory. Typically, a single bit is used (up versus down), but with a very high sampling rate (2.8 MHz in DSD). By comparison, standard digital recording uses PCM

(pulse-code modulation), which employs multiple bits to represent instantaneous waveform amplitudes, but with a lower sampling rate. Thus, the two modulation methods correlate, and, indeed, it is possible to convert from one to the other.

Sony has kept the professional recording community up to date on DSD development through timely demonstrations in international recording centers, and recent progress has made it possible to equalize and change the levels of DSD signals without first down-converting them to PCM. Minor problems in system stability are said to have been solved as well. All told, DSD is claimed by Sony to have an equivalent signal-to-noise ratio of 120 dB and an effective audio bandwidth extending to 100 kHz. On the surface, all problems of digital recording would seem to be solved. The proof is in the listening, and here I can say that DSD is as transparent as any digital transmission I have heard.

The September demonstrations took place under excellent acoustical conditions in the Sony Building on Madison Avenue. Our host for the occasion was the articulate and amiable David Kawakami, Sony's director of new business development in the U.S. The stereo program consisted of a live, unedited segment of a Bach suite played by cellist Yo-Yo Ma and a portion of a new dmp album, *Alto*, featuring alto flute, guitar, and percussion, beautifully recorded by Tom Jung. Both of these originated as DSD recordings, with the dmp down-converted through Sony's Super Bit Mapping system for the CD release.

In the demonstrations, we were able to make three-way comparisons between DSD originals and two PCM versions derived from them, one with 20-bit data and a 96-kHz sampling rate and the other with

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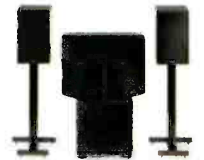
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16-bit data and 44.1-kHz sampling (the CD standard). All examples came across beautifully, so well were they recorded. I felt that there was no difference between DSD and the high-resolution PCM but that the CD-standard PCM had a bit less sense of depth. These were not blind comparisons, however; we knew at all times which version was being played, so there may have been some listener bias.

The surround sound demonstrations used the standard five-speaker setup for home theater, three speakers across the

front plus a stereo surround pair at the left and right rear. A studio recording of Winton Marsalis with strings in a big, slow jazz arrangement of "The Party's Over" was beautifully delineated, especially as regards its natural string timbres.

Classical examples included an excerpt from Scriabin's symphonic poem *Prometheus*, recorded in a relatively small hall in Finland, and an excerpt from a Schumann symphony recorded in England's rather resonant Watford Town Hall. Both of these were of the direct-ambient type, with pre-

dominant early hall reflections and reverberation reproduced by the surrounds. Delineation across the front three channels was excellent in both examples, but the front/back balance depended critically upon the listener's front/back location. (This is usually the case with direct-ambient recordings unless dipole surround speakers are used.) The channels were immaculately clean, irrespective of the recording/playback methodology.

Regarding the proposed disc itself, Sony and Philips say the initial raw manufacturing cost will be about twice that of a CD. Today, that cost is typically about 55¢ apiece, so the hybrid, dual-layer disc would come in at about \$1.10. There will undoubtedly be cost reductions over time, and the prospects for eventual single inventory are fair, if not yet certain.

For the high-density portion of the disc, Sony and Philips have developed a lossless data-compression system (a combination of predictive and entropy coding) that is said to roughly halve the data rate, to about 1.4 megabits per second per channel. Even so, the maximum playing time for the high-density stereo and surround sound programs is given as 74 minutes. If the same program is to be presented on both layers of the disc, this means that the compatible CD layer would also be limited to 74 minutes. This is certainly not a problem in the pop or rock world, but there are numerous classical CDs in the 80-minute range.

Any discussion of new consumer formats leads to consideration of backward compatibility and adaptability to multiple-use players. If the audio carrier of the future is to be some form of DVD, then it is assumed that in that future *any* DVD player will play *any* DVD, video or audio, as well as ordinary CDs. But will this assumption hold if the audio carrier of the future is the Super Audio Compact Disc, or will it be up to each player manufacturer to decide?

Finally, it is important to note that Sony and Philips are putting the Super Audio Compact Disc forward only as a "technical proposal" at this time, primarily for consideration as the DVD-Audio standard; they are not announcing a new product. We can expect a lively debate to ensue. Even if nothing comes of it, we will have gained, at the very least, a new professional recording technology for the studio. A

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CIRCLE NO. 33 ON READER SERVICE CARD

AUDIO/JANUARY 1998

22

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ZAPPING INTO THE FUTURE

It's not often that I praise a retailer. But Sound Components in Coral Gables, Florida, has a noble history, and I knew its president, Mark Goldman, from his days at Wilson Audio Specialties, where he became a setup wizard. It

Not that this is the first digital-in/digital-out preamp to reach production. Nowadays there are plenty of preamp/surround processor/DAC combinations on the market that offer some form of all-digital or primarily digital signal path, not



Z-Systems' RDP-1, an all-digital preamp with (gasp!) tone controls.

was Mark who used to tour the globe fine-tuning Wilson Audio's WATT/Puppy and X1 Grand SLAMM systems, dazzling all and sundry with a technique that showed how well he had learned his craft from Dave Wilson himself (the closest the hi-fi industry has come to producing its own Yoda). I had heard enough of Goldman's work to know that when he says that something is hot, it deserves further—and immediate—attention. What he alerted me to this time was a product whose roots are in the professional sector, an all-digital preamp that he believes will do more to steer home entertainment toward the 21st century than just about any other single component.

least being the sublime if utterly user-hostile Meridian 565 surround processor and 562V multimedia controller. Indeed, that pair sounds so good and is so versatile that it's hard to contemplate spending more than the 562V's asking price just for source switching. But the reason I call your attention to a stereo alternative is that the very component that had my friend Goldman in such a dither (metaphorically rather than digitally) is a two-channel device.

Z-SYSTEMS' DEVICE HAS DAZZLED ONE OF THE KEENEST SUBJECTIVISTS IN ALL OF AUDIO.

What rattled Goldman's cage is the Z-Systems RDP-1 Reference Digital Preamplifier, a \$5,000 control unit that commits the cardinal audiophile sin of reviving the use of equalizers. Given that, to those of us who still indulge in purist audio (by that I mean those of us who still derive pleasure from two-channel analog sources of the black vinyl persuasion), the mere thought of deviating from the shortest, least processed signal path is, well, deviant. We're 20 years or more into the age of tone-control-free preamps, way past the point where consensus has deemed tone shapers and equalizers to be unholy—horrors to be avoided at all costs. Hell, we've been at it for so long that we no longer feel the need to explain why costs have increased though the knob count has dropped. We simply tell initiates that less is more. And yet here's a device that has dazzled—and I do mean dazzled—one of the most dependable listeners and keenest subjectivists in all of audio.

How come? Because everything the RDP-1 does takes place in the digital domain, and because its actions are performed with an efficacy as vivid and desirable as the addition of a line doubler to a video image. And however much one may loathe CD or insist that anything digital causes cancer/impotence/flatulence, nobody has yet argued that there's a better way to perform functions like level adjustment and tone shaping than in the digital domain, if you're gonna go digital to begin with—fewer losses, no added colorations, and all that.

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As reviewed in

AUDIO

September 1997

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CIRCLE NO. 27 ON READER SERVICE CARD

For a demo, Goldman rigged up a couple of systems that allowed easy switching between purist setups and those including the RDP-1. This in itself required a bit of a mental adjustment, because I, like many of you, have been beaten over the head for years with the dictum that each extra component in the signal chain adds its own nasties to the sound: interference, the extra cabling, the extra connections, the extra AC power supply—choose your culprit. And yet here was a situation where not just one but as many as three extra stages/compo-

nents were being added, with no loss of transparency and with frighteningly audible and easily discernible gains evident every time.

Among the various components and combinations used in the demonstrations were a Mark Levinson No. 37 CD transport, a Faroudja DVD player, a Runco laserdisc player, the brand-spanking-new Meridian 861 preamp/processor, three Levinson No. 36S D/A converters, two Levinson No. 33H power amplifiers, one Levinson No. 333 amp (one channel used for the center), one

Levinson No. 331 amplifier, a pair of Wilson Audio Specialties X1 Grand SLAMM Series II speakers, and three Wilson WATT/Puppy System 5.1 speakers (one for the center, two for the surround). All wiring, audio and video, was from Transparent Cable's Reference series. Other items included a Runco 980 projector, a Faroudja LD250 line doubler, and a Stewart 1.85-to-1 projection screen. Oh, and three Z-Systems RDP-1s. The opening salvo was played through the "budget" system, which used Wilson Cubs and two Sunfire True Subwoofers, before I was allowed to hear the higher-resolution, \$300,000 killer system.

Perhaps the best way to comprehend this new ingredient is to think of the RDP-1 as a digital volume control, source selector, and equalizer. To put another spin on it, an all-digital preamp like the RDP-1 forces us to flip-flop a couple of components in the audio chain. Traditionally, a system follows a source/preamp/power amp/speakers progression. In a digital "separates" installation, that would be CD transport, followed by the D/A converter, its analog outputs fed into a preamp, etc. With the RDP-1, you feed the digital signals (e.g., the CD transport's or DVD player's digital output) into one of the preamps' inputs, and its digital output in turn feeds your D/A converter. The analog output of the converter is then fed straight into the power amps, which is

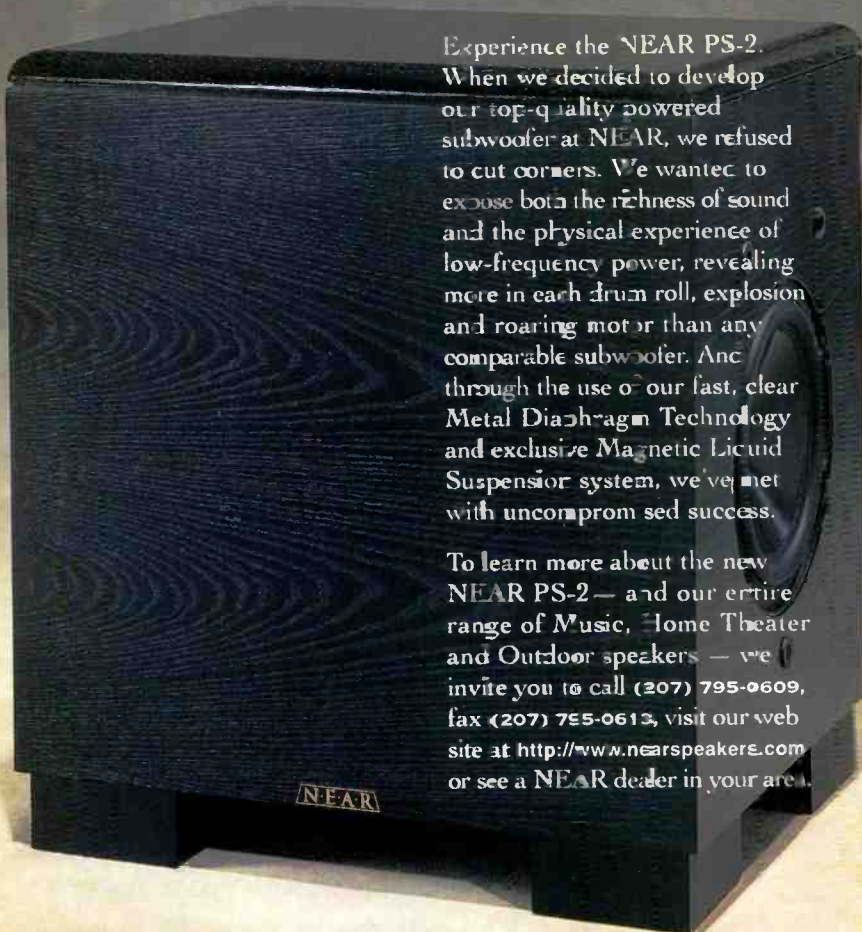
**THINK OF THE RDP-1
AS A DIGITAL
VOLUME CONTROL,
SOURCE SELECTOR,
AND EQUALIZER.**

something you just don't do with a conventional system unless your DAC has an output level control or your power amps have input level controls. Remember: The RDP-1 takes care of playback levels before they reach the DAC.

This in itself was not enough to suggest some sort of revolution. After all, the easiest way imaginable to demonstrate the relative quality of a volume control—or, more correctly, the intrusion of a preamp—is to run a source with its own output control (e.g., Marantz's CD-63SE CD player) directly

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into a power amp. Then a preamp is inserted between the source and the amp. I've yet to hear direct playback bettered by source-plus-preamp playback, nor have I failed to hear the insertion of a preamp. But the reason we don't all abandon preamps (or move to passive volume pots) is obvious:

**THE BIT THAT MAKES
THE RDP-1 A STANDOUT
IS ITS TRANSPARENT
TONE CONTROL.**

Few of us live with only one source. So unless you're a monomaniac (one source as opposed to one channel), you're going to want the facilities of a preamp, rudimentary or comprehensive.

And the RDP-1 is far from rudimentary. Before we get to its secret ingredient, you should know that it has six digital inputs—two XLR, three coaxial, and one optical (Toslink or optional ST type)—and three digital outputs (XLR, coaxial, and optical). It provides digital format conversion, offers a variety of dither options, performs volume and balance control, includes 100 presets, and has an A/B facility for comparing the settings against one another or against a flat signal. But the bit that makes the RDP-1 a standout is its tone correction system, which Z-Systems has trademarked as TTC: Transparent Tone Control.

TTC is so precise and uncolored that it will likely undermine any prejudice older listeners might have formed in the days of coarse parametric equalizers that did more harm than good. Aided by a top-flight calibrated microphone and a spectrum analyzer, Goldman utilized the RDP-1 to refine the already awesome sound of the Levinson/Wilson systems to virtually flat response. And, yes, I was somewhat surprised to see that the SLAMMs required as much tweaking as they did, such as a 5.2-dB boost at 31 Hz.

Repeatedly, switching to the systems that included the RDP-1 resulted in greater transparency and clarity, tighter and more extended bass, a greater sense of openness, and an impression of greater speed, especially in the way the system recovered from

transients. Although I had to keep telling myself that I was listening to a \$5,000 Band-Aid—or \$15,000 for three of them, in the case of a surround sound installation—I couldn't help but marvel at the way the RDP-1 transformed even the most familiar discs in my traveling library. Low-level detail, "revised" spatial presentation—forgive the cliché, but it was like hearing those discs for the first time.

And then Goldman explained why. "Ever since CD was launched," he said, "we've been treating it like an analog source. Be-

cause no matter what way we configure it, we've been feeding the analog output of a CD player or DAC into an analog preamp. The Z-Systems unit lets us preserve the signal in digital form beyond the volume control. And that's in addition to being able to perform tonal shaping in the digital domain, with fewer losses. And it works for home theater as well as pure audio."

And then the T-Rex stomped into the room at about 115 dB, and the only breakup I heard was the sound of a crushed 4x4. A

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COREY GREENBERG

MODIFIED WIENER FILTERING AND OTHER UNNATURAL ACTS OF THE AES

The world's audio engineering community gathers twice a year—once in the U.S. and once in Europe—to present technical papers, view the latest pro sound gear, and just generally whip themselves into such a terrifying orgy of unrestrained meekness that, by the second day, all normal communication breaks down and people start beeping and screeching at each other like modems with the speaker turned all the way up. They call it the Audio

of progress, soaking up the latest thinking from the world's greatest technical minds on the subject of audio and poring over presentation papers that are basically the baby steps of every hi-fi trend you'll see in the flesh five years from now. Others, like "Restoration of Musical Signals Using Wavelet Transform and Modified Wiener Filtering" (by

Alvaro Tuzman, Rossana Ga-dea, Ricardo Laureiro, and Fer-

into enemy territory. My problem is that I don't think the professional studio scenario ever got better than Little Richard screaming "Lucille" into an RCA ribbon mike plugged straight into a simple mixer feeding an Ampex reel-to-reel tape deck. And the floor show of the AES Convention is about as far away from that frame of mind as you could possibly imagine. Forget about gear that the average kid could make jungle sounds with given a few twiddles of a knob and a howl into the right hole—we're now in the era of PC-dominated pro sound, where computers run everything from the faders on a (virtual) mixer to on-the-fly adjustments of individual control settings of every piece of signal-processing gear in the studio.

When it's understood, this stuff is amazing. But every year, it moves further and further away from Little Richard screaming into an Ampex. In fact, I see a direct correlation between the skyrocketing complexity of studio engineering over the years and the decline of musical quality. When you give kids like The Smashing Pumpkins' Billy Corgan the ability to cut and paste each *syllable* in a recorded vocal performance (according to Corgan, there isn't a single unchopped sentence on their last record), the natural weeding-out that used to filter these cretins from the system and promote the few genuinely talented performers like Little Richard, who could stand in front of a microphone and knock out perfect takes all the way through and all day long, is no longer there.

But I don't go to AES to wallow in the misery of the latest Alesis digital reverb box or the newest Sound Forge plug-ins. I go to hear the world's leading audio thinkers climb up onto the podium and present their latest discoveries, theories, and experiments. And I have to say that the 103rd AES Convention, held last September in New York City, had the best group of papers of any show I can remember.

Engineering Society, or AES, Convention, and it is not for the faint of heart.

For me, going to AES is a double-edged sword. The engineer half of my brain happily bathes in the steam

nando Vilaró, Preprint No. 4613) simply point to a future where wiener modification means audio done right.

But it's the musician half of my brain that feels like a spy sneaking

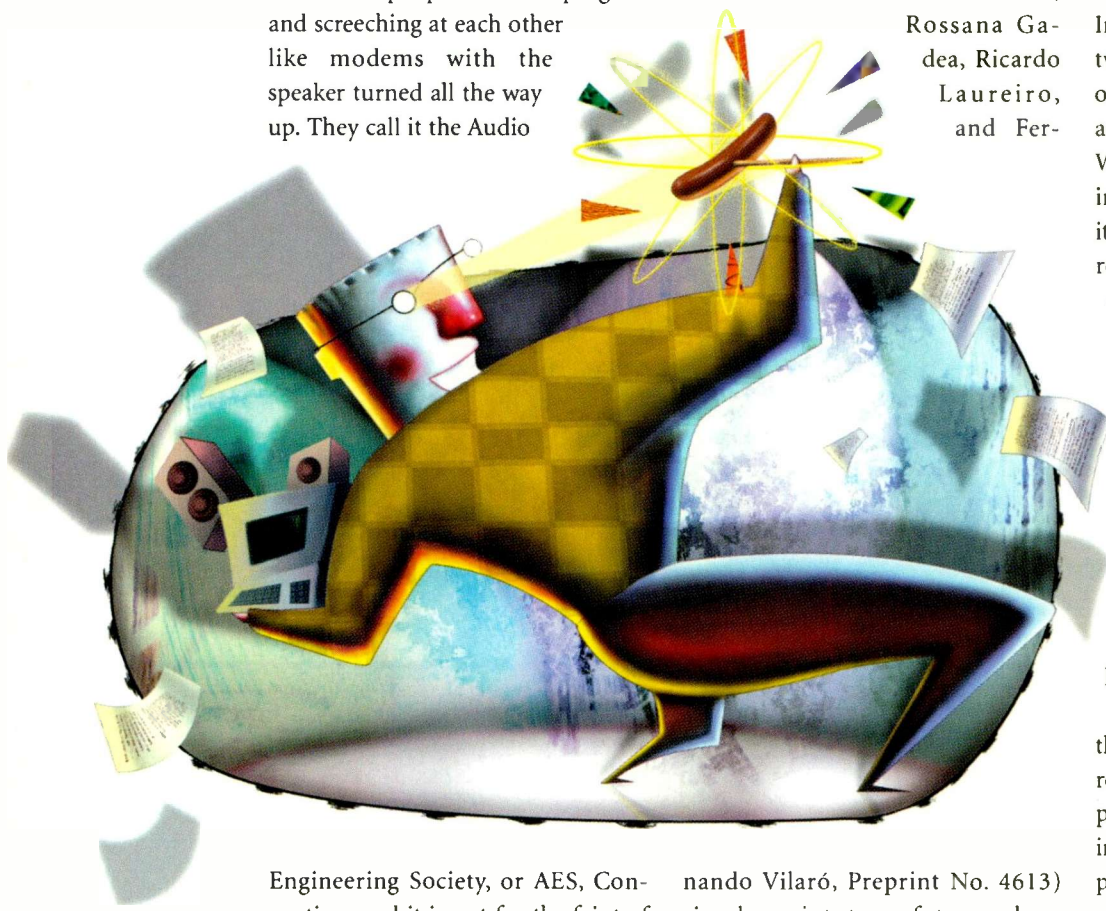


Illustration: ©Stu Suchitt

Mixing sound for 5.1-channel surround was a hot topic. Five papers were devoted to different approaches to multimiking an acoustic event so that home theater playback would render a soundscape that remained true to the sound of the original venue. The two I found most interesting, "5-Channel Microphone Array with Binaural Head for Multichannel Reproduction" (by John Klepko, Preprint No. 4541) and "Microphone Techniques for Ambient Sound on a Music Recording" (by Akira Fukada, Kiyoshi Tsujimoto, and Shoji Akita of NHK, Preprint No. 4540), approached the notion of accurate 5.1-channel miking from opposite ends of the spectrum. Klepko prefers using a dummy head fitted with omnidirectional mike capsules in the ear canals to capture the ambience signals for the surround channels, while the NHK team found that directional cardioid microphones pointed toward the rear of the recording

**MIXING SOUND FOR
5.1-CHANNEL SURROUND
WAS A HOT TOPIC
AT THIS YEAR'S AES.**

site gave much better ambience on the final recording than omnis. All of the authors agree, however, on the use of three directional mikes for the front left, center, and right, as opposed to the practice of stereo miking with two mikes and creating a center mix by adding L and R together.

Klepko makes an interesting observation in his paper that I happen to agree with: Although some prefer the use of dipole radiators for surround loudspeakers, he recommends that a matched set of five monopole speakers be used to allow for optimal imaging and continuity of the reproduced sound field. All of the papers presented at AES concerning 5.1-channel microphone technique echoed this sentiment. The issue of dipole versus monopole surrounds also surfaces in "Teaching Concepts in Mixing for Surround Sound—Pedagogical Changes with the Shift to 5.1" by Doug Mitchell (Preprint No. 4544). The author, a professor of recording at Middle Tennessee State, notes that while the accuracy of his 5.1-channel recordings was preserved by a monitor system consisting of five identical speakers, the perceived depth of sound field shrank considerably when he and his students played the same mixes on a system

featuring dipole surround speakers. I've long felt that dipole surround speakers, while certainly dramatic in their effect, obviously exaggerated the ambience of a 5.1-channel recording, and Mitchell and his recording students found this as well. The lesson? Dipole surrounds are neat for movies, but if your goal is an accurate audiophile playback rig for multichannel audio—whether movies or music—you'll get the best results by using five matched speakers around the room.

Verity's controversial NXT flat-panel speaker technology was the subject of six different papers, two of which were co-authored by professional consultant Martin Colloms, who also works as a reviewer of high-end audio equipment. After reading Colloms' collaborative effort with NXT, Ltd., "Diffuse-Field Planar Loudspeakers in Multimedia and Home Theatre," by Colloms and NXT's Christien Ellis (Preprint No. 4545), I look forward with great interest to his reviews of the first NXT products.

For my money, the most thought-provoking paper delivered at AES was Meridian's Bob Stuart's "Coding Methods for High Resolution Recording Systems" (Preprint No. 4639). Stuart helped found Acoustic Renaissance for Audio (ARA), whose proposal for the as-yet-undecided DVD-Audio format strikes me as the most forward-thinking of the dozen or so that seem in the running. And Stuart's paper lays down his latest thinking on what the next-generation digital audio carrier should be.

Typically, Stuart makes a case for multi-bit PCM versus single-bit bitstream coding for DVD-Audio, arguing that bitstream's high data-rate requirement becomes unacceptable when the needs of multichannel audio are taken into account. But his other recommendations may surprise those who'd expect such an avowed high-ender to simply sign on to 24 bits/96 kHz and follow the rest of the mob to torch Herr Frankenstein's castle.

On the subject of sampling rate, Stuart pulls a Three Little Bears number, declaring 96 kHz too high and 48 kHz too low. He ar-

gues that while 96 kHz wastes too much data without improving the sound beyond a lower sampling rate, 48 kHz isn't enough of a jump beyond the current 44.1 kHz CD standard. As for the number of bits, Stuart concludes that there is no convincing argument for using 24-bit data in a distribution format, and further, the noise floor and resolution of a 24-bit channel will be 24 decibels greater than is necessary. Stuart asserts that the minimum rectangular (i.e., not noise-shaped) channel necessary to ensure transparency is linear PCM with 18.2-bit samples at 58 kHz. He recommends 20-bit/58 kHz as being *juuuust* right, while conceding that the industry will likely adopt a standard of either 96 kHz or 88.2 kHz in order to maximize compatibility with the existing 48 kHz and 44.1 kHz standards.

Perhaps the most startling—to the audiophile mind, anyway—part of Stuart's paper concerns his enthusiasm for lossless data compression. Unlike *lossy* compression schemes like Dolby Digital and DTS, which throw away some of the signal all of the time, *lossless* compression (or as Stuart calls it, packed PCM) simply groups the digital data into more efficient packets of information, with no data loss whatsoever. Properly implemented, as it is in Stuart's recommendation, lossless compression could enable a DVD-Audio format to use a 96-kHz sampling rate without halving the disc's playing time. Whether audiophiles can learn to get over their fear and loathing for the term "data compression" as it applies to digital audio is anyone's guess.

But I have to say, this year's AES was the most exciting I've attended in the plain, raw terms of audio's best minds attacking today's most important audio issues—optimal production techniques for 5.1-channel recording and the DVD-Audio standard—instead of engaging in the kind of superfluous academic navel-gazing that has marked too many AES Conventions in the past.

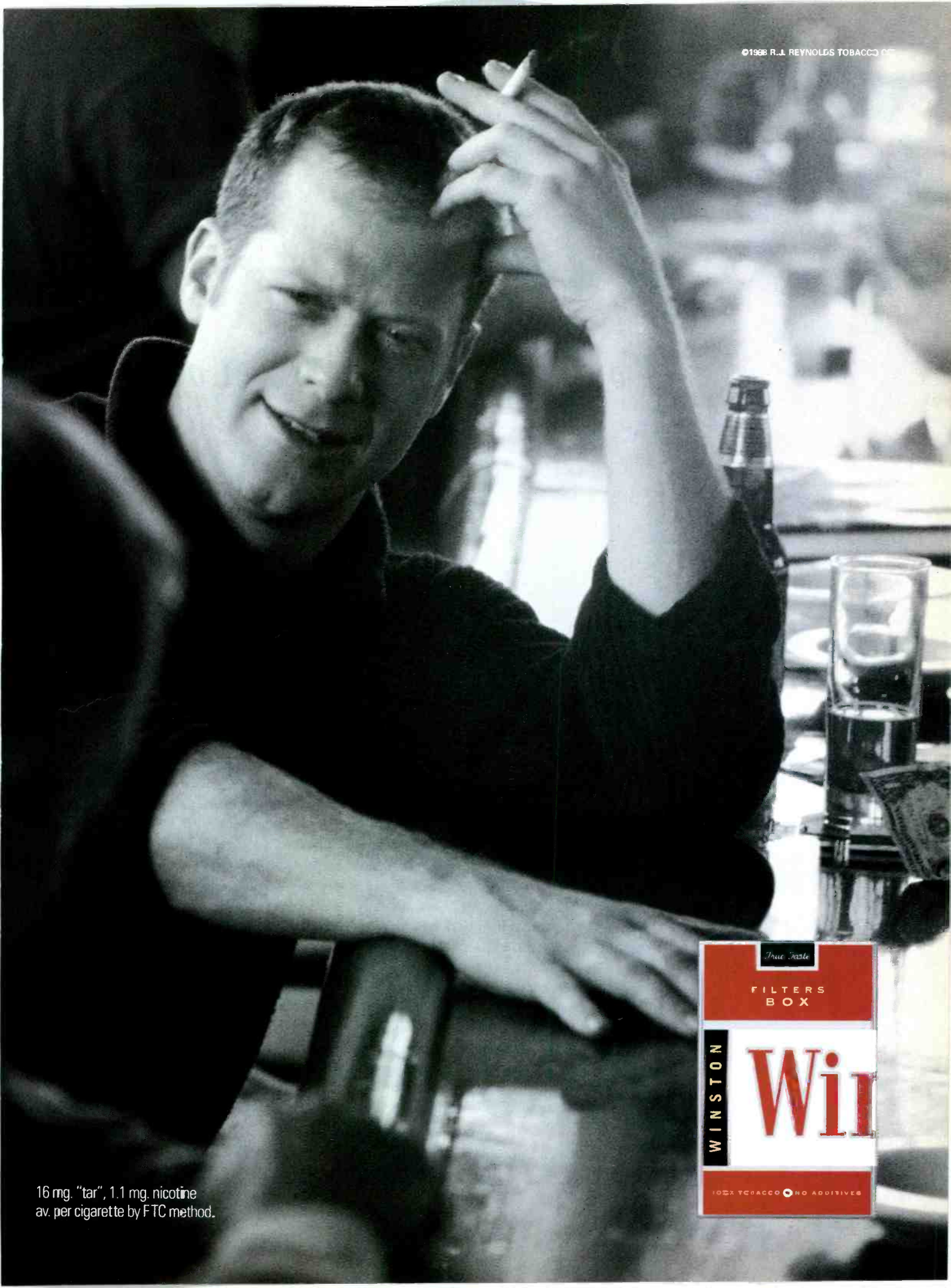
Here's hoping that recording engineers heed the AES authors' advice regarding 5.1 for future music recording and that the DVD-Audio committee adopts the ARA's proposal and makes a truly dramatic leap forward from the CD. If both of these things happen, we can look forward to an era of unprecedented realism in audio reproduction. And if they don't, well, we've always got 8-track. **A**

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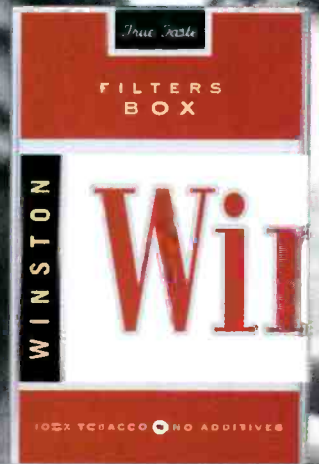
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RADIO

today and tomorrow

by John Gatski

A little more than three years ago, in the September 1994 issue, I wrote about the future of digital radio. At that time, I scrutinized potential new digital services designed to bring the virtues of 1s and 0s to radio listeners: CD-like frequency response and dynamic range plus freedom from noise, distortion, and multipath interference, the last perhaps FM radio's greatest liability. In 1994, a report on digital radio (also referred to as digital audio broadcasting, or DAB) seemed timely, because millions of American consumers had already adopted the digital Compact Disc during the decade or so since its introduction, and small-dish digital broadcast satellite TV (DBS) had been launched successfully. Other digital audio formats—DAT, MiniDisc, and DCC—had been introduced with varying success, and lots of talk and engineering effort was being directed to developing high-definition digital TV, now set to hit the airwaves later this year.

Unfortunately, despite this proliferation of things digital in the average consumer's life, radio remains a straggler. Development and testing of digital transmission systems that could be used by the 12,000 local U.S. radio broadcasters, which beam the bulk of their programming to car listeners, have been ongoing for about four years, but the radio industry has not yet chosen one to propose to the FCC. Of course, analog broadcasting—with its transmission roots in the 1920s—contains some digital links in its audio chain (playback sources, editing, studio-to-transmitter links, hard-disk recording of announcers, and so forth). Yet because of technical, commercial, and political obstacles, the crucial transmission stage of radio remains analog.

Digital radio transmission for terrestrial (land-based) broadcasting has not progressed as quickly as advocates would like, but it is moving forward (albeit slowly). Powerful broadcast technology companies, in partnership with advanced research conglomerates, are developing digital systems to replace the

John Gatski, a contributor to Audio and editor of Pro Audio Review, was on the editorial staff of Radio World from 1988 to 1995.



Illustration: Adam McCauley



analog conduits of existing AM and FM stations, and other companies are already poised to offer digital radio directly from satellite.

In-Band, On-Channel

Because of the shortage of available space in the frequency spectrum, radio broadcasters have gravitated to a type of digital transmission system termed in-band, on-channel (IBOC), which would use existing station frequencies and simulcast or bury the digital signal on the analog carrier. In fact, the National Association of Broadcasters (NAB) is intent on its members using only their current channel frequencies. Doing so would avoid drastic changes to radio stations' commercial mar-

kets and coverage areas, which they fear an out-of-band digital system would require. In theory, were it perfected, an IBOC system would enable FM and AM stations to convey digital radio signals on a subcarrier without disruptive changes to their familiar analog radio frequencies, loss of commercial revenues, or upheavals in their listening audience. The crucial phrase, of course, is "were it perfected." Thus far, it hasn't been.

An early version of an IBOC system, tested in Cleveland by the Lewis Research Center in 1995, showed that a digital signal could be simulcast within an analog signal. But to be workable, the system needed improvements in the digital compression "codecs" used to reduce the required data

rate and narrower bandwidth to ensure that the digital signal wouldn't interfere with adjacent analog channels or a broadcaster's main analog signal.

A European-developed, out-of-band digital radio technology, known as Eureka 147, is now being implemented in Canada by Digital Radio Research, Inc. (DRRI), a consortium of large private broadcasters and the government-owned radio network, the Canadian Broadcasting Corporation (CBC). Full-time digital transmission began in Toronto last fall. Eureka 147 fared well in lab tests, and the perceptual coding scheme (Musicam) that it uses to achieve its 6:1 data reduction has been found transparent in controlled listening tests. However, the transmission system is

DMX **BY SATELLITE** **A USER REPORT**

The future of terrestrial digital radio in the U.S. may be uncertain at the moment, but there is already an alternative in the form of satellite-borne digital music services, the best known of which is Digital Music Express, or DMX.

The company was founded more than a decade ago to provide digital audio to homes and businesses, without commercials or announcements. According to DMX, the service is available on four continents and reaches more than 2 million homes and 40,000 businesses in the U.S. alone. It's delivered to homes in several different ways. For the diehard music fan, it can be received directly from a satellite rooftop antenna, which can pull in

more than 90 channels of music, including ethnic music and seasonal channels.

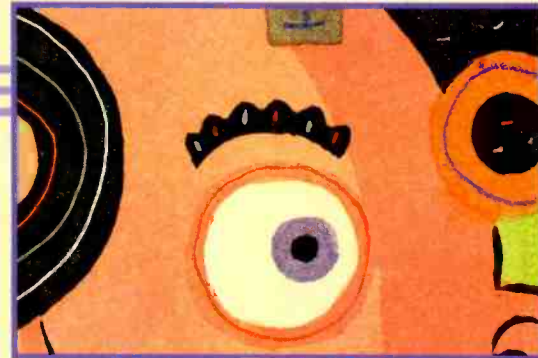
But most DMX listeners receive it as part of their cable TV service, in which case a standard package of 30 channels is provided. Depending on your tastes, the cable package may seem to skimp on certain kinds of music: It includes only two classical channels, for instance, "Symphonic" and "Chamber Music," although the company seems to interpret both terms rather broadly. Even the full, direct service adds only a couple of other classical channels, including opera. Country and jazz fare a little better, but the service is obviously intended for pop/rock fans, as the overwhelming majority of

programs are aimed at them.

A similar selection is included in several satellite TV services, such as PrimeStar (and was offered by the now-defunct AlphaStar). Other satellite delivery systems include digital music, but from other sources; DSS's DirecTV, for instance, adds 31 channels of digital audio from Music Choice.

One benefit enjoyed by DMX listeners who receive the signal via cable and directly from satellite is that the digital tuner's remote control has an LCD readout that can display details about the selection currently playing, including title, artist, album name, label, and so forth. The TV satellite systems, on the other hand,

use their regular tuners for both video and audio and thus lack this readout capability. For those who are receiving the service by that means, DMX posts the information on its Web site (www.dmxmusic.com) within two or three minutes of a selection being played. Getting the information that way is obviously more cumbersome than simply pressing a button on the remote, but it is useful when you simply must identify a piece of music. The Internet listing also has the benefit of showing what has been played earlier.





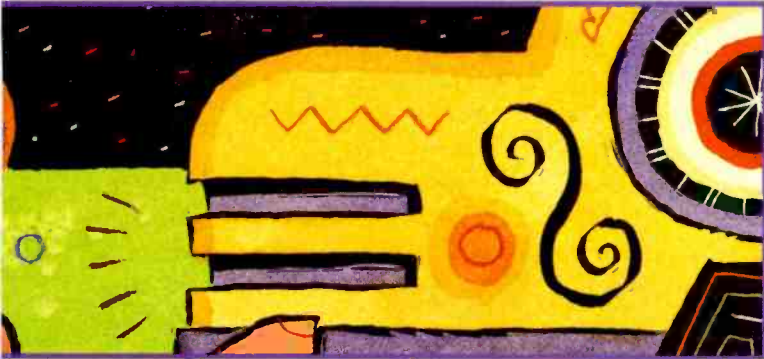
designed to operate best in the L band, at about 1.5 GHz—scarce spectrum that is set aside in the U.S. for military and government use. Moreover, U.S. broadcasters were never enthusiastic about Eureka because it requires new spectrum, an entirely new band assigned to digital radio. Eureka also must use gap-filler transmitters in hard-to-reach signal areas, such as heavy skyscraper concentrations and tunnels.

The newest U.S.-originated IBOC system, claimed to be more advanced than previous versions, is being developed by a partnership of Westinghouse CBS, Gannett Newspapers, Lucent Technologies (Bell Labs' Innovations Research division), and Gannett Radio. More than 30 engineers are working at the Westinghouse Wireless lab

in Baltimore, Lucent Bell Labs in New Jersey, and Xetron Corporation in Cincinnati (where they have been focusing on this research since mid-1997) to develop the USA Digital Radio (USADR) system.

Glynn Walden, Vice President of Engineering for the CBS Radio Division, says the USADR/Lucent team is developing a hybrid digital/analog broadcast system that uses a robust transmission technique called orthogonal frequency-division multiplexing (OFDM), coupled with AT&T/Lucent Technologies' Perceptual Audio Coding (PAC) data-reduction scheme. PAC is claimed to achieve near-CD-quality audio at a lower data rate than the original IBOC system tested in 1995. The combination of PAC and OFDM,

according to USADR research, will enable a digital audio signal and auxiliary data to be broadcast simultaneously with an analog FM signal. Backers of the USADR IBOC system say it would enable the many millions of listeners who have conventional analog FM radios—and those with yet-to-be-produced hybrid analog/digital receivers—to hear their favorite stations without adjacent-channel interference. The long-term plan for IBOC, however, is to use the hybrid system until analog transmission is eventually phased out, though that could take many years. (*Editor's Note:* In Canada, the DRRRI consortium anticipates complete digital radio coverage in seven years and analog services to cease after 15 years.—A.L.)



One of the banes of much contemporary radio is repetition of songs. DMX offers a more extensive playlist than most radio stations: The company claims its channels carry three to seven times the number of songs as conventional stations. Except for hits, the company says that the total number of tracks played, plus the ability to vary times of the day when songs are repeated, means that a listener could go for weeks without hearing the same song twice. In a couple of months of listening, I was never conscious of that oh-no-

there's-"Yesterday"-again feeling.

Consistency was something else. Certainly, if you dial up "60s Oldies" or "Reggae," you can be sure that the music will fall into a fairly narrow stylistic range. But the two classical channels that I could receive covered so much territory as to seem very unfocused. On the other hand, perhaps services like DMX are not really meant for critical listening; as background music they work fine.

As with any sort of audio delivery system, a major concern is sound quality. In the

absence of test signals, my evaluation was mostly subjective, but I was favorably impressed. I was not surprised, however, for DMX uses AC-3 data reduction, which is also found in Dolby Digital surround. This system, used here in two-channel form, has proved to be as close to transparent as a processed signal is likely to get.

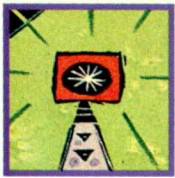
I was able to observe phase and channel separation. Using an oscilloscope developed by audio consultant Neil Muncy, I determined that the DMX engineers were playing it straight. Mono really was mono, and stereo signals showed no signs of processing or synthesis. I confirmed this from time to time by feeding the signal to a Dolby Pro Logic decoder; I heard none of the exaggerated noises from the surround speakers that are common when you apply

Pro Logic to the signal of a conventional FM station.

On a few occasions, by acting quickly, I was able to find my own CD version of what was being transmitted and get it on the player before the DMX version was over. Although that hardly counts as a real A/B test, I didn't see any gross differences on the oscilloscope and concluded that DMX was injecting no processing other than the basic AC-3 coding. Nor did I hear anything untoward; one particularly rotten-sounding recording turned out to be just that: a rotten recording.

In most ways, DMX and other such services offer a lot less than ordinary radio; they're like huge CD changers permanently set on random play. But there is room for that, and it's encouraging to know that the task is being performed so well.

Ian G. Masters



Lab testing of the hybrid system is expected by late spring, and actual over-the-air tests could start this summer. The research—if successful—also could revolutionize AM audio quality through a concurrent broadcast project, a hybrid digital/analog transmission system that would eliminate the pesky electrical noise and channel interference that has plagued AM reception for years.

CBS Radio's Walden boldly predicts that some stations could be broadcasting hybrid analog/digital radio by 1999. And because

the power of the accompanying analog transmission.

Because radio transmission and reception can be made unpredictable by such obstacles as buildings, trees, and hillsides, analog radio signals often fade, get noisy, or disappear momentarily; the main culprit is multipath (reflected signals arriving at the antenna along with the direct signal). Most of the time, though, the analog signal—however diminished—remains listenable. But with digital transmission, multipath might cause a reception glitch even

Further, he notes that broadcasters will not be anxious to spend thousands of dollars upgrading to another system if the first system they adopt has problems.

If IBOC is implemented, one of its capabilities could be worrisome, according to Marino. He claims that the digital system can be configured to broadcast at lower bit rates so as to allocate more of the spectrum to data services (for instance, pagers, messages, stock market quotes, and sports scores). Marino hopes that broadcasters will be prudent and not reduce the data

Because of technical, commercial, and political obstacles, the crucial transmission stage of radio remains analog.

the new system would use already allocated channels, he is confident that the Federal Communications Commission approval process would not be as complicated as that required for a new out-of-band system, such as Eureka.

PACing It In

At the heart of the USADR IBOC system is AT&T's sophisticated PAC digital data-reduction scheme. Similar to MiniDisc's ATRAC or Dolby Digital's AC-3, PAC is based on the principles of auditory masking. Audio information that is not discernible—e.g., a soft sound masked by a loud sound close to it in frequency—is encoded with fewer bits (or not encoded at all). Running at a data rate of 96 kilobits per second, PAC is said to yield CD-quality audio. (The data rate of a conventional CD with no data reduction is approximately 1.5 megabits/second.) With IBOC transmission on FM channels, the data rate can fall to as low as 48 kilobits per second and still maintain "near-FM quality," according to Walden. "The thing about this algorithm is that it does not produce strange, audible artifacts," even at aggressive compression levels. He says that if PAC is married to an aggressive error-correction system and a high-quality hybrid analog/digital receiver, home radio reception will sound as clean as CD. And, he adds, the digital transmission will require only a hundredth of

more annoying than analog fading and noise: total silence. Like a CD player that completely mutes the sound when pressing flaws, excessive dirt, or scratches prevent it from reading a disc, a digital radio receiver could be totally silenced by a weak or interfered-with signal.

CBS Radio's Walden says that the hybrid analog/digital IBOC receiver could actually help lessen the chance of dead air by automatically switching to a stronger signal—whether digital or analog. "There will be [reception] areas where the analog [signal] will be more trashed, and there will be areas where the digital is trashed more than the analog," he explains. When the hybrid system eventually becomes all-digital, as USADR predicts, the power level for the digital transmission will be increased and a delayed, frequency-diversity-tuned backup digital channel will be added to mitigate signal outages in a station's coverage area, Walden adds.

John Marino, the NAB's Vice President of Science and Technology, asserts that the broadcaster advocacy group supports the USADR's IBOC effort. However, the association wants to ensure that existing FM broadcast quality not be degraded and that the regulatory process for a new digital transmission be minimally intrusive. "There already is a good [transmission] system out there with analog FM. We view digital as an enhancement," Marino says.

rate to the point of adversely affecting sound quality. Such a tactic could ultimately harm the reputation of terrestrial radio broadcasters, he emphasizes.

No Noise Is Good News

The USADR-proposed AM digital IBOC system would transmit at a data rate of 48 kilobits per second and use the PAC data-reduction scheme, yielding "near-FM" audio quality free of the noise and troubles that plague analog AM reception, such as whistles, static, electrical interference, fading, and long-distance stations knocking out local stations at night (the last viewed as desirable by DX listeners, of course). Robustness is said to be built into the system. The data rate could fall to as low as 16 kilobits per second and still offer audio frequency response marginally better than analog AM, but without noise, according to CBS Radio's Walden.

"I was blown away when I heard digital AM in an informal lab demo," says Rick Martinson, Digital Radio Project Manager for Westinghouse Wireless. "This will bring noise-free AM to your home and car. It's going to sound like FM."

If the proposed IBOC systems sound too good to be true—broadcasting digital and analog signals on both AM and FM bands while simultaneously offering data capacity for screen text and displays of song titles, artist and album names, and messages—



there are indeed doubters. Critics contend that no matter how good the technology is, in-band systems that transmit analog and digital signals together will have problems. Walden and Martinson, though partisan observers, remain convinced that the PAC algorithm will ultimately enable radio stations to broadcast digital signals without disrupting the stations' current coverage and channel location.

The Receiving End

Receiver manufacturers are waiting for the definitive IBOC system to be developed before making any announcements about product delivery. However, Scott Wright, a spokesman for Delco, a major U.S. maker of car radios, says that unlike in the past, when receivers were virtually the same around the world, different designs will have to be produced for different countries: AM/FM IBOC for the U.S. and AM/FM/Eureka for Canada and Mexico.

CBS's Walden says that IBOC receivers in the U.S. should offer compatibility with hybrid analog/digital AM/FM in addition to an all-digital system so that consumers will not have to make two upgrades from their old analog receivers. Walden predicts that initial products will be in the price range of premium car decks and high-end home units but that prices will come down as demand increases.

text.) Unfortunately, many of the stations with RBDS capability are not using the technology to its full potential. With the recent proliferation of RBDS-equipped radios (confusingly labeled "RDS") from various manufacturers, listeners (including me) in many markets have reported stations with RBDS encoders merely transmitting their call letters or a station slogan. Those stations providing artist names, song titles, and more in-depth text with RBDS are said to be exceedingly rare.

Home Satellite Digital Audio

Digital radio skeptics are less uncertain about satellite digital broadcasting. Several DBS systems, such as PrimeStar and DSS, already provide digital broadcasts of music channels. Another popular digital audio system, Digital Music Express, is also delivered by satellite. DSS's DirecTV, for example, offers Music Choice, a packet of 31 music genres digitally transmitted via the DirecTV satellite on the Ku band; the signal is digital all the way to the home DSS receiver. In 1996, Music Choice added text capability to the channels, which can now automatically display song titles, artists' names, album title, and an 800 phone number in case you want to order the CD you've just heard. The text feature works well, though its display sometimes lags

designed to accept the authorized digital programming. Thirty channels will be dedicated to different music genres; the other 20 channels will be used for news, talk, and information. Subscription fees are expected to be less than \$10 per month.

Robert Briskman, CD Radio's Executive Vice President of Engineering, says the spread-spectrum technology permits robust digital satellite reception and that "gap-filler" terrestrial transmitters will be positioned in major cities to augment satellite coverage where reception could be weak. The antennas that will be used for in-car reception are claimed to be as unobtrusive as current car antennas, and Briskman predicts that manufacturers will be able to produce receivers at competitive prices.

American Mobile Radio Corporation (AMRC), affiliated with the Hughes Corporation, is another satellite digital radio player that plans a subscription-based service in the near future.

Predicting the Outcome

Although the USADR proponents believe that digital delivery is workable on existing radio frequencies, the reality is that even with optimistic projections, the satellite digital radio services are likely to begin operations first, probably within a couple

Satellite digital radio services to cars are likely to begin operations first, probably within a couple of years.

The Reality of RBDS

Of course, some digital broadcast capability is already in place in the U.S. Nearly 1,000 FM stations are equipped with the Radio Broadcast Data System (RBDS), a digital subcarrier that can display the time, weather and traffic conditions, station format (jazz, rock, classical, etc.), album and song titles, and artist names. RBDS is based on a 1980s European technology that delivers about 1.2 kilobits per second of data. (The IBOC system is claimed to provide many times that data rate for ancillary

song changes. And occasionally the display will freeze on the previous song during the entire playback of the next one.

Satellite broadcasts have so far been confined to home reception. But that may soon change: CD Radio is a new digital system slated to be ready by late 1999. This 50-channel, subscription-based system will use spread-spectrum transmission technology (used for cellular phones, military communications, and the like) to broadcast from two satellites that are to be launched in late 1999. The S-band, 2.3-GHz signals will be broadcast to receivers

of years. Already the DBS music services demonstrate that delivering audio to the home is easily accomplished. However, they and the more mobile-oriented satellite services described above are like pay TV channels, with a variety of programming but without the local flavor of terrestrial radio stations. Whether digital or analog, the future of over-the-air radio ultimately hinges on local broadcast.

Despite the disappointments and slow progress in digital radio over the last few years, the scenario is still unfolding. As they say in broadcasting, stay tuned. **A**

by Daniel Levitin

JOHN

The vast majority of rock and pop musicians rely on outside producers; only a few have successfully produced themselves: John Fogerty, Stevie Wonder, Prince, Paul McCartney, Donald Fagen and Walter Becker (Steely Dan), Brian Wilson, Richard Carpenter, Neil Young, Lindsey Buckingham (Fleetwood Mac), Paul Simon and Jimmy Page and Robert Plant (Led Zeppelin). While each of these self-producers has his own strengths, Fogerty is able to work in all aspects of record production. The band with which he was associated from 1967 to 1972, Creedence Clearwater Revival, was scarcely more than a convenient fiction, a marketing vehicle for Fogerty's songwriting and production ideas. With their swampy grooves, CCR's albums seem to be the epitome of laid-back front-porch casualness, but they are, in fact, impeccably produced and carefully orchestrated. Fogerty wrote every note that was played and in many cases played most of those notes himself, alternately handling guitar (acoustic and electric), Dobro, saxophone, har-

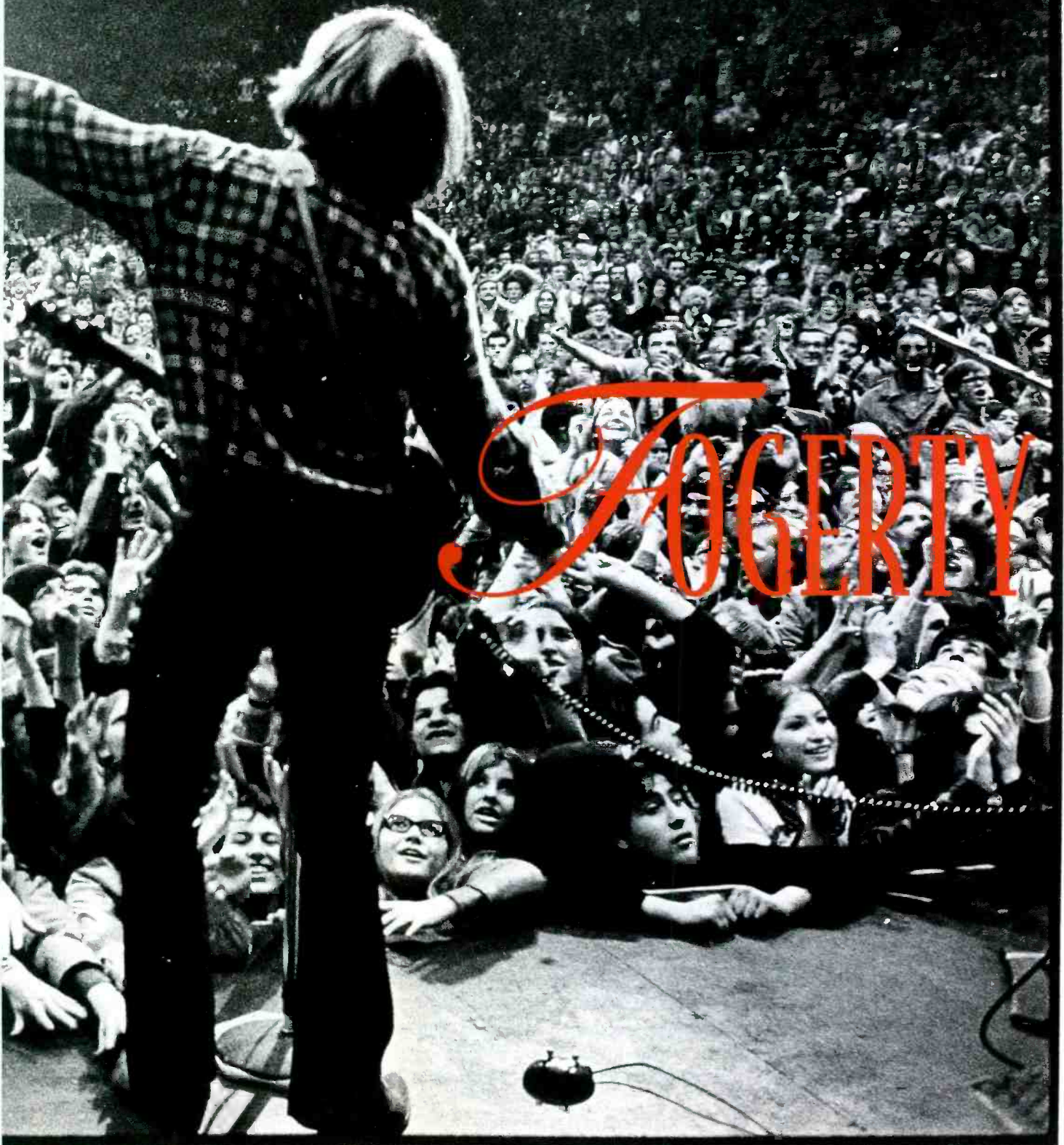


monica, and vocals. On all his albums, Fogerty's musical arrangements are simple enough that almost any band can play them and sound good doing so. But his performances are subtle and intricate enough that no one has ever bettered them. On the engineering side, his records have always conveyed a strongly identifiable sound and technical consistency. He also has an uncanny ability to pick hit singles. A generation of rock bands—from ZZ Top, Lynyrd Skynyrd, and The Allman Brothers to The Eagles and Chris Isaak—has been influenced by Fogerty's melding of rock, blues, country, and bluegrass. And more than a few current country hits have been written around guitar licks he played (and wrote) in the 1960s.

In June 1997, Fogerty released a fine new solo album, *Blue Moon Swamp*, reportedly five years in the making. He used the occasion of its release to talk to me about his philosophy of producing records and how he achieved some of the sounds he and CCR are famous for. D.L.

Daniel Levitin is a member of the Research Staff at Interval Research Corporation, in Palo Alto, California; Visiting Professor of Psychology at Stanford University; and Visiting Scholar at the Center for Computer Research in Music and Acoustics at Stanford University. He was formerly a staff recording engineer and producer for 415/Columbia Records.

I N T E R V I E W



Photograph: ©1970, BARON WOLMAN/RETNA LTD.

I know that for the new album you said that you wanted to take some time out to become a better guitar player. But you are considered by many to be one of the great guitarists. Where did that desire come from?

Well, I'm not sure I can answer that. I'll try. When I was young, I was smitten by Elvis and Duane Eddy. But there came a point when I could tell the difference between their roles; Elvis on the Dorsey show was just strumming his guitar. I've had renewed respect for him in later years. He sure strummed it great. He could really mash the guitar, and those old Sun Records have a great acoustic sound. But still, there came a time when I knew there were other guys who could play with a lot more technique and finesse. Particularly Chet Atkins and

Photograph: © Barry Wentzell/Star File

With Creedence, I was trying to present the image of a

blue m

Blue Velvets] emulated The Ventures and Duane Eddy.

But as good as those records are, there's not a lot of technique there. Which is why they sound so good played by garage bands. And also, I might say, that's the same secret of Creedence. All the arrangements I did were for four people who were kind of medium talent or less on their instruments. So the reason all the Creedence stuff sounds so good by every bar band in

you're doing. You can sing the guitar line; you can say it with your mouth.

I guess that's partly the simplicity, and also it's that you've written parts that are so memorable. You could take the lead-in from any one of 40 Creedence songs, play it for somebody on another instrument, and he would know the tune.

Well, I read something once where a writer was listing the 10 most influential guitar players, and somehow he had stuck my name in there. It was a real shock to me. I went "huh?" There were people on there like Cliff Gallup, Eddie Van Halen, and Jimi Hendrix. But the guy's theory was that in the case of me and Eddie and Jimi, we're all songwriters. And a guy who writes songs and can apply that same knack to his playing will write parts; he'll tend to play things that you remember—as opposed to a Les Paul, who's so incredible, but you could never hum his parts. It's an interesting theory.

There's always this tension between the technique and the passion, with the extreme case maybe being someone like Al DiMeola. . .

Thank you!

. . . on the technique side.

Yeah, and you know what? If he were in the next room, I might not even get up out of my chair to go listen.

But then there are players like Buddy Guy, who have so much energy that when they're playing one note it knocks you over.

Right.

So this internal battle you have with technique: How do you perceive it and the desire to balance energy in your playing?

Well, it's sort of a cop out—kind of like the argument about not learning to read music, which I still don't know how to do for the guitar. I'll say, "I don't want to get any better because then with my technique I'll end up screwing the music up, like those guys that play a million notes." So in the old days of Creedence, my aesthetic was more toward less is more, that simple is more powerful. I still feel that way. And I'm very happy with most of the stuff I did with



James Burton. Chet was the first guitarist I appreciated because he was the artist, the solo artist. He was the name on his records. He was obviously real good, and I liked some of his early records. Chet was more country and more elegant, and I knew that he was awfully damn good. But then James Burton came along, and he was rock 'n' roll. He just really played the crap out of that guitar. It sounded so good, particularly on the records he made with Rick Nelson. I'm about 14 years old and I'm thinking, "When I grow up, I want to be a really good guitar player like that." And then you go on, and you're in a garage band that plays mostly instrumentals, so we [Fogerty and the earlier incarnation of CCR, The

**Creedence Clearwater Revival
in its heyday: (left to right)
Stu Cook, Doug Clifford,
John and Tom Fogerty.**

the world is that the ability required to play the stuff is so minimal that anyone can play it and it sounds good.

I still play in concert these days in a very simple way—not a lot of technique, not real complicated. My way of playing guitar is more like singing with the guitar, like a vocalist, so that you could hum the parts. You know, "Green River," if you go. . . [sings opening guitar line], everybody knows what

on rising

group – this band of happy lads, much like The Beatles.

Creedence. Although, let's say, something like "I Heard It Through the Grapevine," where I go off for 11 minutes basically in the same position on the guitar. . .there's times now when, although I don't actually sit down and play those things, I'll be in the car, just driving along, and hear them. This actually happened about 10 years ago with that song; I was on the highway and four, then five minutes pass and I'm thinking, "Come on, John, do something different now." And then there was *another* chorus. *There's a real tubey sound in your solo on that song, a beautiful guitar tone I hadn't heard on your other recordings. How did that come about?*

Well, that's a Les Paul Custom, the same one that I still use for recording. I don't take it out on the road, but I have other guitars from that era; that's the black one. It was a small Fender amp, probably the Concert; I used to always play through the Vibrolux, but at some point mine developed a chirp in the vibrato, so we had to rush out and get something else at the local music store, and we got the next larger model. So I'm thinking it was the two-speaker—whatever was the vintage—'67, '68, '69 Fender.

Open back?

Open back, with the silver grille. You know, I think it was probably two 12-inch speakers, not two 10s. But the whole song's played on one amp. There was no switching. I think I may have gone to the bass pickup on the guitar for the solos.

Yeah, it sounds that way. It has that kind of fullness.

Yeah, what Eric [Clapton] called the "woman" tone. But best as I can tell—I've done some relistening in the past couple of years—he would darken up the bass pickup by putting all the bass tone on it. But to me, that makes it kind of unprintable. It makes it too [sings imitation]. But it certainly worked for him in those days.

In particular, I know you wanted to spend time studying Dobro. But you played it 25 years ago on "Lookin' Out My Back Door."

Well, I played one little lick on the Dobro for that. I figured out how to do it by just playing with a flat pick.

There are two Dobro parts in there, right? There's the solo and then some fills going on through the whole tune.

Yeah, I guess you could say that, but it's just what one mediocre player would play. But you know, I had a knack for making records—that's the producer guy talking. Anyway, I couldn't really play the Dobro, it was so complicated and so over my head. I was down in Nashville at the Johnny Cash show in 1969, that's where I picked this up, and Tut Taylor, who was with Johnny's band, was saying, "Well, you know, you can do *slants* and *reverse slants*," and I went, "What in the world is that?!" And he said, "You know, you don't just put the bar straight across, you can slant it this way and it covers other frets." He sounded like a rocket scientist to me. I thought, "Oh my God!" So I went home and tried it for three days, and I finally said to myself, "Never mind. This is not my job right now." So I put it away for 25 years until 1992, when I was at a vintage guitar show and a guy had a Dobro for sale. I asked him to play me something, and he played pretty simple, too, but I thought, "Damn, that sound is so great." So I bought it from him because it was reasonable, and I'm really glad I did because it's a good one. Anyway, that's where it started. I was smitten; I was helpless. The sound kind of grabbed way down in my heart, where these things go—like seeing a pretty girl, you know? If you have any chance at all, you take the flying leap and go over and ask her a question. So that's what I did with the Dobro. I started without knowing anything, but the sound grabbed me and I said, "Man, I gotta learn how to do

this." And really play, rather than just working up a part for a record.

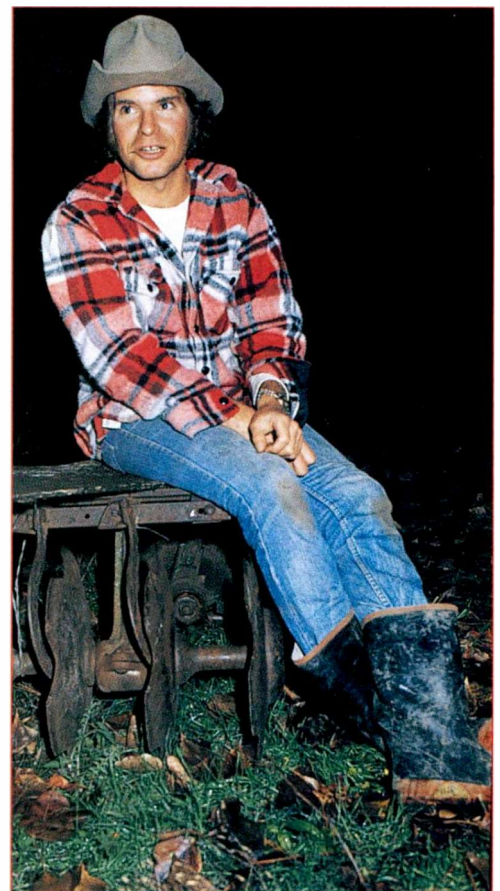
A lot of producers try to cop a sound from somebody else's record for the record they're making. That's not necessarily a negative thing. The Beatles, for example, were always trying to sound like other people. How much of that did you do in producing Creedence records? "Lookin' Out My Back Door" has some of the sounds of Ricky Nelson's "Hello Mary Lou."

If that's the case, then I would say no. [Laughs.] "Green River" is obviously a tip of the hat to the Sun Records sound, but I can't think of any real specific song. Actually, with the loping beat of the acoustic guitar and then the bass kind of doing that rocking beat on the I and the V, I tend to think of something like "Dream Baby" by Roy Orbison. Yet "Green River" was much more rocking than that song, but the rhythm treatment fit. Obviously I'm trying to sound *that* way as opposed to James Brown.

I can't think of a time we tried to capture another sound, except when we covered another person's song. Like "My Baby Left Me" by Elvis. We did our best, but we didn't

Photograph: ©Andrew Kent/Retna Ltd.

Post-CCR, Fogerty goes country in this 1975 publicity shot.



That's all arranging is: resolving those musical

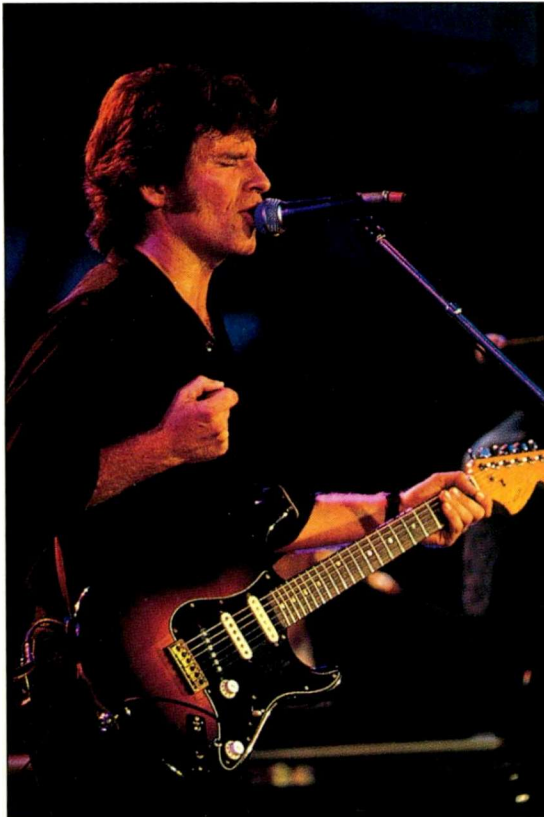
have the musicality of those guys. With my guitar playing, all I could do was give an *impression* of Scotty Moore, who is one of my idols. But in those days it was just an impression. I was playing with a traditional flat pick and playing with a couple of fingers. And Moore actually played all that stuff with a thumb pick and his fingers, more like Chet Atkins. I've since learned how to do it both ways, but that's what I went after in the last 10 years or so. But in those days, all I could try to do was get my little "impression of," and it was a sort of a limited impression at that.

Speaking of impressions, when The Hollies came out with "Long Cool Woman in a Black Dress"...

That was Creedence's greatest record! It's the way I feel about [Gene Vincent's recording of] "Be-Bop-A-Lula"—that was Elvis's greatest record!

And "Long Cool Woman" was "Green River," right?

Photograph: ©1985, Mike Fuller/Outline



Yeah, and kind of just the *vibe* coming from "Green River" and a little bit of "Bad Moon," and just kind of going off into the Creedence repertoire. And that's okay; unless you're actually stealing the song itself, the sound and the arrangement are just there for the asking, really.

Don't get me wrong. I'm not going to say that I was not influenced. I was influenced by everybody. I always made it clear by saying, "Here's a guy I love, here's another guy I love." I did not fall to the earth a complete original.

I was hoping we could set the historical record straight on something. You told Dan Forté in an interview for Guitar Player in 1985, that CCR was very much a band in the conventional sense, that everybody wrote and played their parts, and after they did that, you would go in and do everything else necessary to make it a record. Later in the interview you said that when you write a song you have all the parts figured out in your head, that you have the whole arrangement completed. Those two statements seem incompatible. How

Fogerty front and center in 1985, the year of his successful solo release, *Centerfield*.

much of the parts did you write for Doug Clifford, Stu Cook, and Tom Fogerty?

One hundred percent. I was always a team player. I had created this entity, and I was doing what a CEO today would call "marketing." I was trying to present the image of a group and that we were all this band of happy lads, much like The Beatles. And so years later I was still trying to defer to their egos and not make it look any other way.

But the truth is, I would write the song and then the producer in me would take over and write the arrangement, and I would show everybody *exactly* how it went. If you're going to go in and record, everybody's got to have a specific part, otherwise you have a train wreck—it's just going to be noise. So I arranged everything, quite specifically, much in the way that Benny Goodman did with his swing

band. There are only a couple of right ways to play a song, and there are a whole lot of wrong ways. With most Creedence songs, the arrangements were based on a groove or a rhythm. I've had people tell me, "Gee, you've always had this great groove going on in the background." Well, that's not an accident, that's what I wanted. You have to figure out what it is that grooves. Only a few things are going to work. Let's say you've figured out the guitar; then you've got to figure out the bass part, and the rhythm guitar part, and the drums that complement that because you still have a myriad of choices that could screw up your initial choice on the lead guitar. So it was very much chosen and arranged before they even heard the song.

I would show the guys in the band what to play. And in some cases, it got really touchy, especially as we made our way along the successful path we were taking. Their egos got more and more sensitive, to where I actually had to spoon-feed them the parts. I remember when I was showing Stu [bassist] "Down on the Corner," he was having a hell of a time with it. I was showing him one or two notes at a time, so that it evolved to where he thought he invented the part. I'd say, "well, try going. . . [sings first two notes of bass line]," and he'd play those, and then I'd say, "Well, what if you did this next. . . ." So by the time he got done, he actually thought he invented it, but I had worked it out a couple of weeks before.

Did you work it out by doing demos at your house on a tape machine, or was it all in your head?

Well, both ways. In fact, the guys used to say, "It seems like John was born with an eight-track machine in his head." I actually started playing around with that when I was still in ninth grade. I bought this Sony tape recorder that had a tweed covering on it.

Oh yes, with the built-in speakers?

Yes, and it had what they called "add-a-track." You could record something on the first track and then play that back and play

on rising

questions in a way that works, so you can go on.

along with it on the second track, so you were adding to it. I learned how to add three or four parts, and that I had to add the thing I wanted loudest last so that it was the cleanest. A lot of my arranging skill came from being able to experiment with that when I was 15 or 16 years old.

Did you go through several iterations of tapings to get the arrangements right, or did they come out right the first time?

No, no. Let's take a song like "Who'll Stop the Rain." I wrote that on my electric guitar, but unplugged so it sounded very acoustical. Remember, I'm a guy in a little two-room apartment, and can't be rocking out because my neighbors would let me know about it. So I would do that late at night, and it would have a very acoustical sound, so I could imagine an acoustical sound for the song. Which means we're talking kind of folk-rock, if you're going to hyphenate what it was in those days. And you just start imagining what will work. Let's take a bass part: You don't want it to be doing what a Jimi Hendrix part would do, or a James Brown part [*sings a typical funk James Brown bass line*]. You can't do that. You need something that complements the "do-da-chinga-chinga-chinga" of the guitar; you almost end up doing it with your mouth. And the same with the drums: It has to lock together, and it has to complement the acoustic strumming part. It can't be any more complicated or you're going to start getting into some new fusion of some kind.

Well, okay, you can solve the rhythm problem that way. But then there's the choice of notes to make.

Well, in my mind not. You know, the bass has to be supportive. I never really bought into the late '70s and '80s music, or what I just said, "fusion": I never thought of the bass as a lead instrument. And I don't believe you need more than five strings on a bass. You sure don't need all those gadgets. The concept of reverb, echo, and delay on a bass—I'm sorry.

In a typical case, would you go through a whole bunch of demo versions before you brought it to the band?

A few, at home. Certainly I would work it out with the guys, showing them what notes to play, but obviously there would be a couple of places you'd hit where there was a



question from one of the band, and I was always the one who answered it; my personality allowed me to do that.

This is a very different style of working from that of most artists. It's more like what Brian Wilson, Stevie Wonder, or Prince do but not at all like most people work. The typical producer, whether it's a self-producer or not, just has the musicians play a whole bunch of different things and listens and then tells them what works.

Oh no, I would know which one was going to work long before we went into it. That was my *job*. The guys really did not have the musicality to come up with things like that. *Well, I guess history's proven that. Southern Pacific and the other things they've gone on to do haven't been successful.*

There's a lot of ways to judge that, and you can say it cynically or non-cynically. In an

arrangement, you're asking someone to delve within their own taste and musical knowledge and come up with something. I've actually said this to those guys when I was angry with them: "You know, we could stand here until the end of eternity and you're not going to come up with it. It's just not going to happen, because it's not in you."

You knew how to make records.

Yeah, and I knew how to resolve those musical questions. And that's all arranging is: Resolving those musical questions in a way that works, so that you can go on. Have you

Fogerty down on the corner with some famous friends during a 1993 all-star jam.

ever noticed that you'll be listening to something by a good band, let's say Van Halen or Quiet Riot, and it starts out good enough—maybe there's a lead guitar you like—and then the guy comes in singing, and somewhere in the middle it just kind of goes *sphrrrlt* and turns into a mess. That's because they didn't resolve it right, either in the songwriting or the arrangement. In the songwriting there are all those choices: What chord do I go to, what note do I sing? But even in just the music, where it starts out kind of cool or ends up chaos.

Photograph: © 1993, Steve Granitz/Retna Ltd.

I guess there are three separate elements to what you and I are calling arranging. One is how the separate elements of the song go together, and whether there's an intro or not, whether you start on the chorus. The second element is the parts, the notes that the various instruments will play over and above the melody and chords. And the final element is the different instrumental colors and textures in the song, the question of instrumentation and who plays what parts. You can go wrong and derail the train at any one of those points.

In the days of Creedence my aesthetic was

blue m

By "dry" I mean he doesn't use vibrato, which Elvis did. The thing I've noticed about Paul, particularly in "Yesterday," is that the dry sound is so great because it sounds like he's right in your ear. That's a tendency of his I've noticed over the years, his remarkable lack of vibrato—that's his sound. I've often thought when I'm singing along with him, "Oh, too much vibrato, John, they'll think you're Elvis."

With the release of *Blue Moon Swamp* last year, Fogerty hit the road...

In your flat-out rock 'n' roll voice, is there someone you're hearing in your head besides yourself?

Well, I'd certainly have to tip my hat to Little Richard. But it's sort of a composite guy, because I love Wilson Pickett, and there are a few guys who have that sort of high, edgy thing, Little Richard being the best and the most famous. Wilson even screamed in tune. My voice came out a certain way, and I've learned to be that way. But it is an affectation; it's something I had to work on. That's the part that people don't understand. It's

just like guitar playing. You decide in your mind that you want to get good, want to play. But it takes work and practice.

And you practice developing a sound on the instrument that isn't something you had from the get-go.

Right, you end up getting to where you want if you put in enough practice time. It was the same for me and my singing. I had a mental image of what my voice ought to sound like, but it sure didn't sound like that when I was 14—just kind of like any other kid who's voice was cracking.

And there was that whole other thing, of you sounding Southern, affecting the Southern accent in your singing.

That's because what I aspired to—what I thought was cool, in other words—was the

way I ended up sounding. That was what worked for me. It's your musical personality. You should do stuff you're good at and favor your strengths. I've drifted into not always doing that, on some of *Eye of the Zombie* [1986] and maybe some of the cuts from *Blue Ridge Rangers* [1973]. Maybe I tried to be a little more country than I really am, so it sounded like some guy who was out of his element, so to speak.

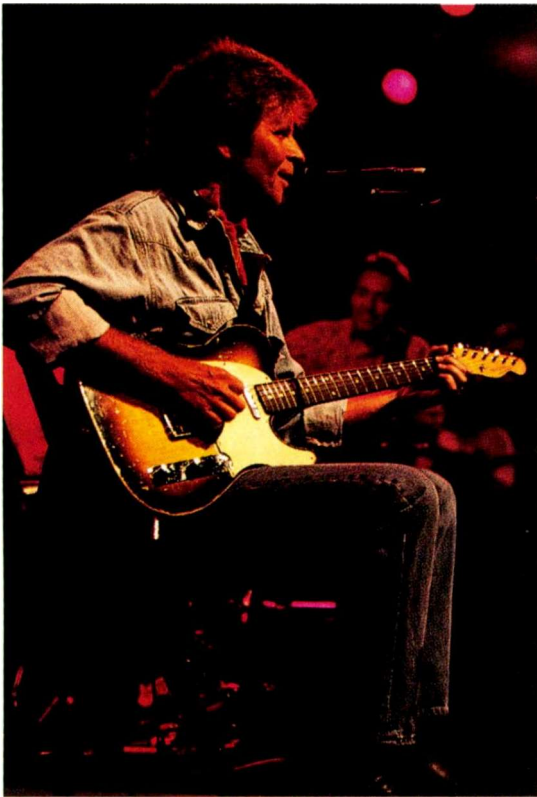
On your Showtime special you were singing a lot of do-wop tunes, and I had never heard that sweet, beautiful John Fogerty voice before. I like your rock voice, but I had no idea you could do that, too!

With *Blue Moon Swamp*, people have commented that there's some softer singing and they ask, "Are you getting softer?" And I say no, but that kind of material demanded that I sound that way. This past Christmas, at my kid's school, the music director wanted me to do the song "Amen" with the kids. So I got up with the acoustic guitar and I sang that with the kids, and afterwards people came up to me and said, "Your voice is so sweet and angelic, I didn't know you could do that." And I was thinking, what do you want me to do, Little Richard in the middle of "Amen?" It was just what the job required at the time.

It's a nice palette of sounds to draw from.

Thank you, I appreciate the compliment. But to me the tough thing, or the rarer thing in this world, is having a good rock 'n' roll voice, especially being a white guy. Paul McCartney's got a great one that for some reason he chooses not to use. Of course, Paul Rogers has that wonderful voice. Even Ted Neely, the guy who did *Jesus Christ Superstar*. . .we haven't heard from him in a long time, but he's got a great voice.

In many of the Creedence recordings you layered a lot of guitars. As a producer, how do you layer so many guitars without it sounding muddy, without them smearing together? The Creedence records have this quality—you can follow any part through



Photograph: ©1997, Steve Granitz/Retna Ltd.

Absolutely. One of the reasons Creedence records sound so good is that the power comes from the simplicity. We were alluding to this about my own guitar playing, which was very simple but deceptively powerful. Something like "Green River" is easy to play, but it's the right easy thing out of all the possible parts.

Paul McCartney said that he really only has two vocal sounds, and they're both based on trying to copy someone; he has his Elvis sound for the ballads and his Little Richard sound for the rockers. Is there a particular singer you emulate?

It's interesting that Paul would say that, because as rock 'n' roll as he really is, I wish he'd do Little Richard more. But on his ballads, he's developed a really nice dry sound.

...n rising
that simple is more powerful...I still feel that way.

the song and it doesn't get lost in the other parts.

That *is* arranging. It's knowing the qualities of a Rickenbacker guitar and how it will mix with other guitars. Also, knowing your equipment. A Rickenbacker guitar sounds best through two 15-inch speakers if you're using it for rhythm. The 10- or 12-inch speaker is much more focused: that's why all the lead players like them so much, for playing single-note stuff. Then if you're going to have an acoustic rhythm over that—let's take "Green River," for example—and that's me playing pretty much all the acoustic guitars on Creedence. I think the only time Tom ever played acoustic was on "Bootleg," because we did that live, and then I just overdubbed the same part on acoustic, with me doubling Tom.

The perception is that Tom's role in the band was just to play rhythm, and then pretty much to play on the 2 and 4 of the measure, so he'd be going "m-DAT-m-DAT."

That's exactly right. Also, Tom did not understand the role of the producer, so it was like every other band you've ever heard of. It was like a cartoon to me. When I mixed "Suzie Q" they were present in the studio. This was one of those studios where the mixing console was raised, and then from down in front of it, you could look out into the recording studio.

This was the Wally Heider studios in San Francisco?

No, we recorded our other albums there, but this was at Coast Recorders. Heider had a similar setup though. So there were some seats down in front of the console where hangers-on could look out into the studio, but they were not looking at the mixing console. So while I was doing "Suzie Q," the one and only time they were there during a Creedence mix, I kept hearing, "That's not going to work!" and "Oh, that's too loud!" and "Aw, that'll never. . . ." You know, that sort of thing for the whole two hours.

Which is the producer's greatest fear of what the band is going to do if they're around.

Exactly. I let it happen only one time, even though I was only 22 years old. When it was all mixed and mastered and they heard it, they said, "John, how did you know all that background vocal stuff was going to work?" And I said, "Because I mapped it out. I knew what I was going to do before I got in there."

And they said, "Well we didn't think. . . ." And I said, "Yeah, I *know* you didn't think it was going to work. And that's the last time you're ever going to be around when I'm doing it."

And that was it. I never let them be in there again. Every song after that, I just refused to let them be there because it was so disruptive. It's like that with every single band in the world, especially when they're young. They have no concept of what a producer does—they just know they played this part, their little drum part, or their rhythm part or whatever. They go into the control room, and the rhythm guitar player hollers, "I can't hear my part," so of course the guy defers to him and turns up the rhythm guitar. Then the bass guy comes in and screams, "I can't hear *my* part," and he turns up the bass part. And then the background singer comes in, "I can't hear *my* part." *Shit*, you can't have everybody louder than everyone else; you're not making a record when you do that. It was a go-around I had with Tom for the whole three years we were Creedence. He kept saying, "My part's not loud enough."

...here hitting a high note
at L.A.'s House of Blues.

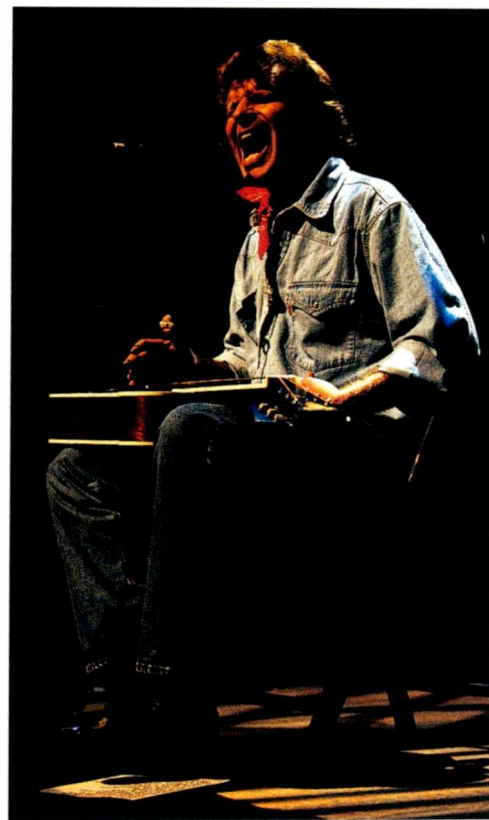
The frustrations you had with Doug and Stu as a rhythm section have been famously reported. I know you've talked about how you were never happy with the tightness in that rhythm section. But by analogy, let's talk about The Rolling Stones. With Charlie Watts drumming, the band always sounds like it's just about to fall apart at any second.

And sometimes, like on the song "I'm Free," it does!

But that's part of their excitement. I wonder if some of the excitement in Creedence tracks come from that—not being sure what is going to happen.

This is the way I look at it. I have not altered my position about it musically. I think it could have been a whole lot better and the sound wouldn't have suffered. It's like talking about Rosanne. Somebody could say that if she were to slim down and be more pretty the lines wouldn't be as funny. And I say, okay, I'll buy that. But deep down in her heart, I'll bet Rosanne wishes she were slimmer and prettier, because most women do. In the case of The Rolling Stones, take "Honky Tonk Women," which is one of my favorite Stones tracks. If you listen to the drums, even in your car, you listen to Charlie and he's just rushing and he's all over the place. It's a compliment to him when I say I love Charlie's playing, but it's sort of a cop-out, too. I'll give you a better example, because with Charlie and The Rolling Stones it

Photograph: © 1997, Steve Granitz/Retna Ltd.



works. With Jimi Hendrix, I thought Mitch Mitchell was sloppy. And then people always say, "but he's a jazz player." And I go, "Yeah? Show me a jazz player whose time is that bad."

The rare thing is having a good rock 'n' roll voice, especially being a white guy.

They called him a jazz player because he didn't play straight time.

You're saying what I'm saying. I'm cynical: Because he couldn't really rock 'n' roll, they've got to give him some kind of credible title. I maintain that he's not. Max Roach would say he's not. I'm playing with guys now who I always thought Creedence could be like. Kenny Aronoff is a *great* rock 'n' roll drummer. I think there really is a greatness in the performance of the music

very popular—let's pick on Hole with Courtney Love—I mean, that's the most godawful stuff I've heard in my life—it's *really* bad. But a 14-year-old kid doesn't know that.

We sound kind of like our parents now, right? "What is that noise you're listening to?"

Yeah, but there's other bands that are really good, like Pearl Jam. Those guys are kickin' butt. But with Hole—not only is the singing

There are times now when we're playing that song live and Kenny Aronoff will go "ba-do-do-do-do-bump-bump-bom-bom-bom," and I'll hear it and I'll look back and grin at him because I know what he's done there. It's like he just slid in the other drum part from the record. It cracks both of us up. *So was that one of those cases where in order to keep peace in the Creedence family you let Doug do that?*

Yep, you've got it.

What was your working relationship with Russ Gary, the engineer on the CCR albums? He was a good engineer; he covered all the bases. Later in life I've had some differences with Russ. He's been trying to put together a Creedence tribute album and some other stuff I think is kind of hokey. I think that in his mind he's had a lot more to do with the success of the recordings. But honestly, my recordings all sound a certain way, and I can't think of other recordings by Russ that have this sound. I don't want to put him down. In the old days we recorded pretty much the way things sounded out in the room. Very little EQ going to tape, and then I'd EQ them a little bit in mixdown if that's what was required. I never trusted those knob twiddlers—they'd get in there and make a mess of things.

You have brought some beautifully poetic and introspective lyrics to rock music: "Five year plans and new deals/Wrapped in golden chains/And I wonder, still I wonder/Who'll stop the rain?" Or, "We watched the dream dead end in Dallas/They buried innocence that year." Nobody else puts those kinds of lyrics into rock songs.

I always thought that people who love rock 'n' roll aren't necessarily *stupid*. If you can write a really good song and add good lyrics as icing, then it's even better, as long as you don't sacrifice the ethic of rock 'n' roll in the first place. I like lots of stuff and I think I have a brain, and I consider my audience to be the same way. Instead of playing down to them, you're playing up to them. **A**



Photograph: ©Hulton Getty/Tony Stone Images

on *Blue Moon Swamp* that was never achieved at any time in my career before. That's why I'm so happy.

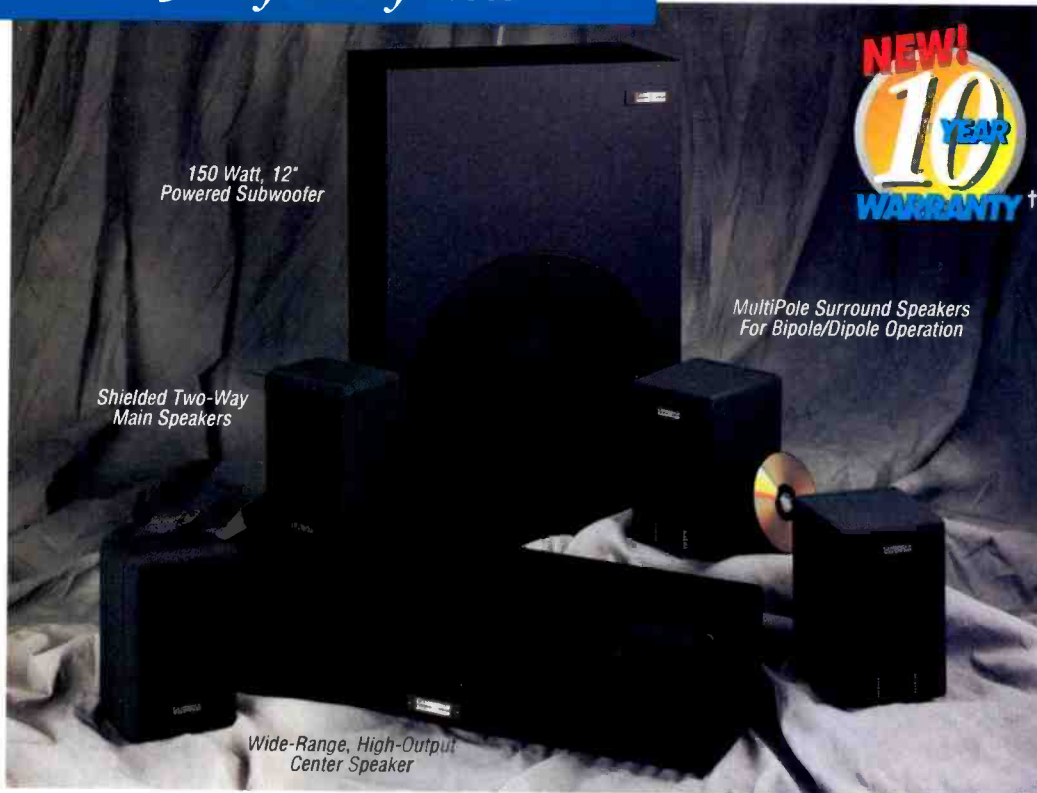
But that's what I was always complaining about with Creedence. We were very young, and the rhythm section didn't have anywhere near the tightness I thought it should have. But there's another angle you could look at it from: Our average audience was 14 years old, and they couldn't tell the difference. They really do not hear the difference at that age. That's why when you and I listen to some of the stuff now that is

**Behind the No. 1 hits
and happy facade,
not all was right with CCR.**

awful, but you hear a drum break and it's so out of time, it sets girl drummers back 150 years.

What's the story on "Who'll Stop the Rain" with all those drum fills?

Umm, I would prefer it not to be that way. *I wouldn't have thought so.*



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As a digital recording format, CD-R certainly has competition: MiniDisc (MD) continues to provide ever better performance at ever lower prices, Digital Audio Tape (DAT) has become universally accepted in pro sound, and recordable DVD *may* be coming in a year or two. The average listener, however, does not have machines to play any of these formats, whereas millions of people are equipped to play CDs (and CD-Rs) at home, in cars, and in all manner of portables.

Although playback opportunities for CD-R are vast, it does have one recording limitation: It's a "write-once" format, which means it doesn't allow false starts,

bad takes, or other errors to be erased or rerecorded. Instead, you enter codes that make a CD-R deck automatically skip problem areas in playback. (Those areas still occupy part of the disc's real estate, so recording time is reduced accordingly.)

You can interrupt and resume recording a CD-R at will, but you can't use the disc in an everyday CD player until you "finalize" it. This process, which takes the PDR-04 about 4 minutes to complete, copies the disc's temporary table of contents (TOC) to its permanent location and format. After finalization, the disc can be played on all CD equipment but you can't do any more recording (or TOC editing) on it. Furthermore, normal CD players, designed for factory-perfect recordings, do not recognize skip codes, so any bad tracks will still play on them unless you program those tracks out each time through.

Pioneer gives you a choice of four recording modes, three for digital signals and one for analog. The PDR-04 (unlike the \$1,970 PDR-05 and \$2,000 Elite PDR-99) has no sampling-rate converters, so you must use its analog inputs when recording from DAT originals or other digital sources whose sampling rates aren't the CD-standard 44.1 kHz.

Pioneer has gone to considerable lengths to simplify recording from analog sources. For one thing, there are no recording level controls, just an automatic level control on the analog inputs. On the assumption that you'll use the analog inputs for copying from recordings (as opposed to live music), the owner's manual instructs you to first put the PDR-04 into record/pause mode,

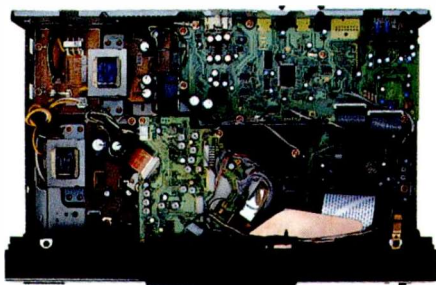
then play the loudest passage in your source recording. This activates the automatic level control, which samples the input every 13 milliseconds, attenuating it by 1 dB whenever it exceeds the PDR-04's 0-dBFS

point, to a maximum attenuation of 78 dB. (It works: No matter what level I fed in, I couldn't get peaks to distort.) If, on the other hand, the source level is consistently too low, pressing the "Skip/Play" button will boost input level by 6 dB; if that's not enough and the level is still low, you'll need

**UNLIKE OTHER DIGITAL
RECORDING FORMATS,
CD-R CAN BE PLAYED
BY ALMOST ANYONE.**

to boost it with an external preamp or replace the source.

For the most popular CD-R applications, dubbing favorite CD tracks or cloning CDs entirely, the PDR-04 has two automatically synchronized digital recording modes, one-track and all-tracks. Once you engage record/pause mode and feed in a 44.1-kHz digital signal, the 04 automatically starts



**PIONEER'S UPSIDE-DOWN
"STABLE PLATTER"
TRANSPORT IS DESIGNED
TO REDUCE JITTER
AND PLAYBACK ERRORS.**

and stops recording in sync with the source, digitally dubbing one or all tracks, depending on which mode you've selected. Nothing could be easier (see "Nothing As Sure As Discs and Taxes").

The Pioneer's fourth recording option is a manual digital mode, in which incoming data is simply copied continuously. This leaves it up to you to start and stop recording and to insert track ID numbers as you go along.

You can, in fact, manually enter track ID numbers during all recording modes, using buttons on the remote or the front panel. When the CD-04 is recording via the analog inputs, you can also select an automatic track ID function, which assigns new track IDs whenever the deck detects a silent interval. When the 04 is dubbing directly from CDs, of course, the source's track ID numbers will automatically be written to the disc.

Like many tape decks, the PDR-04 can be set to automatically add a 4-second blank passage at the end of a track. This feature can also be used to create a 4-second blank track if you like. You can make smooth, automatic fade-ins and fade-outs, and the 04

automatically fades out when there's only 3 seconds left on a disc. The automatic fader may also be used to fade in and out during playback, presumably for copying CDs to an analog recorder.

Aside from its additional controls for recording modes, the PDR-04 looks and feels like a conventional CD player. (Okay, not all that conventional: It has Pioneer's kinky, upside-down Stable Platter transport.) Opening the disc drawer, just beneath the centered display, reveals the Stable Platter transport's unusual carrier. It's the same diameter as a CD, with a damping mat and a label that says "Insert Disc Label Side Down." When you close the drawer, the disc is clamped firmly against this full-diameter base, and the laser reads it from above. Pioneer claims that this arrangement significantly reduces jitter and vibration-induced reading errors. If you insert a disc the wrong way—label-side up, as you would for other machines—"No Disc" appears in the display. This seems needlessly imprecise and a missed opportunity: A cheap disc-presence sensor and a few bytes of code could make the display read "Flip Me!" instead.

The two-color electroluminescent display has track, time, and operating-mode indicators. It also has indicators for various recording functions and a two-channel, eight-segment level meter (calibrated from -40 dB to "Over") that works in playback and record.

The PDR-04 has just about all the usual features of a Compact Disc player (including disc/track repeat, random and shuffle play, and 24-track random-access programming); the sole omission is repeat of a user-selectable A-B segment.

Around back, this deck is quite Spartan, with nothing to see except pairs of gold-plated input and output RCA jacks for analog connections and Toslink optical jacks for digital input and output. Under the hood, however, there's more to see than in a typical CD player. Much of the 04's internal complexity is because the analog circuitry is

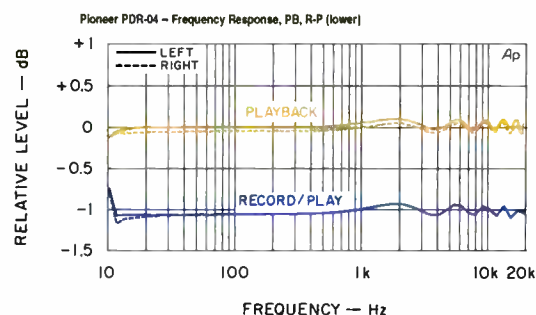


Fig. 1—Frequency response.

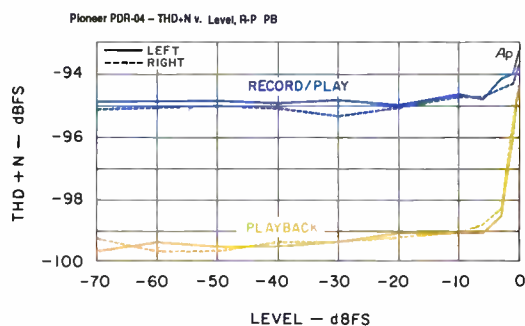


Fig. 2—THD + N vs. level.

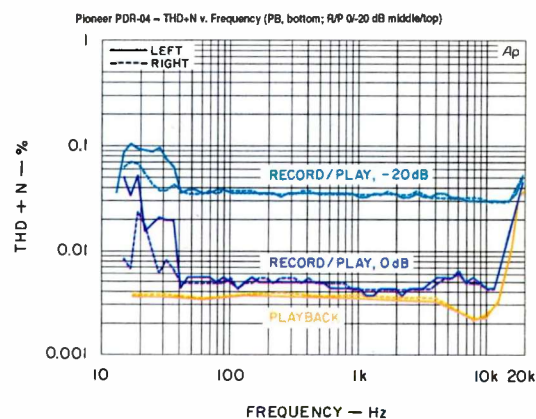


Fig. 3—THD + N vs. frequency.

separated from the digital, perhaps to ensure cleaner recording. The analog and digital sections have their own power supplies, each with its own transformer connecting a pair of circuit boards. The deck's two main boards, one for the digital circuitry and the other for the analog, are extensively populated with highly integrated chips. Most of the servo and demodulation circuitry appears to be on a small board attached to the transport's pickup/laser-writer assembly. There's a lot more in there than you'd find in the average \$1,000 CD player; on a parts-per-dollar basis, you get a lot for the money with the PDR-04.

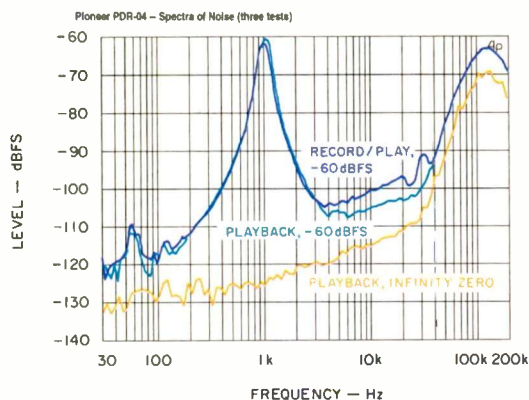


Fig. 4—Noise spectra.

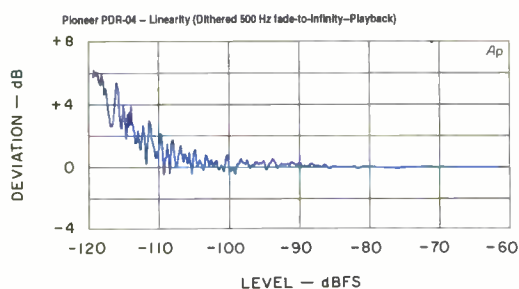


Fig. 5—Fade-to-noise test.



The Spartan rear panel offers no hint of the PDR-04's internal complexity.

Measurements

I found little in the Pioneer PDR-04's playback behavior to indicate that it was anything but a fine conventional CD machine, and its record/play measurements would do most pro digital recorders proud. Signal-to-noise (A-weighted re 0 dBFS) was 105 dB in each channel for playback only and 92.4 dB for a record/play cycle of the worse channel with an analog input signal. Dynamic range reached almost 100 dB, A-weighted, in playback, which is excellent for any CD player; in record/play, it went down only a few dB.

The PDR-04's frequency response is very accurate over the entire range (Fig. 1); what little error there is was caused by filter ripple from the analog stage. The playback and record/play curves are virtually identical, a

testament to the quality of the deck's analog input circuits and A/D converter. And though channel balance is extremely good in playback, it is even better in record/play: The two curves overlaid exactly from about 20 Hz up and hardly differ below that frequency.

Distortion is low, as you'd expect for a CD player. This can be seen in Fig. 2, total harmonic distortion plus noise (THD + N) versus amplitude. (I made the playback-only curves using the CBS CD-1 test CD. Record/play curves are for analog input, using 2 volts as the 0-dB reference; this was just enough signal to turn on the PDR-04's 0-dB light but not to flicker the "Over" segment or activate the automatic level control.) The playback curves are typical of excellent CD players, suggesting minimal noise and outstanding accuracy with small signals (small steady-state signals, at least). The difference between the playback and the record/play curves appears to reflect mostly additional noise from the input and recording circuits.

I tested THD + N versus frequency (Fig. 3) for playback from the CBS disc and for record/play with input of 2 volts (which yielded a reading of 0 dB on the Pioneer's meters) and 200 millivolts (-20 dB). Again, the similarity between the 0-dB playback and record/play curves demonstrates the excellent performance of the PDR-04's input and A/D sections, and only noise appears to increase at the lower signal level. The curves' rise in the top octave is almost certainly from noise displaced into the ultrasonic range by the noise shaping of the deck's delta-sigma (one-bit) D/A converter. Because of it, I had to use a 20-kHz brick-wall filter in my measurement loop for most tests.

The noise spectra in Fig. 4 show this ultrasonic content quite clearly. The recorder's input and A/D sections contribute relatively modest amounts of noise (and, possibly, traces of harmonic distortion) in the top three or four octaves and just a trace of power-line hum. Otherwise, the results are impressively clean.

The fade-to-noise test (Fig. 5) demonstrates that the PDR-04's D/A converter handles small signals with remarkable accuracy. Error is less than 1 dB to below -100 dBFS—pretty good stuff.

Use and Listening Tests

As a CD player, the Pioneer PDR-04 operated quite conventionally, except for its upside-down disc loading. It was, however, slightly slower than most modern-day players at track skipping and cueing. And it took longer than the norm (about 10 seconds) to identify a disc as CD or CD-R and prepare for playback (or recording).

The supplied remote is a rather small, fussy design with same-size/same-shape buttons and absurdly faint lettering. I found it annoying to use, especially as the main transport keys are buried in the midst

MEASURED DATA

Record/play measurements were made via the analog inputs.

Channel Balance: Playback, ± 0.03 dB; record/play, ± 0 dB.

Frequency Response: Playback, 10 Hz to 20 kHz, ± 0.1 dB; record/play, 10 Hz to 20 kHz, +0.22, -0.1 dB.

THD + N at 0 dBFS: Playback, less than 0.004%, 20 Hz to 20 kHz; record/play, less than 0.05%, 40 Hz to 20 kHz (0.1% at 20 Hz).

Maximum Playback Linearity Error with Dithered Recording: Less than 2 dB to -110 dBFS.

S/N, A-Weighted: Playback, 105 dB; record/play, 92.4 dB.

Dynamic Range, A-Weighted: Playback, 99.5 dB; record/play, 96.1 dB.

Channel Separation: Playback, greater than 85 dB, 125 Hz to 16 kHz; record/play, greater than 68 dB, 100 Hz to 14 kHz.

Line Input Sensitivity: 2.05 V for indication of 0 dBFS.

Line Input Impedance: 38 kilohms.

Line Output Level: 2.56 V for 1 kHz at 0 dBFS.

Line Output Impedance: 920 ohms.

Headphone Output Level: 21 mW into 150 ohms.

Headphone Output Impedance: 100 ohms.



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of a group and indistinguishable by size, color, or feel. The remote includes all the PDR-04's recording functions; although that's convenient, I also found it a bit scary, considering this handset's design.

The PDR-04's sound quality was excellent, giving up very little, if anything, to my reference player. The Pioneer was just as quiet and "deep" on widely dynamic recordings and just about as detailed and transparent. My reference player had slightly more depth of "air" and smoothness on delicate, shimmering cymbal passages, but these effects were subtle enough to be debatable.

Of course, the PDR-04's most significant attribute is recording ability. I made a half-dozen or so dubs to the Pioneer, using a handful of CD tracks and a few 44.1-kHz DAT masters of my own recordings. In general, I found digital copies to be virtually transparent. If there was a difference—and I'm not entirely confident there was—it was a faint loss of top-octave depth, audible via ultra-critical headphone listening, and subtle changes in reverb tails and the stage-wall reflections in chamber music recordings. With analog copies, the change in transparency was only slightly more discernible, and only on the very best source material; this effect, too, was vanishingly small.

It's obvious from the design and action of the PDR-04's automatic level control that Pioneer prefers recordists err on the side of too little input signal level rather than too much, a sensible policy with any digital recorder. The level-setting system worked surprisingly well and yielded fine recordings even when a source was several dB shy of the 0-dB reference. However, you must exert some care in finding the source recording's peak level in order to calibrate the automatic level system before commencing; with unfamiliar material (especially on analog tape) or a source whose output characteristics are unknown, this might be difficult. But since the Pioneer essentially is incapable of producing a recording distorted by digital overload, the worst-case result would be a bit more noise than ideal, due to insufficient level (which probably won't be much of a concern with an analog source), or level reduction in the middle of a recording because you didn't find the highest peak when you initially set the recording level.

NOTHING AS SURE AS DISCS AND TAXES

It has not escaped the recording industry that recorders like the Pioneer PDR-04 make it a breeze to clone CDs. That's the reason for the Home Recording Act tariff, thanks to which blank *audio* CD-Rs, marked "Compact Disc Recordable For Consumer," cost about \$10 per disc—not much of a bootlegging incentive there! *Computer* CD-R disks, which are indistinguishable from audio blanks except for a permanent ID code burnt into them at the factory, have been known to sell for as little as \$2 each. But the PDR-04, like all other audio CD-R decks, will not record on these computer disks.

As a further deterrence, all home digital recorders, including the PDR-04, have the beloved Serial Copy Management System (SCMS, generally pronounced "scums"), which prevents copying of any digital source beyond one generation, regardless of changes in format between CD-R, DAT, Mini-Disc, or whatever. The system does not, however, restrict recording via analog connections. *D.K.*

I tried my best to trip up the PDR-04's analog auto-level routine but could not induce any clearly audible distortion, even when I used a mixer to boost average signal levels to the 10-volt range. Attenuating average signal level to less than 100 millivolts did cause an audible noise increase, but an unexpectedly mild one. In short, the PDR-04 sounded every bit as good as my fine-sounding DAT recorder.

It's not too tough to understand why Pioneer reports brisk sales of its CD-R decks: The convenience of burning your own CDs is self-evident. And the PDR-04 is fine enough as a Compact Disc player to make the cost premium for recordability seem relatively modest. It might be a justifiable purchase even if your primary motive were a one-time archiving of your LP or tape collection, a function for which CD-R is tailor-made; the continued ability to produce CDs at will would then prove a worthwhile bonus. *A*

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Video

DANIEL KUMIN

ARCAM ALPHA 9 INTEGRATED AMP



The integrated amplifier may be the forgotten component of American audio, but in other parts of the world (especially in Britain and Asia) it serves as a key hi-fi building block. It's not particularly tough to understand its popularity. By combining a preamp and power amps on the same chassis, integrated amps save space. They also save you money, by using a single chassis, power-supply transformer, and jack panel—not to mention one owner's manual, packing carton, and shipping fee (which accounts for a significant part of an audio component's cost). Omitting the tuner circuits that would make the amp a receiver saves money, too, and appeals to a more se-

**MODERATELY POWERFUL
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THE ARCAM ALPHA 9
IS A CLASSIC BRITISH
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rious, audiophile-oriented customer. That omission also gives the designer more freedom to focus on sonic performance and power without fear of inducing noise or hum into a tuner circuit's delicate, low-level RF paths.

British integrated amps have a tradition of excellence dating back at least two decades. The classic British integrated amp is moderately powerful, reasonably compact, and nicely put together with high-grade components. It almost always includes one or two useful, innovative, and possibly even quirky features or technologies. That could well have been the design manifesto for the Arcam Alpha 9, a \$999 integrated amp rated at 70 watts of

power per channel and peak current of ± 18 amperes.

The Alpha 9 is arranged on a more conventional platform than some British designs of yore. Its all-steel chassis is a rather standard 17 x 4 x 13 inches, and its faceplate is a nicely rounded design of sculpted plastic. One large volume knob complements five smaller knobs (controls for bass, treble, and balance and rotary switches that select sources for listening and recording). Four pushbuttons control the two speaker outputs and the "Tape 2/Processor Direct" input (more on that shortly) and invoke the amp's direct mode to bypass all tone and balance circuitry. I found the overall effect simple, pleasing, and handsome, though the dark gold lettering is not highly visible against the dark gray panel.

This is solidly conventional stuff, but there's a well-camouflaged, thoughtful feature tucked away on the rear panel. Its compact field of gold-plated RCA jacks offers inputs for four play-only audio sources ("Tuner," "AV," "CD," and "AUX") plus two complete input/output tape loops ("Tape 1" and "Processor/Tape 2"). The thoughtfulness comes in the rear-panel slide switch, which has "Normal" and "A/V Processor" positions. The latter setting routes the "Processor/Tape 2" input jacks directly to the power amp section, bypassing the Alpha 9's volume and tone controls. This enables the Arcam to lead a double life: as a conventional integrated amp for all other inputs and as a simple power amp for a home theater system that includes an external surround decoder. Presumably, you'd use the Alpha 9 for the main channels (it

Rated Output: 70 watts per channel into 8-ohm loads, 20 Hz to 20 kHz, both channels operating.

Rated THD: 0.5% at rated output; typically 0.02% at 60 watts into 8 ohms.

Dimensions: 17 in. W x 4 $\frac{3}{8}$ in. H x 13 in. D (43 cm x 11 cm x 33 cm).

Weight: 13 $\frac{1}{2}$ lbs. (6.1 kg).

Price: \$999.

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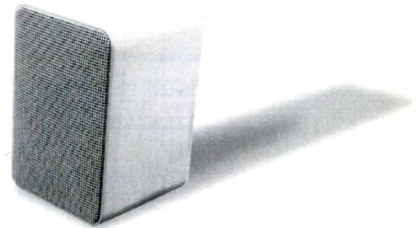
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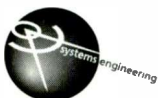
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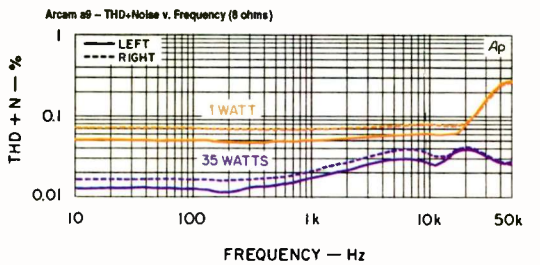
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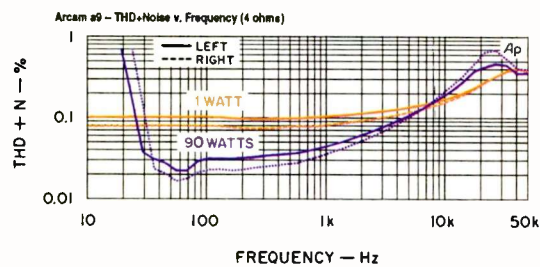
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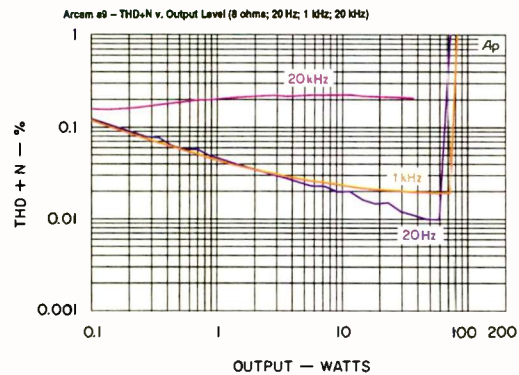


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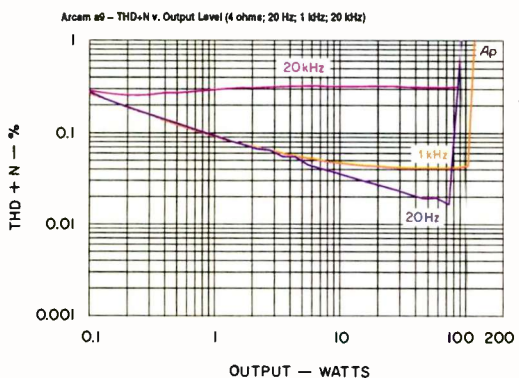


B

Fig. 1—THD + N vs. frequency with 8-ohm loads (A) and 4-ohm loads (B).



A



B

Fig. 2—THD + N vs. output, for 8-ohm loads (A) and 4-ohm loads (B).

would be connected to those speakers for stereo, anyway) and additional power amps for the center and surround channels and your subwoofer.

You can also use the Alpha 9's preamp and power amp sections separately, via pre-amp-out and amp-in jacks, which are en-

abled (another unconventional touch) by an internal slide switch. This lets you use the Arcam's two halves independently, for bi-amplified or multichannel systems, so it's hardly coincidental that Arcam also offers an Alpha 9P power amp (\$799) that essentially duplicates the Alpha 9's power amp section.

The phono facilities consist of a gold-plated grounding post and holes for four more jacks, plus space inside for an optional \$100 RIAA preamp board. The holes allow for separate moving-magnet and moving-coil inputs, but you must use an internal switch to set gain for one type or the other.

The only other notable rear-panel features are an IEC power-cord socket and the two sets of speaker connectors—hideously inconvenient, Euro-standard BFA (British Federation of Audio) terminals, which look invitingly like familiar five-way binding posts but aren't. Like those posts, the BFAs accept spade lugs or bare wire, and you can just manage to insert individual banana plugs through the holes that accept the latter. Alas, their spacing is wrong for U.S. dual-bananas; they will, of course, accept BFA connectors, which are available from your local British-amplifier dealer but not, I suspect, from your local Radio Shack.

Six screws release the texture-painted top cover, which is attractively embossed with an "α" and handsomely slotted for the centrally located heat-sink chimney. But as it is formed of aluminum "for superior sonic and thermal performance," it's a bit boingier (and a bit boingier) than the Alpha 9's generally solid construction led me to expect. The amplifier's chassis, however, is assembled from screwed-together sheet-metal sides, bottom, and front, with the formed front panel wrapping around five surfaces; the whole business is satisfyingly heavy-duty and generally well finished.

The Alpha 9's circuitry is all on one high-quality, through-plated main board, except

for the phono card, which plugs vertically into the board's left edge. One-third of the board is occupied by a toroidal power transformer, rated at 400 volt-amperes. This transformer appears to have separate taps for the preamp and power amp sections, with the heat-sink stack between it and the signal circuitry. The heat sink cools two pairs of power transistors, which are listed as high-current VMOS-FET devices. According to Arcam, these devices are direct-coupled to "remove sound-compro-

MEASURED DATA

Measurements were made with both channels driven and a bandwidth of 20 Hz to 80 kHz. Unless noted, data is for worse-case channel.

Output Power at Clipping (1% THD + N at 1 kHz): Into 8 ohms, 78 watts per channel; into 4 ohms, 107 watts per channel.

Dynamic Power: Into 8 ohms, 95 watts per channel; into 4 ohms, 146 watts per channel.

Dynamic Headroom: Into 8 ohms, 1.3 dB.

THD + N, 20 Hz to 20 kHz: Into 8 ohms, test aborted at 15 kHz by thermal shutdown at rated output, 0.05% at 10 watts; into 4 ohms, 0.8% at 90 watts, 0.3% at 25 watts.

Damping Factor re 8 Ohms: 118 at 20 Hz and 67 at 20 kHz.

Output Impedance at 1 kHz: 71 milliohms.

Frequency Response at 1 Watt: 20 Hz to 20 kHz, +0, -0.2 dB.

Sensitivity: 21 mV for 0 dBW (1 watt) into 8 ohms and 175 mV for rated output.

S/N, A-Weighted: Left, 76.3 dB; right, 76.1 dB.

Input Impedance: 5 kilohms.

Tape Output Impedance: 300 ohms.

Tape Output Level: 480 mV for 500 mV input.

Tone-Control Range: Bass, ±7.7 dB; treble, +7, -7.5 dB.

Channel Separation at 1 Watt: Greater than 50 dB, 20 Hz to 20 kHz; 65.3 dB at 1 kHz.

Channel Balance: At 1 kHz, 0.33 dB; at 20 kHz, 0.87 dB.

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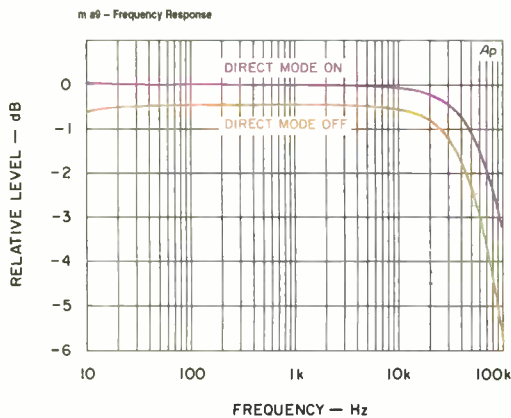


Fig. 3—Frequency response.

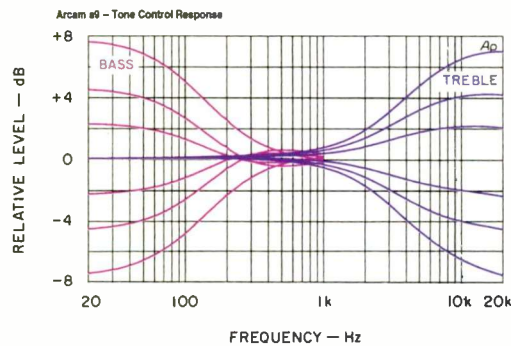


Fig. 4—Tone-control responses.



A rear-panel slide switch enables the Alpha 9 to lead a double life.

mising capacitors from the signal path,” and “the output stages use Arcam’s proprietary autobiasing circuitry for consistent results.” I noticed that the circuits are populated by a goodly number of high-grade parts, including 1% resistors throughout and premium-grade capacitors in signal-path applications; most of the amplifying devices are discrete transistors, though Arcam also uses op-amps here and there. The Alpha 9’s volume, tone-control, and balance potentiometers are all premium-grade units, too.

The volume pot and the listening source selector are motor-driven, so they can be controlled from the supplied remote. The remote itself is a fairly generic handset that also controls Arcam CD players and tuners. Though the remote’s identical, small black keys are

hardly ergonomic, its two amp functions (volume and source selection) are, at least, well segregated.

Measurements

As always, I completed my listening evaluations before going to the test bench. The Arcam amp produced generally fine numbers, but I did uncover a couple of mild anomalies.

Power while driving 8-ohm loads closely reflected Arcam’s specs. The amp’s channels delivered 79 and 78 watts at the clipping point and maintained quite low distortion, in the double-zero region, at most power levels below its rated 70 watts per channel. However, above about 55 watts into 8 ohms, the Alpha 9 would not withstand a full-band sweep, always succumbing to thermal shutdown by opening its output relays at about 15 kHz. I tried various methods to encourage the Alpha 9 to hang on, including running a clip-on fan directly into its vents, to no avail. To its designers’ credit, the Alpha 9 seemed perfectly content to overheat, shut down, reawaken, overheat, shut down, and so on, countless times, without producing any complaints, smoke, or unpleasant noises. The Arcam had no problem performing the same test into 4 ohms at an arbitrarily select-

ed 90 watts from each channel. (The only 4-ohm power figure mentioned in the owner’s manual is 90 watts, with *one* channel driven.) It’s possible that low line voltage may have been a factor; I tested the Alpha 9 during a heat wave, and at no hour of the day could I extract more than about 116 volts from my AC line.

Figure 1A shows total harmonic distortion plus noise (THD + N) versus frequency, for 8-ohm loads at 1 watt and at 35 watts. Distortion with 4-ohm loads (Fig. 1B) is somewhat higher, as is typical of FET-output amps, but not egregiously so. Output power versus distortion at three frequencies is shown in Fig. 2A for 8-ohm loads and in Fig. 2B for 4-ohm loads. In both tests the Alpha 9 gave up a bit of power at the bottom octave. (Here again, the

sagging AC voltage might have played a role.) Both graphs’ 20-kHz plots stop at about half power, indicating where the Arcam shut down in response to the rapidly rising thermal stress. Arcam lists a peak current rating of ± 18 amperes but does not stipulate any frequency or range over which this is available.

The Alpha 9 integrated amp delivered a measurable dose of dynamic headroom in response to the IHF-standard tone burst as a stimulus. With 8-ohm loads, 95 watts were produced, or 1.3 dB of dynamic headroom relative to the rated 70 continuous watts. With 4-ohm loads, dynamic power was 146 watts. There’s no real 4-ohm power rating to compare this to, but relative to the measured output, dynamic headroom worked out to 1.3 dB again.

Output impedance was quite low, 71 milliohms at 1 kHz, but hardly record-setting. Damping factor was 118 at 20 Hz but fell to 67 at 20 kHz. Sensitivity was rather high: 21 millivolts produced 1 watt into 8 ohms, and only 175 millivolts were required for the rated 70 watts—pretty much as specified. The line inputs’ impedance was 5 kilohms. I measured a gratifyingly low 300 ohms of output impedance at the “Tape 1” outputs, which should minimize response variations induced by cables or input loads, and saw a 480-millivolt output for a 500-millivolt input. The Alpha 9’s S/N ratio was just over 73 dB, A-weighted, fairly typical for a well-performing integrated amp or receiver.

There wasn’t much difference between the Alpha 9’s frequency response in “Direct” mode, which disengages the tone- and balance-control circuits, and the response with those circuits activated but with the controls at their center detents (Fig. 3). I was mildly surprised, however, that output was about 0.5 dB higher in “Direct” mode. In each case, the left and right channels’ responses overlaid almost precisely. Channel separation was right on Arcam’s spec of 65 dB at 1 kHz (and below) and decreased smoothly to about 50 dB at 20 kHz.

I liked the shaping action of the Alpha 9’s tone controls, and Fig. 4 may show you why. The treble control tends to shelf (especially at small control rotations), enabling you to modify overall upper-octave balance; peakier treble controls, which are all too common, just function as “air” or “tizz” valves. But it’s equally nice that the bass control is




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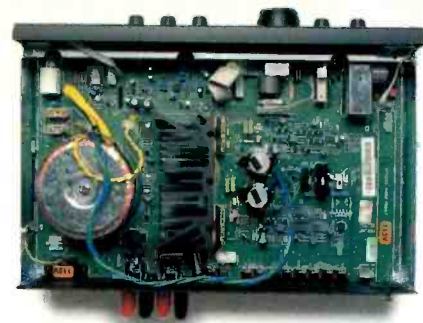


relatively peaky, with minimal action above 150 Hz or so (again, particularly so at mild settings); that's precisely what you want for occasional program equalization, or even bass extension, without undue impact on the male-vocal region. The interaction of the curves in the midrange consists almost entirely of overshoot from the bass control; this is not ideal, but it's very mild.

Use and Listening Tests

I've long felt that the natural complements to many British audio components are mini-monitor speakers, which first evolved in the United Kingdom. Not having a pair of the classic BBC LS3-5a speakers, I first tried the Arcam Alpha 9 on the NHT SuperOne mini-monitors in my project studio. With its 6½-inch woofer and 1-inch tweeter, the NHT is at least spiritually very close to the classic British minis. Keeping this system as simple as possible, I hooked up a Sony XA-3ES CD player and listened from the studio's usual near-field seat, with my head about 6 feet from each speaker.

In this setup, the Alpha 9 sounded very impressive. Timbre remained excellently balanced over the full range of dynamics, and the sound had an open, low-strain quality and excellent transparency. The Arcam did nothing to impede the NHTs' rendering of subtle details, which they do excellently for such inexpensive speakers. At the same time the Alpha 9 seemed almost to enhance the weight of the SuperOnes' bottom octaves. Low-end timbral precision and "edge" did not sound quite as controlled as with the amp I usually use to drive the NHTs (a unit twice the Arcam's power but nearly three times its price) yet were satisfyingly close nonetheless. String tone was particularly attractive: rich and woody but still well-etched and detailed. The Arcam worked every bit as well in driving B&W 803 Series 2s, full-range tower speakers that are somewhat more sensitive. With either speakers, the Alpha 9 could not match the output level of my bigger, everyday amps. Still, it played loud enough for even ultra-serious auditioning, despite the dynamic limits that occasionally cropped up on high-level transients, such as percussion. As it reached its limit with the SuperOnes, the Arcam had a tendency to "splat" a bit (though quite cleanly and smoothly) on percussive transients before it evidenced



THE TREBLE CONTROL'S SHELVING ACTION AND THE BASS CONTROL'S PEAKING CURVE WERE IDEAL CHOICES.

the obvious harshness indicative of full clipping; in other words, it has something of a "soft clipping" characteristic.

The soundstage produced by the Alpha 9 was dramatically wide, detailed, and believable; it even permitted the magical "wider-than-the-speakers" effect to bloom when captured on the disc. Depth was not as dramatic as I've heard from these same speaker setups with other amps but was still above average.

The Arcam was extremely quiet; its preservation of perfectly "black" backgrounds and its subtlety in ultra-quiet passages helped give me a sense of "high-endness." And the Alpha 9 is one of those rare amps whose "direct" switches make a difference. With the switch engaged, I could distinctly hear its effect: clearer and better-defined music. And the Arcam amplifier worked smoothly and silently, free of clicks, pops, or unexpected glitches.

In general, the Alpha 9's sonic qualities were high. The Arcam/NHT combination seemed a particularly happy marriage; in fact, I cheerfully left it set up and in use for well over a month.

All in all, the Arcam Alpha 9 is very pleasant, musical, delightfully compact, and easy to live with. The typical general-interest buyer will consider a \$1,000, 70-watt integrated amp to be a flat-out absurdity, since many Japanese manufacturers will sell you twice the power or more at that price. But to the space- or budget-constrained audiophile or audiophile-in-training, the Arcam Alpha 9 may well seem heaven sent. A

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PSB STRATUS GOLDⁱ SPEAKER



speaker company to use the NRC's facilities and took advantage of them in developing the original Stratus Gold; the Stratus Goldⁱ's design was finalized based on tests made in the new chamber.

The Stratus Goldⁱ looks sleeker than the original model, because its cabinet is narrower (but deeper), and its edges are now rounded, to reduce diffraction, improve horizontal coverage, and provide a slight but noticeable improvement in imaging. A smaller (though equally heavy) base also contributes to the sleeker look. The

The Stratus Goldⁱ is the new version of PSB's top-of-the-line speaker, the Stratus Gold, which I reviewed in the November 1991 issue. PSB has more than doubled its line since then, to two dozen models. But the company doesn't upgrade its products very often and didn't want to change its flagship speaker unless it could make meaningful improvements.

One factor that helped PSB improve the Stratus Gold was its access to a new anechoic chamber at Canada's National Research Council (NRC). PSB was the first

new cabinet has front-to-back and side-to-side stiffeners and longitudinal braces, to minimize side-panel resonances. The front panel is now thicker, further reducing vibration, and all drivers are flush-mounted. The port has been enlarged and is now flared at both ends to minimize wind noise. And the speaker now comes with beefy, adjustable spikes plus rubber leveling feet in case you don't want to use the spikes.

However, the overall acoustical design and driver complement have not changed. The Stratus Goldⁱ is still a three-way speaker, using a 10-inch cone woofer in a vented

enclosure, a 6-inch cone midrange, and a 1-inch aluminum dome tweeter. The midrange is at the top of the baffle, with the tweeter underneath; the woofer is just below the center of the baffle, and the port is at the bottom—all just as in the original Gold.

The tweeter, from Vifa of Denmark, is essentially the same. Its stiff, low-mass dome is made of aluminum alloy, and it has a polyamide suspension and magnetic-fluid cooling. A "phase plug," in the form of a

**THE PSB STRATUS GOLDⁱ
IS A SLEEKER,
MORE REFINED VERSION
OF THE ORIGINAL
STRATUS GOLD.**

0.5-inch-diameter rigid disk held about 0.05-inch above the center of the dome, helps maintain uniform response off the tweeter's axis.

Aside from a 1-inch voice coil that can take higher temperatures, the 6-inch midrange is also essentially unchanged. It still has a very heavy, 20-ounce, ceramic magnet, a cast magnesium frame, and a mineral-filled polypropylene cone with a heavily

Rated Frequency Response: On axis, 31 Hz to 21 kHz, ± 3 dB, and 36 Hz to 20 kHz, ± 1.5 dB; 30° to one side, 36 Hz to 10 kHz, ± 1.5 dB.

Rated Sensitivity: 88 dB at 1 meter with 2.83 V rms applied.

Rated Impedance: 4 ohms nominal, 4 ohms minimum.

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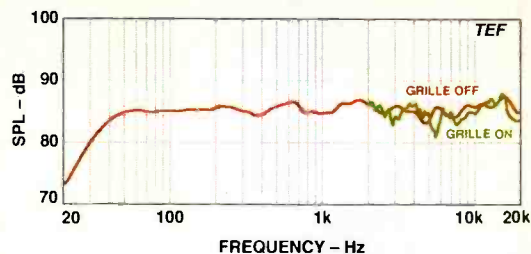


Fig. 1—On-axis frequency response.

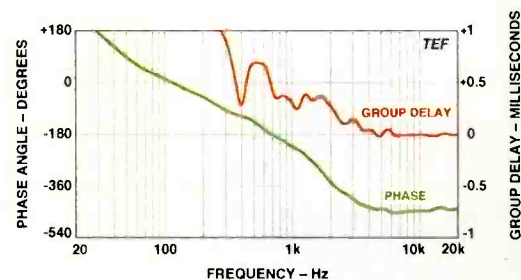


Fig. 2—On-axis phase response and group delay.

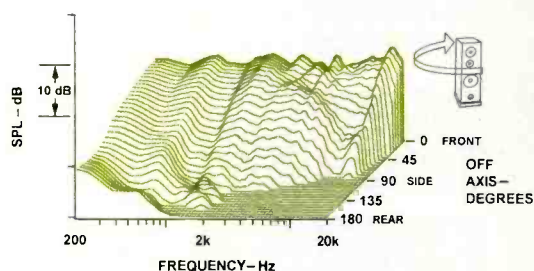


Fig. 3—Horizontal off-axis frequency responses.

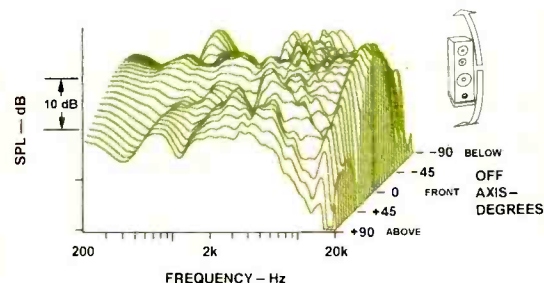


Fig. 4—Vertical off-axis frequency responses.

damped rubber surround for smoother response. It is in its own sealed sub-enclosure, which is damped with loosely packed felt.

The 10-inch woofer's voice coil, 2 inches in diameter, has also been revised to withstand higher temperatures, substantially increasing the Stratus Gold's power handling. It has a very heavy, 40-ounce, ceramic

magnet and a cone of felted paper, treated for increased stiffness, with a butyl rubber surround.

Electrically, the crossover consists of a second-order high-pass filter for the tweeter, a fourth-order bandpass for the midrange, and a second-order low-pass with impedance compensation for the woofer. It has 12 circuit elements, made up of 19 components of very high quality, including all air-core inductors wound with heavy-gauge wire. Connections to the drivers are made with 12-gauge, audiophile-grade wire attached with clips. The crossover's heavy-duty circuit board is attached to the rear panel, behind the woofer.

Acoustically, the crossover between the midrange and tweeter is said to act as a sharp-cutoff fourth-order Linkwitz-Riley type. This keeps the two drivers' acoustic outputs in phase, to minimize lobing. The crossover between the woofer and midrange is specified as having a third-order acoustic Butterworth curve, to provide both flat on-axis response and flat sound power through the crossover range.

The Stratus Gold's input connections are conveniently placed near the bottom of the rear panel. (The original model's connections were on the bottom of the cabinet, where they weren't visible but weren't accessible, either.) The terminals are heavy-duty, gold-plated, five-way binding posts on 3/4-inch centers to accommodate double-banana plugs. Separate terminals for the woofer allow bi-wiring, but tri-wiring is not supported. Thick straps connect the terminals for single-wire use.

Measurements

I tested the Stratus Gold's on-axis frequency response (Fig. 1) at the height recommended by PSB, approximately halfway between the midrange and tweeter. The curves combine ground-plane measurements below 250 Hz with midrange and treble measurements made in a large anechoic chamber. The sound pressure levels

are for a 2.83-volt input, equivalent to 2 watts into the speaker's rated impedance of 4 ohms.

The response taken without the grille is commendably flat, fitting a tight, 4.3-dB, window from 38 Hz to 20 kHz. If you ignore a peak at 15.5 kHz and a slight dip at 4.8 kHz, the curve fits a very tight, 2.8-dB, window. Low-frequency response is particularly good, only 3 dB lower at 35 Hz than at 100 Hz and 6 dB below the 100-Hz level at a low 28 Hz. The grille causes fairly significant response changes above 2 kHz. Averaged from 250 Hz to 4 kHz, the Stratus

**OFF-AXIS RESPONSE
IS VERY UNIFORM,
IN BOTH THE VERTICAL
AND HORIZONTAL PLANES.**

Gold's sensitivity was 85.7 dB, 2.3 dB below PSB's rating.

The crossover point between woofer and midrange is specified as 250 Hz. However, when I checked response with the woofer's polarity reversed (easily done, thanks to the bi-wirable connections), a deep null of about 25 dB occurred at approximately 300 Hz, indicating that this was the true crossover point. I double-checked by measuring the output of the woofer and midrange separately, again using the bi-wire connections, and verified that their levels were equal at 300 Hz. These tests also revealed that the acoustic crossover between the midrange and woofer was essentially a first-order, 6-dB/octave, transition through the range from 150 to 600 Hz. (However, the level at the 300-Hz crossover point was -6 dB rather than the -3 dB usually seen from a first-order crossover.) But beyond that range, the slopes grew steeper, the midrange rolling off at 12 dB per octave below 150 Hz and the woofer doing the same above 2 kHz. The individual drivers' outputs overlapped quite broadly over the two octaves centered at 300 Hz.

The phase and group-delay responses of the Stratus Gold are shown in Fig. 2. The phase response is typical of direct-radiator speakers; there are no anomalies. Considered together, the phase and group-delay

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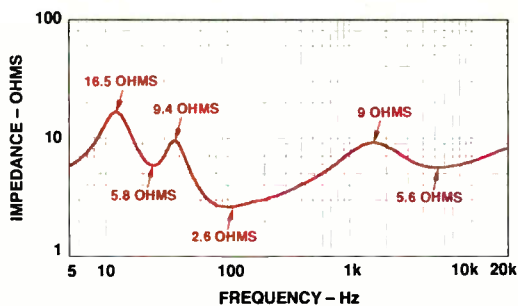
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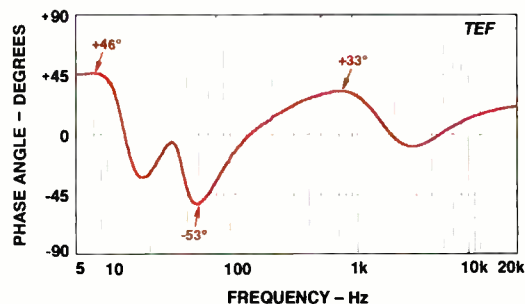
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A



B

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

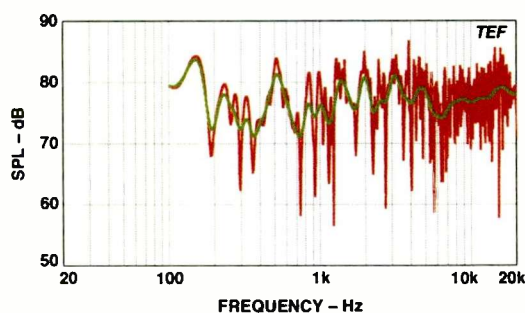


Fig. 6—Three-meter room response.

responses indicate that offset between the midrange and tweeter is relatively short, about 0.23 millisecond when averaged from 1 to 4 kHz, and that the midrange lags the tweeter.

Response variations for listeners sitting to one side of the Gold's axis are shown in Fig. 3. (The bold curve at the rear of the graph is on-axis response.) The off-axis response is very uniform, with minimal narrowing above 10 kHz. At 30° off axis, response is down merely 3 dB at 13 kHz.

Response above and below the axis (Fig. 4) is very uniform in the main vertical listening window, 0° to 15° above axis. There are no anomalies in the region of the upper crossover (about 2 kHz). Although response does dip moderately here for posi-

tions below the axis, it's just 8 dB down at 15° below axis, which is significant only for a listener lying on the floor. The slight upward tilt in the main radiation pattern at the upper crossover point indicates that the acoustic outputs of the midrange and tweeter are not quite in phase. That's actually desirable, because it improves the response on and above the axis, where listeners are most likely to be. Above the main listening window and below -15°, there is a significant dip at about 2 to 3 kHz.

The Gold's impedance magnitude (Fig. 5A) ranges from 2.6 ohms at 100 Hz to 16.5 ohms at 12 Hz. Within the audio band, the speaker's impedance phase (Fig. 5B) ranges from a maximum of +33° (inductive) at 750 Hz to a minimum of -53° (capacitive) at 50 Hz. Below 10 Hz, the impedance phase rises to +46°; I've extended the frequency scale in Figs. 5A and 5B down to 5 Hz so that you can see this.

The Stratus Gold's low impedance (less than 3 ohms) and significantly lagging phase angle in the upper bass (between 70 and 200 Hz) make it a demanding load, so it should be used with amplifiers having high-current capability. Because the impedance magnitude within the audio band varies from 9.4 to 2.6 ohms (a ratio of 3.6 to 1),

the Stratus Gold is relatively sensitive to cable resistance. To keep cable-drop effects from causing response peaks and dips greater than 0.1 dB, you should use cable whose series resistance is no more than about 42 milliohms; for typical lengths, 12-gauge (or larger) cable should do.

Figure 6 is the Stratus Gold's 3-meter room response, with curves for raw and smoothed data. From 800 Hz up, the smoothed curve fits a tight, 7-dB window. Below 800 Hz, the deviation increases somewhat, with peaks at 150 and 500 Hz and several minor dips. Except for the 150-Hz peak, the curve fits within a 10-dB window, which is still quite tight.

The Gold's woofer was capable of very large excursions, about 1 inch, peak to peak.

I was impressed by its clean output from 24 Hz up; the sound was quite effortless in this range when the speaker was driven by 100 watts. The port sharply reduced cone excursion at 26 Hz, the Gold's tuning frequency. The port tube's flared ends reduced wind noise and turbulence very well. This port was one of the least noisy I have encountered; noise was extremely low even when the PSB was driven hard at its tuning frequency. Above box tuning, the woofer reached a maximum excursion at about 40 Hz accompanied by a rise in distortion. I noted just a slight amount of dynamic offset



**I WAS VERY IMPRESSED
BY THE GOLD'S
CLEAN AND EFFORTLESS
BASS OUTPUT
FROM 24 Hz UP.**

in the woofer's cone motion. A high-level sine-wave sweep uncovered no significant resonances in the cabinet walls.

Figure 7 shows the PSB's E_1 (41.2-Hz) harmonic distortion for input power levels up to 100 watts (20 volts rms into the rated 4-ohm load). This frequency is very close to the woofer's maximum excursion frequency. Even so, the second and third harmonics are relatively low. The fourth harmonic reaches measurable levels at and just below 100 watts and rises to a mere 1% or so. (The constant-level ridge in Fig. 7, just above 50 Hz, was caused by 60-Hz hum in my test setup.)

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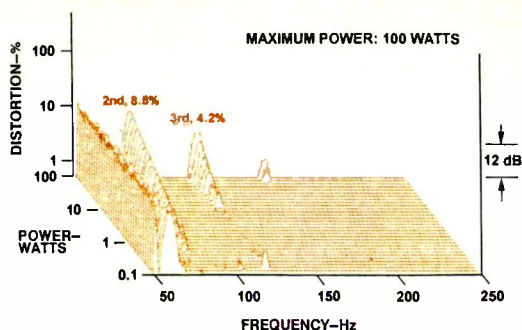


Fig. 7—Harmonic distortion for E_1 (41.2 Hz).

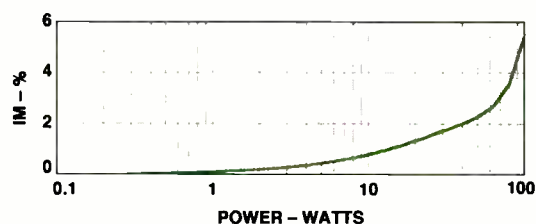


Fig. 8—IM distortion for A_4 (440 Hz) and E_1 (41.2 Hz).

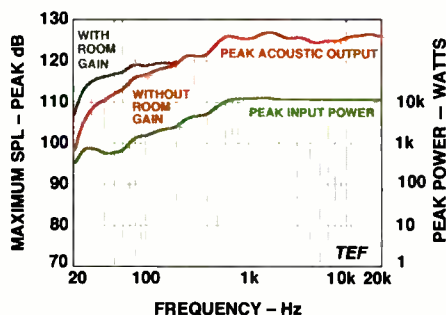


Fig. 9—Maximum peak input power and sound output.

Figure 8 indicates how the Stratus Gold's intermodulation distortion rises with increasing input power; the test signal consisted of 440-Hz (A_4) and 41.2-Hz (E_1) tones of equal power. Below 40 watts, the IM is quite low; by 100 watts, it has risen to a clearly audible 5.4%. This distortion is somewhat higher than might be expected from a three-way speaker. But as I mentioned, the crossover between the woofer and midrange is at 300 Hz, with a rather broad overlap between the two drivers. Therefore, the woofer is still handling a significant amount of the energy at the upper, 440-Hz, test frequency. And the lower test frequency is very near the woofer's maximum excursion point. With different test frequencies or a somewhat lower crossover point and sharper rolloff slopes, measured IM would be lower.

Short-term peak input power and output capabilities are seen in Fig. 9 as functions of frequency. The peak input power (calculated by assuming that the measured peak voltage was applied across the rated 4-ohm impedance) starts quite high, rises quickly at the 26-Hz box tuning, falls slightly, and then rises smoothly above 650 Hz, reaching more than 11 kilowatts. With room gain, the peak acoustic output starts quite high and rises quickly. Above 500 Hz, it reaches a very loud 120 dB SPL or so. Between 80 and 800 Hz, the Gold's low impedance was a real challenge for my Crown Macro Reference amplifier. At some frequencies, the amp ran out of power just before the speaker reached its limit.

The Stratus Goldⁱ has a hair greater power handling than its predecessor but lower sensitivity; peak output is thus about the same. Its woofer, however, has higher power handling and output capability than its predecessor's, especially below 32 Hz. On the whole, the Goldⁱ measured about the same as, or slightly better than, the original Gold in almost every respect.

Use and Listening Tests

The Stratus Gold's I tested had a beautiful dark cherry finish. As usual with PSB speakers, the cabinets' appearance, workmanship, and fit and finish were excellent. Their bulk and substantial, 90-pound, weight made it plain that these were serious speaker systems. Nevertheless, unpacking and setup were quite straightforward, though it usually took two people to move the PSBs, particularly when the spikes were attached.

Although the eight-page owner's manual covers the whole PSB speaker line and is half in English and half in French, it manages to include a lot of information. Details are provided about connecting the speakers, the listening room, speaker placement, and amplifier power precautions. Bi-wiring and bi-amplification, and the speaker's spikes and feet, are described in separate instruction sheets.

PSB's recommended placement is at least 18 inches from room walls, angled toward the listener. I set up the Stratus Gold's about 7 feet apart and canted them toward my listening position on the couch, about 8 feet away. Auxiliary review equipment included a Krell KRC preamp, a Krell KSA-250 power amp, and Straight Wire cabling. I did most of my listening with the speakers' grilles removed and without the spikes.

The Stratus Gold's had essentially the same sensitivity as the B&W 801 Matrix Series 3 speakers I use for comparisons. With some recordings, however, the PSBs sounded slightly louder than the B&Ws, and in those cases I had to reduce the level of the PSBs by about 1 to 2 dB to get a good match in perceived loudness.

On Liszt's *Works for Violin and Piano* (Dorian Recordings DOR-90251), the Stratus Gold's delivered a very tangible and believable image and a neutral, effortless sound that was very much to my liking. The violin was particularly realistic: quite pure, clean, and accurate, as if it were right in the room with me. The one solo piano track, "Hungarian Rhapsody," demonstrated the PSB's excellent dynamics, with the low registers of the piano exercising the speaker's excellent bass capabilities. Next, I listened to Louis Moreau Gottschalk's "Cakewalk," played by John Arpin (Pro Arte/Fanfare CDD 515). On this solo piano album, the best piano CD in my collection, the PSBs produced a clean, wide-range sound and impressive dynamics.

The PSBs' dynamic range was also demonstrated very ably on track 2 of a jazz/pop album by Billy Cobham, *Power*

**THE STRATUS GOLD'S
IMAGING WAS TANGIBLE
AND BELIEVABLE,
ITS SOUND NEUTRAL
AND EFFORTLESS.**

Play (GRP Records GRD-9536). Here, the Stratus Gold's exhibited an intensity and vigor matched by few other speakers. Peak levels on the synthesized percussive sounds were quite impressively clean, while the kick drum had a solid, tactile whomp. On *Tropic Heat*, a Latin jazz CD by Dave Valentin

(GRP Records GRD-9769), the PSBs reproduced the brasses very realistically, re-creating the high levels and bite and blat of the trombones and the growl of the saxes. (This CD reminds me of a '90s big-band jazz version of Desi Arnaz's band from the '50s.)

The Stratus Gold's were at ease on a wide selection of music, from the sedate to the very dynamic, from rock to symphonic, and from club to chamber music. On wide-range symphonic pieces, the PSBs' imaging and soundstaging were excellent. They gave the B&Ws some fierce competition.

The PSBs are voiced with a very slight upward tilt in the treble, whereas the B&Ws have a slightly greater downward tilt. As a result, I sometimes preferred the PSBs' more open and revealing sound; cleanly recorded female vocals sounded clear and distinct, and I heard no hint of harshness. But on some poorly recorded vocals, presumably made with microphones that had peaky high-frequency response, the added treble did not work in the PSBs' favor.

The Stratus Gold's were particularly good at reproducing program material containing high levels of low bass. They han-

dled essentially anything I threw in their direction—from pipe-organ pedals, to heavy rock kick drum, to synthesizer bass—with solid, floor-shaking response.

On third-octave band-limited pink noise, the PSBs' clean output essentially equaled, and sometimes exceeded, the B&Ws'. At 20 Hz, though the PSBs had slightly less clean fundamental output than the B&Ws, they produced significantly less

**I GOT FLOOR-SHAKING
BASS ON EVERYTHING
FROM PIPE ORGAN
TO KICK DRUM.**

port wind noise. At 25 Hz, the PSBs had the clear edge. At all higher bass frequencies, the two systems were equals. Few speakers have done so well against the B&Ws on this test. On the stand-up/sit-down test, the Stratus, like the 801, exhibited essentially no change in timbre when I stood up.

The Goldi has a narrower front panel and larger port than the Gold, but its driver sizes are unchanged.



The PSB Stratus Gold's were standout performers on almost everything I listened to. These are accurate, well-balanced speakers that have deep and powerful bass coupled with an extended and smooth high end. Do I still like the Stratus Gold in its updated version? An emphatic yes! **A**

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thanks to a shiny front panel in your choice of gold or stainless steel and matching top plates on the round transformer cans. Rated at 70 watts per channel, the SJ-801A uses a pair of Svetlana

6550C output tubes in each channel, a 12AX7 dual triode for the front end, and two 6SN7s for the phase-inverter/driver tubes.

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DROVE B&W 801s
TO AMAZING VOLUMES,
CLIPPING GRACEFULLY
WHEN OVERDRIVEN.**

Front-panel controls consist of an on/off toggle switch, a rotary volume control, and a rotary input selector. Unlike some of Jolida's other amplifiers, the SJ-801A has no balance control. On the rear are three

speaker terminals per channel, for common, 4-ohm, and 8-ohm connections. These terminals are very nice, gold-plated binding posts that accept large wires (at least AWG #8), large spade lugs, or banana plugs; however, they are too far apart to accept dual banana plugs. Three pairs of input phono jacks, an IEC AC power-cord socket, and a power-line fuse complete the rear-panel lineup.

Bias test points and screwdriver-adjustable bias pots for each of the four output tubes are accessible through the bottom plate. When adjusting bias, you connect your voltmeter's negative lead to the center pin of a five-pin in-line socket, connect its positive lead to the pin corresponding to the tube whose bias you're setting, and adjust the pot for a reading of 50 millivolts, ± 5 millivolts. The test voltage is measured across 1-ohm resistors connected from the output tube's cathode to ground, so the millivolt reading corresponds to milliamperes of cathode current.

The SJ-801A's chassis is made of fairly heavy steel and seems to be quite robust. An internal subplate holds the tube sockets; the audio circuitry is split between circuit boards for the input and driver stages and for the output stage. Power-supply components, including the bias-adjustment pots for the output tubes, are on two other boards, but the bias-adjustment test points are on the same board as the output stage.

Parts quality appears to be reasonable and appropriate for a product in this price class. Some of the wiring is secured with tie wraps, while larger bundles are contained in shrink tubing. Under the decorative transformer cans, the power transformer appears to be a toroid, whereas the output transformers are of the EI-lamination type.

Measurements

The Jolida SJ-801A's manual suggests that the output tubes' plate current should be 50 milliamperes, ± 5 milliamperes, and it actually was about 53 milliamperes per tube for 120-volt AC line voltage when the amp reached me. (However, I did tweak the bias

Rated Power: 70 watts per channel into 8 ohms, 29 Hz to 25 kHz.

Rated THD + N: Less than 1% at 11 volts (15 watts) into 8-ohm loads, 49 Hz to 20 kHz.

Dimensions: 18¼ in. W x 8½ in. H x 13½ in. D (46.5 cm x 22 cm x 34.5 cm).

Weight: 47 lbs. (21.5 kg).

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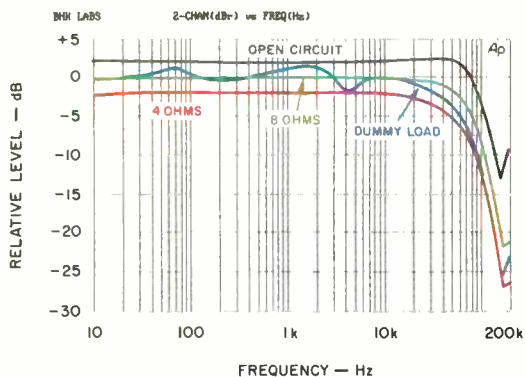


Fig. 1—Frequency response as a function of loading on the 8-ohm tap.



Fig. 2—Square-wave response for 10 kHz into 8-ohm load (top), 10 kHz into 8 ohms paralleled by 2 μ F (middle), and 40 Hz into 8 ohms (bottom).

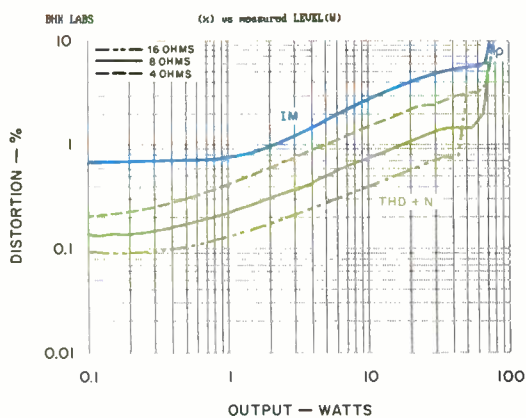


Fig. 3—THD + N at 1 kHz and SMPTE-IM distortion vs. power output, measured at 8-ohm tap.

slightly to get all four tubes as close to the same current as I could.) If plate current is much below 50 milliamperes, the SJ-801A will have higher distortion and higher output impedance; currents much above 50

milliamperes will lower the output impedance and distortion but also shorten the life of the output tubes. Distortion is not the only aspect of the amp's sound that plate current can affect. Lower current will make it brighter, more articulate, and possibly a bit edgy; higher current will make it smoother and more listenable, but with less of a sense of life.

The SJ-801A's frequency response is plotted in Fig. 1 for open circuit, 8-ohm and 4-ohm loads, and the NHT dummy speaker load, all on the left channel's 8-ohm tap at the maximum volume-control setting. (Response with the volume control turned down was not appreciably different.) As can be seen from the wide spread between the curves, output regulation and damping factor (which are related) are not very high in the SJ-801A, as is the case with many tube amps. In the SJ-801A, this is largely because of the low amount of overall negative feedback used. On the 4-ohm tap, response was essentially the same as in Fig. 1 (but for 4- and 2-ohm loading instead of 8 and 4 ohms), except that variations with the NHT dummy load were only about half as great because the 4-ohm tap's output impedance is about half the 8-ohm tap's.

Square-wave response is presented in Fig. 2 for the left channel (overshoot was a bit greater on the right channel). The moderate tilt on the 40-Hz square is acceptable; however, many amps have less tilt, signifying less low-frequency phase shift. Rise and fall times for a 10-volt peak-to-peak output into 8 ohms on the 8-ohm tap were 5.5 microseconds for the left channel and 5 microseconds for the right.

Figure 3 shows how distortion varies with output power and how changes in load affect total harmonic distortion plus noise (THD + N). Figure 4 shows how THD + N varies with frequency at different power levels. A spectrum analysis of harmonic distortion for a 1-kHz signal at 10 watts (Fig. 5) reveals that

ASSOCIATED EQUIPMENT USED

Equipment used in the listening tests for this review consisted of:

CD Transports: Sonic Frontiers SFT-1 and PS Audio Lambda Two Special
CD Electronics: Genesis Technologies Digital Lens anti-jitter device and Threshold DAC 2, Sonic Frontiers SFD-2 MkII, and Classé Audio DAC-1 D/A converters

Phono Equipment: Oracle turntable, Well Tempered Arm, Accuphase AC-2 moving-coil cartridge, and Vendetta Research SCP-2C phono preamp

Additional Signal Sources: Nakamichi ST-7 FM tuner, Nakamichi 250 cassette deck, and Technics 1500 open-reel recorder

Preamplifiers: Sonic Frontiers Line 3, Ayre Acoustics K-1, and Threshold T2 (or no preamp at all)

Power Amplifiers: Sonic Frontiers Power-3 mono tube amplifiers, an Ayre Acoustics V-3, and an Arnoux Seven B digital switching amp

Loudspeakers: Genesis Technologies Genesis Vs and B&W 801 Matrix Series 3s

Cables: Digital interconnects, Illuminati DX-50 (AES/EBU balanced); analog interconnects, Transparent Cable Music-Link Reference (balanced) and Tara Labs Master and Music and Sound (unbalanced); speaker cables, Transparent Cable MusicWave Reference and Tara Labs RSC Master Generation 2

the dominant distortion components are the second and third harmonics. Higher-order harmonics are less prominent, but there's still an appreciable amount of fifth and seventh harmonic. Note also the cluster of power-supply ripple components around each harmonic.

Interchannel crosstalk at the highest volume setting was below -70 dB from 20 Hz to about 2.5 kHz; at 20 kHz, it increased to -54 or -57 dB, depending on the testing direction. With the volume set for 1 watt of output into 8 ohms for a 500-millivolt input (a standard IHF test condition), crosstalk was about the same.

"I'D GIVE IT AN A..."

...IF CELESTION HADN'T BEATEN ME TO IT."

—D.B. Keele, Jr. on the new Celestion A3, *Audio* August 1997

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No matter what source materials he selected, from Mozart symphonies to movie soundtracks, Keele was amazed by the A3's performance. He

wrote that "their dynamic range and effortlessness border on the best I have ever heard" and that "their imaging and localization could not be faulted."

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Once you've read the Celestion story and heard the Celestion sound, you'll see why D.B. Keele, Jr. and *Audio* gave us an A. And why it's time for other speaker companies to go back to school.



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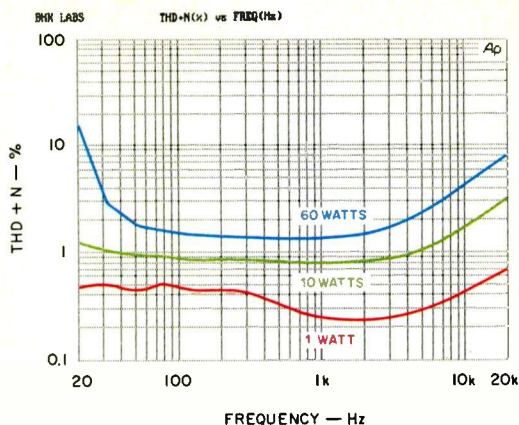


Fig. 4—THD + N vs. frequency.

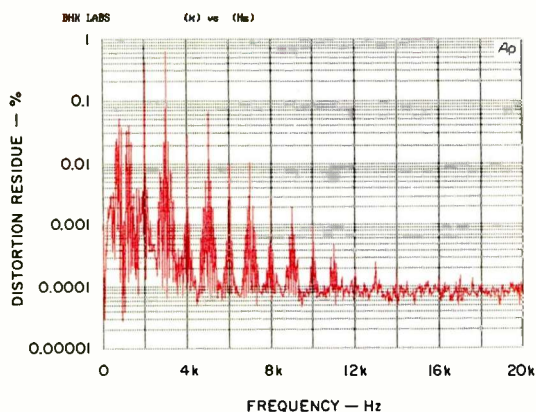


Fig. 5—Spectrum of harmonic-distortion residue for a 1-kHz signal at 10 watts out into 8 ohms.

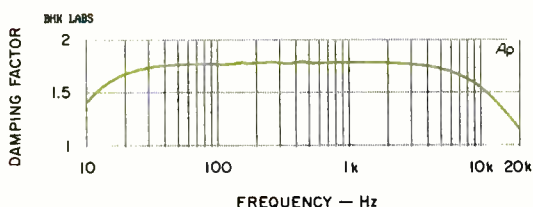


Fig. 6—Damping factor.

Damping factor for the left channel on the 8-ohm tap is shown in Fig. 6; it was about the same on the 4-ohm taps. Damping was slightly higher in the right channel at either tap.

Output noise was just about equal in each channel. Wideband, it measured 1.57 millivolts in the left channel and 1.5 millivolts in the right; with A-weighting, the results were 407 and 427 microvolts, respectively. The wideband figures are dominated by power-supply hum components; 1.5 millivolts of hum could be audible in a quiet room, if your speakers' sensitivity is

greater than about 90 dB. The amp's IHF signal-to-noise ratio was 77 dB for the left channel and 76.3 dB for the right.

Dynamic power attainable at the visual onset of clipping was 70 watts at the beginning of the 20-millisecond tone burst (yielding a dynamic headroom of 0 dB) and 64 watts at its end. Steady-state power at the visual onset of clipping (about 1% distortion) was 60 watts, which corresponds to a clipping headroom of -0.7 dB.

Voltage gain for 8-ohm loading on the 8-ohm taps was 36.1 dB for the left channel and 36.3 dB for the right. These figures correspond to IHF sensitivities of 44.4 and 43.3 millivolts for 1-watt output into 8-ohm loads. The SJ-801A drew 0.64 ampere from the AC line before plate current commenced to flow and 1.76 amperes when the 801A was fully warmed up.

Use and Listening Tests

Driving B&W 801 Matrix Series 3 speakers for my first, casual, listening, the SJ-801A sounded okay. When I tried it on Genesis Vs, it still sounded pretty good, but the sound was noticeably less clear and open than with the other, much more costly, amps I use. These speakers demand the utmost of a power amp, and I didn't think the SJ-801A was really a match for them—not that you'd expect it to be, at its price.

The B&Ws are a more appropriate and representative load for this amp, so I went back to them for the rest of my concentrated listening. The SJ-801A drove them to amazing volume levels and clipped gracefully when overdriven. I played a CD that I made of a train recording that my mentor, Gordon Mercer, recorded on the last day steam locomotives went through town, back in the mid-'50s. The SJ-801A played this quite impressively, handling the thunderous bass without apparent strain. Bass was reasonably tight and powerful. On other recordings, imaging and detail were good, but there was a bit of mild glare and irritation in the upper mid-

range. All in all, though, the Jolida SJ-801A is a good-sounding amp that should yield fine musical reproduction for many listeners. As I said the last time I reviewed a Jolida amp, anyone who wants to get tube amplifier sound without paying a fortune should check out this company's products. **A**

TECHNICAL HIGHLIGHTS

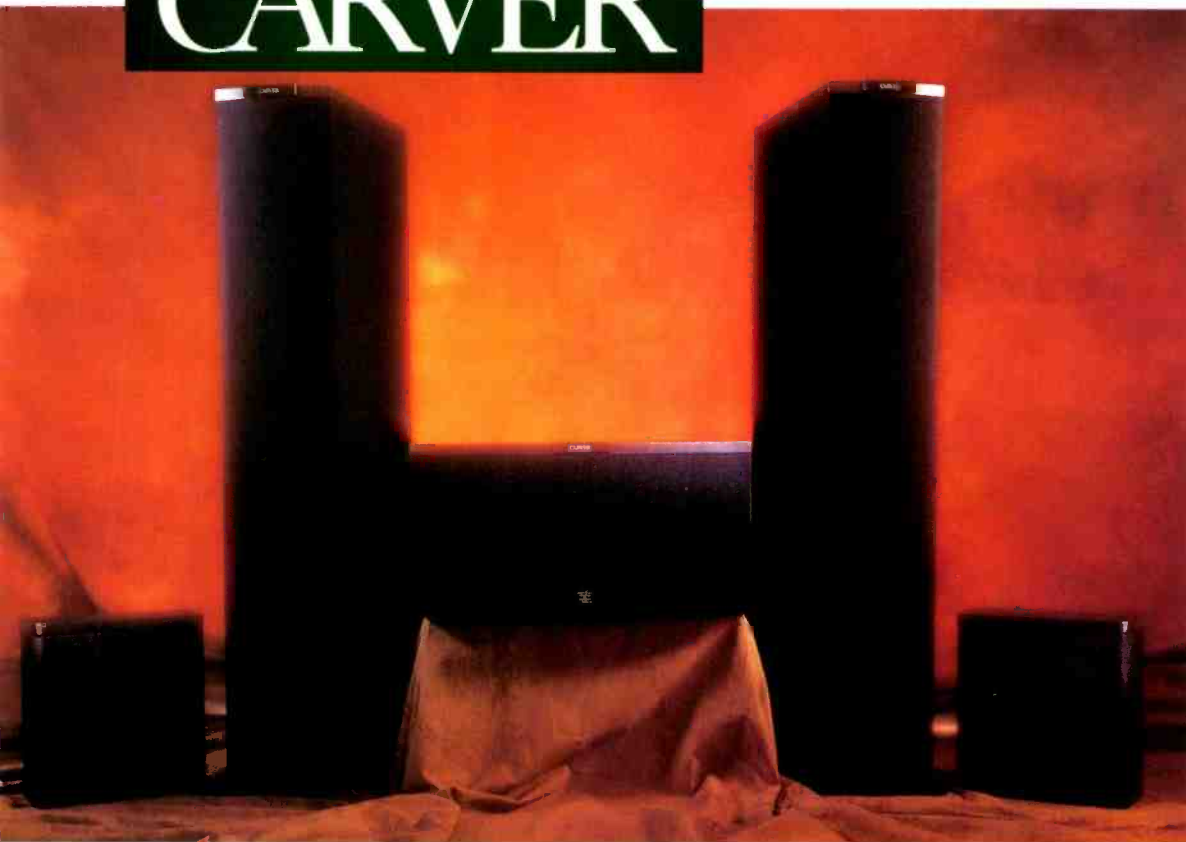
The first-stage circuit and tubes of the SJ-801A are somewhat different from those of the Jolida SJ-302A amplifier, which I reviewed in the March 1996 issue.

The SJ-801A is said to have about 5 dB of overall feedback. The feedback loop runs from the 8-ohm tap, on the secondaries of the output transformer, back to the input tube cathodes through a series feedback resistor.

The SJ-801A's input jacks are wired, via a two-pole selector switch, to the volume control. The control's wipers then feed signal to the grids of the input tubes. Each channel's first stage uses half of a 12AX7 dual triode that's wired as a common-cathode amplifier with a simple resistive plate load. This stage's output is directly coupled to the second stage, a 6SN7 tube configured as a long-tailed phase inverter. The output of this stage is capacitor-coupled to the output stage—6550C beam-power tubes in an Ultra-Linear configuration, operating with fixed bias.

The term "fixed bias" means that the cathodes are operated at or near ground potential and that the control grids of the output tubes are run at an appropriate negative bias voltage. If the negative grid bias in such a circuit is adjustable, you have "adjustable fixed bias," contradictory as that sounds. If the grids are at ground potential and the cathodes are connected to ground through a common resistor, you have "cathode bias," or "self-bias." In that arrangement, the cathode resistor's value is chosen so that the voltage drop caused by the tube's current flow matches the cathode-to-grid voltage bias needed for the desired current flow. **B.H.K.**

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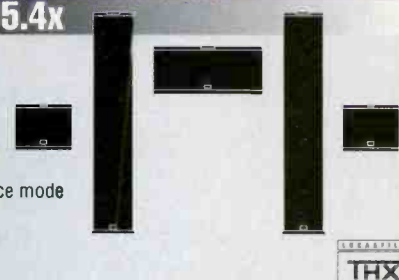
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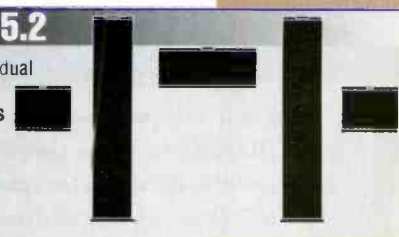
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- Constant Directivity tweeters
- Nominal impedance 4 Ohms
- Freq. response 27Hz-22kHz



EDWARD M. LONG

SENNHEISER HD 600 EARPHONES



When I reviewed Sennheiser's HD 580, in the June 1996 issue, it was at the top of the company's extensive line of dynamic earphones (Sennheiser also makes more expensive electrostatic models), and I was convinced that it was indeed special. The HD 600 earphones, which the company has slotted above the HD 580s, are intended to be even more so. Although similar to the HD 580s, the HD

600s incorporate several refinements, use more costly parts, and carry more stringent specifications.

The HD 600s are "open-air" earphones, a design Sennheiser pioneered many years ago to yield a sense of openness while still producing good, deep bass. Before open-air earphones were introduced, good bass could be attained only from 'phones whose cups formed a tight seal around your ears.

The HD 600s' open-backed earcups let you hear outside sounds easily; black mesh screens protect the transducers from damage. Most closed earphones have difficulty avoiding the "canned" sonic quality that is caused by sound from the rear of the diaphragm being reflected back to your ears. (The owner's manual cautions against putting your hands over the rear of the earcups while you are listening, lest you get this effect.) Open-air earphones are not well suited for monitoring live recording sessions, however, as they make it hard to tell which of the sounds you hear are being picked up by the mike and which are reaching you through the air. This can make it difficult to be certain that you're recording what you think you are.

The inside face of each of the HD 600s' earcups is covered with a foam pad to protect the transducers from contamination. The earcups are made of glass epoxy, for strength and ruggedness. The velvet-covered, foam-filled ear cushions completely encircle the pinnae, or outer ears; they are similar in shape to most ears, so they can be reasonably compact without clamping down on your ear lobes. The ear cushions can easily be replaced if necessary. Carbon-fiber bails enable the earcups to swivel about 30° in both the vertical and horizontal planes, which is more than sufficient. Two spring-steel pieces in the glass-epoxy headband provide the moderate pressure needed to hold the earcups against your head. These steel pieces slide in the headband cover, enabling you to adjust the earphones for proper fit; detents in the headband hold your chosen position and keep it

Transducer Design: Dynamic.

Coupling to the Ear: Circumaural.

Rated Frequency Response: 16 Hz to 30 kHz, ± 1 dB; -10 dB at 12 Hz and 38 kHz.

Rated Impedance: 300 ohms.

Rated THD: 0.1% or less, per DIN 45500.

Weight (Without Cable): 9.2 oz. (260 grams).

Price: \$449.95.

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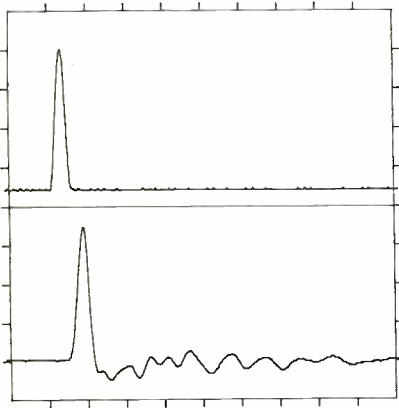


Fig. 1—Cosine-pulse test: input (top) vs. output.

from slipping. The adjustments and cushions help make the HD 600s very comfortable for long-term listening.

The Kevlar-reinforced cord contains oxygen-free copper wires and is about 9½ feet long. The cord can be unplugged from the HD 600s and replaced. Its other end has a gold-plated stereo mini plug for portable CD and cassette players; a gold-plated adaptor for ¼-inch stereo phone jacks is supplied.

Sennheiser specifies the HD 600s' frequency response as 16 Hz to 30 kHz, ±1 dB; my measurements showed that they have very strong and relatively smooth output at least to 20 kHz, the limit of my test. The amplitude and phase responses were more uniform with frequency than were those of the HD 580 earphones. The HD 600s also produced excellent square waves, which is possible only when the fundamental and the harmonics have the correct amplitude and phase relationships. The left and right earphones matched very closely. Smoothness and left/right matching were even better in the HD 600s than in the HD 580s, up until now the best I had tested. As with the HD 580s, driving the HD 600s from a 100-ohm source lowered their output by about 3 dB but did not affect their response. Thus, response should remain consistent when these earphones are used with components that have different output impedances.

The response of the HD 600s to a positive-going, 20-kHz cosine pulse (Fig. 1) indicates that they have positive acoustical-output polarity. The output pulse is almost identical to the input pulse, which confirms the excellent high-frequency response I

measured, and the pulse's fast recovery confirms the earphones' extended low-frequency response.

Sensitivity was 99.2 dB for a 1-milliwatt input, 2.2 dB better than Sennheiser's specification. This high sensitivity can be attributed mainly to Sennheiser's use of neodymium magnets, which provide a strong magnetic field while keeping the HD 600s' weight to a minimum. Impedance was 308 ohms for the left earphone and 309 ohms for the right, evidence of the aluminum voice coils' precise winding. The care that Sennheiser takes in matching the voice-coil impedances and in selecting and matching the lightweight, two-layer, Duofol diaphragms helps keep the channels closely matched. This, in turn, should result in an excellent sound field and very stable images.

The HD 580s and HD 600s have a diffuse-field response. This is also true of the Stax Omega electrostatic earphones, which I and members of my listening panel use as a reference. I asked the panel members to compare the sound of the Sennheiser HD 600s to that of the Stax Omegas and write down comments. One of the first selections

was "Christe, Rex Glorise" from Berlioz's *Te Deum* (Voices of Ascension Chorus and Orchestra conducted by Dennis Keene, Delos DE 3200). This recording, engineered by John Eargle, incorporates nuances of detail and definition while maintaining a perspective of the enormous musical forces the work requires. On this track, the panelists' comments about the HD 600s were: "good articulation of voices," "easy to locate dif-

ferent groups of the choir," and "good sense of space." There was, however, a general consensus that the HD 600s had a little less openness and sense of space than the Omegas. I believe that the smaller inside

diameter and closer fit of the HD 600s' earcushions may have contributed to this perception.

I next played "Dance of the Earth," from Stravinsky's *The Rite of Spring*, which was recorded with the Neumann KU-100 dummy-head binaural microphone system. This gold CD, with the Pasadena Symphony conducted by Jorge Mester (Newport Classic NCAU10002), excels in definition and clarity and has especially powerful bass. The panel's comments were: "Bass is a little boomier than reference," "brass is very

**SENNHEISER'S
OPEN-AIR DESIGN
YIELDS GOOD BASS AND
A SENSE OF OPENNESS.**

EARPHONE EVALUATION

PARAMETER	RATING	COMMENTS
Overall Sound	Excellent	"Very close to reference 'phones, with slightly less sense of space"
Bass	Very good	"Slightly boomier," "Bass guitar sounds similar," and "Bass very tight"
Midrange	Excellent	"Trumpet slightly less sharp" and "Brass very slightly recessed"
Treble	Excellent	"Cymbals sound the same"
Overall Isolation	Low	"Very little isolation from outside sounds"
Bass	Low	"Outside low sounds are easy to hear"
Midrange	Low	"Conversation is possible with the HD 600s"
Treble	Fair	"High-frequency sounds are reduced"
Comfort	Very good	"Very comfortable" and "More comfortable than other 'phones"
Value	Very good	"Very good value, considering the level of quality"

GENERAL COMMENTS: Very articulate and detailed sound, even during loud passages. Instrument placement is very stable. Comfortable during long listening sessions. Very good value.

Plastic reinforcing ribs keep the HD 600 light but rigid.



slightly recessed," "cymbals sound the same as reference," and "both are very good during loud passages."

"Blue Bird," sung by Jimmy Rogers on TDK's *Ultimate Guide to Great Sound* (TDK CDK 0101, taken from Analogue Productions APO 2001), led the panel members to comment: "Drums have less snap," "vocal very articulate," "harmonica has less edginess," and "bass guitar sounds similar." (This selection, by the way, sounds very good over earphones and has a good sense of ensemble.)

"Take the 'A' Train" (on *Carved in Stone*, performed by the dmp Big Band, dmp-512) sounded very good to the panel through either the Sennheiser HD 600s or the Stax Omegas. (Not all recordings sound good on both earphones and loudspeakers, but Tom Jung, the engineer here, takes care to make sure his recordings do.) The panel commented: "trumpet slightly less sharp," "saxes more mellow," "trombones smoother," "drums have slightly less snap," "piano about the same," and "bass very tight on both."

The Sennheiser HD 600s sounded very much like the Stax Omegas, albeit with slightly less openness and sense of space and a little less edginess on brass. I found the Sennheisers to be very comfortable for long-term listening and very enjoyable on a wide variety of music.

A year and a half ago, I ended my report on the Sennheiser HD 580s by saying, "If you are looking for a comfortable, wide-range pair of high-quality earphones, you should check out the Sennheiser HD 580s. You won't be disappointed." This is still valid, but now you should also check out the HD 600s and see if you agree with me that they are worth the additional hundred dollars. A

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CINEPRO 3k6SE SIX-CHANNEL AMP



The versatile Cinepro 3k6SE is neatly styled and built like a battleship.

Stereo fans can no longer afford to be snobs about home theater; it has now evolved enough to have a true high end. While Dolby Digital (AC-3) surround may lack some transparency in the upper octaves, it nevertheless yields much better defined spatial cues than Dolby Pro Logic. And, like DTS, it has outstanding dynamics and deep bass, better in these regards than most stereo recordings.

High-end home theater equipment has made me revise my standards for stereo listening with respect not only to dynamics, bass power, and bass definition but to transient response as well. I now want far greater power-handling capability from my system and am less tolerant of any compression of full orchestral

dynamics or attenuation of deep bass. And my home theater experience constantly reminds me that many LPs, CDs, and stereo components have serious shortcomings in areas where laserdiscs and DVDs are strong. Equally important, many stereo components that seemed close to the state of the art a few years ago now seem lacking in dynamics and bass extension.

Which brings me to Cinepro Professional's 3k6SE, a souped-up version of the company's established 3k6 six-channel amplifier, designed for home theater and for complex stereo systems that may benefit from biamping or triamping. By any standard, it is a high-end component: Each channel's power output is rated at 375 watts into 8 ohms, 550

watts into 4 ohms, and 750 watts into 2 ohms, with more than 3 dB of headroom at 8 or 4 ohms. (If you have access to a 220-volt AC line, its rated power output per channel increases to 455 watts into 8 ohms, 800 watts into 4 ohms, and 1,200 watts into 2 ohms.) All this muscle is generated not just by the 10 or 20 output transistors found in most high-end stereo amps but by 60 Motorola 250-watt TO-3 bipolar devices. Cinepro says that the power supply has more than 120,000 microfarads of capacitance and energy reserves of 1,050 joules. Peak current is rated at 125 amperes per channel, and damping factor is said to be greater than 1,000.

The 3k6SE has just three gain stages (with no ICs in the path) and uses less than 15 dB of negative feedback. IM distortion is rated at less than 0.05% at rated output; rated signal-to-noise ratio is 110 dB, and slew rate is rated at 65 volts per microsecond. Internally, the amp is wired with Kimber Kable Silver and uses Wima and RelCap capacitors and Dale 1% metal-film resistors at all critical points in the circuit path.

All this technology and performance potential is packaged in a nicely styled chassis that weighs a liftable 74 pounds. (It's nice to see something this good in a reasonably sized package that a normal person can lift without risk.) Front-panel LEDs indicate the presence of a signal and warn of overload for each channel; the balanced and unbalanced inputs are at the rear. The internal layout is clean and neat. And the 3k6SE has the battleship-quality construction demanded of high-end components, with a 14-gauge steel chassis and a half-inch-thick front panel. Yet the Cinepro 3k6SE is priced about the same as a high-end *two-channel* amplifier: \$5,995.

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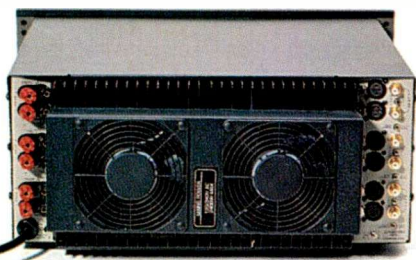
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The 3k6SE's rear panel is dominated by exceptionally quiet cooling fans.

All six amplifier channels are mounted on a single heat sink to ensure that they'll operate at the same temperature and have the same phase response and rise time. The cooling fans are exceptionally quiet—quieter than the ambient noise of the average listening room, according to Cinepro. The 3k6SE has a photo-optical system to protect the amplifier when overdriven and ensure that it won't burn out speaker voice coils. A 12-volt remote trigger jack enables an external processor to power it up. The Cinepro also has a convenient ground-lift switch to minimize hum from the ground loops prevalent in many A/V systems.

The amp can work quite well with the 15-ampere 110-volt circuits found in virtually all homes and apartments, but it will work better with 20- and 30-ampere circuits. You'd probably gain more benefit from upgrading your power line to deliver that current than from buying fancy power cords or line conditioners.

The Cinepro 3k6SE's six channels are grouped in pairs, and the members of each pair can be bridged, so you can use it as a six-, five-, four-, or three-channel amplifier. In a home theater, you can use it to drive all six channels or, if you have a powered subwoofer, bridge two channels to feed extra power to the center channel. You could also use all six of its channels to drive a triamplified stereo system or biamplified main and center-channel speakers. In short, the 3k6SE can be used to drive practically any home theater system and the most complex stereo systems.

This combination of power and flexibility may seem a touch of glorious excess, but it's eminently practical. High-end audio/video systems need real power. For example, the SMPTE movie-soundtrack specifications now permit special effects to peak 20 dB above the average dialog level, thus requiring about 100 times more power than is needed for dialog. Cinepro says it has conducted tests with speakers of 87-dB sen-

sitivity, in a listening room measuring 15 x 22 feet, and that the average dialog levels on *Independence Day* required only 5 to 10 watts. But the most intense dynamics (for instance, blowing up the White House) generated peaks of more than 750 watts for brief periods!

These claims are not exaggerated. Using a Radio Shack sound-level meter, I have discovered that when my home theater system is set to reproduce average movie dialog at levels ranging from 80 to 90 dB SPL, peak levels can exceed 115 dB SPL. Gunfire, for

EACH OF THE CINEPRO'S SIX CHANNELS IS RATED AT 375 WATTS INTO 8 OHMS AND 550 WATTS INTO 4 OHMS.

example, usually reaches 110 dB SPL. With stereo music, I rarely measure sound levels greater than 100 dB, although rock and some symphonies occasionally require massive power.

I'm not saying that every amplifier must match the output of the Cinepro 3k6SE. I have achieved good results driving six full-range speakers with three Adcom 5500 amplifiers, at 200 watts per channel (although their power-overload LEDs sometimes flicker during intense sound effects). And the Krell KAV-500, at half that power level, works superbly with moderately efficient speakers or with home theater systems that have powered subwoofers for the main channels as well as the effects channel. But no one can deny the value of vast reserves of fast, clean power for maximum excitement from movie soundtracks.

Such reserves are equally valuable, I find, for stereo listening. For the past few years, I've been increasing the power of my stereo system's amplifiers and seeking speakers that could do a better job of reproducing CDs' massive dynamic swings and transient peaks. With the 3k6SE, the sound became more effortless, and I didn't have to push the gain up to get realistic musical peaks; in

fact, I tended to turn my average listening level *down*. The odd thing is that I also became more aware of low-level detail and of improved transparency at mid and high levels, listening more closely to the dynamics of live music and the low-level bass energy in live orchestral and jazz performances.

My brief listening to earlier Cinepro designs had led me to expect a slightly soft sound, with less upper midrange and treble energy—the kind of sound that complements some speakers and components whose upper midrange is slightly hard. The Cinepro 3k6SE, however, did a really good job of making surround effects more exciting, expanding the apparent sound field and giving a more realistic sense of being there. (I find a fast, open sound works equally well with stereo, particularly if you have a speaker with true deep-bass power.)

The quality of the Cinepro 3k6SE's output was as impressive as its quantity. It did far more than deliver sheer power. Like other recent amplifier designs, the Cinepro 3k6SE did a superb job of getting more definition and control in the region below 35 Hz, moving all the air in the deep bass with excellent control and definition. It also had excellent mid-bass and did an outstanding job in the critical transition from the bass to the midrange. It added no warmth or euphonic coloration, but neither did it make the sound seem lean. The midrange was open, detailed, and fast.

The 3k6SE's imaging, soundstage, and transparency were very good to excellent. However, like many Class-AB amplifiers using bipolar output devices, the Cinepro 3k6SE did not provide all of the musically convincing details of the very best Class-A designs. (It was also a touch harder than the best amplifiers with FET or tube output stages; if your speakers have peaky midrange or treble, I think you'd be better off with a more "forgiving" amp.) Side-to-side soundstage performance was excellent, with lateral imaging as stable and natural as the recordings allowed. A few high-end amplifiers do deliver slightly more realistic depth and more stable "3-D" imaging, but such amps can easily cost twice as much for just two channels and still don't deliver as much power or dynamic excitement. And the subtle refinements of those high-end amps are normally audible only when listening to demanding musical material on

stereo systems of very high resolution. With most soundtracks, differences in recording quality and surround processor performance overwhelm many fine nuances of power amplifier sound, so the 3k6SE's dynamic virtues stand out even more.

My limited experimentation with biampified and triampified setups indicates that the 3k6SE can perform excellently in such complex systems. However, not all speakers benefit from multiamping. If your speakers are designed strictly for biamping or triamping, you have no choice. When multiamping is optional, however, there may or may not be an advantage. The interaction between the amplifier, electronic crossover, speaker cable, and speaker is complicated, and some speakers seem to offer biamping or triamping options more as an afterthought than as a well-considered route to better sound quality.

The Cinepro 3k6SE raised no compatibility issues, working equally well with ribbon, electrostatic, and low-impedance cone speakers. Specifically, it had no problems

**THE QUALITY
OF THE 3k6SE'S OUTPUT
IS AS IMPRESSIVE
AS ITS QUANTITY.**

driving the VMPS Super Tower III, the Thiel CS6, B&W 801 Matrix Series 3, Polk SRT, Martin-Logan CLS IIz electrostatic, or Spondor BC-1 speakers. It also worked equally well with any speaker cables I tried; it proved to be exceptionally tolerant of inexpensive cables, though it can elicit the benefits from the very best ones.

I consider high-end home theater one of the most exciting aspects of modern sound reproduction, and components like the Cinepro 3k6SE are a vital element. The 3k6SE is a highly versatile high-end amplifier with amazing power and considerable grace. Had it only two channels, it would be one of the world's best bipolar solid-state stereo amplifiers, with clean, fast upper-octave reproduction and amazing deep-bass power. With its six-channel capability, the 3k6SE may well be the best home theater amplifier available. A

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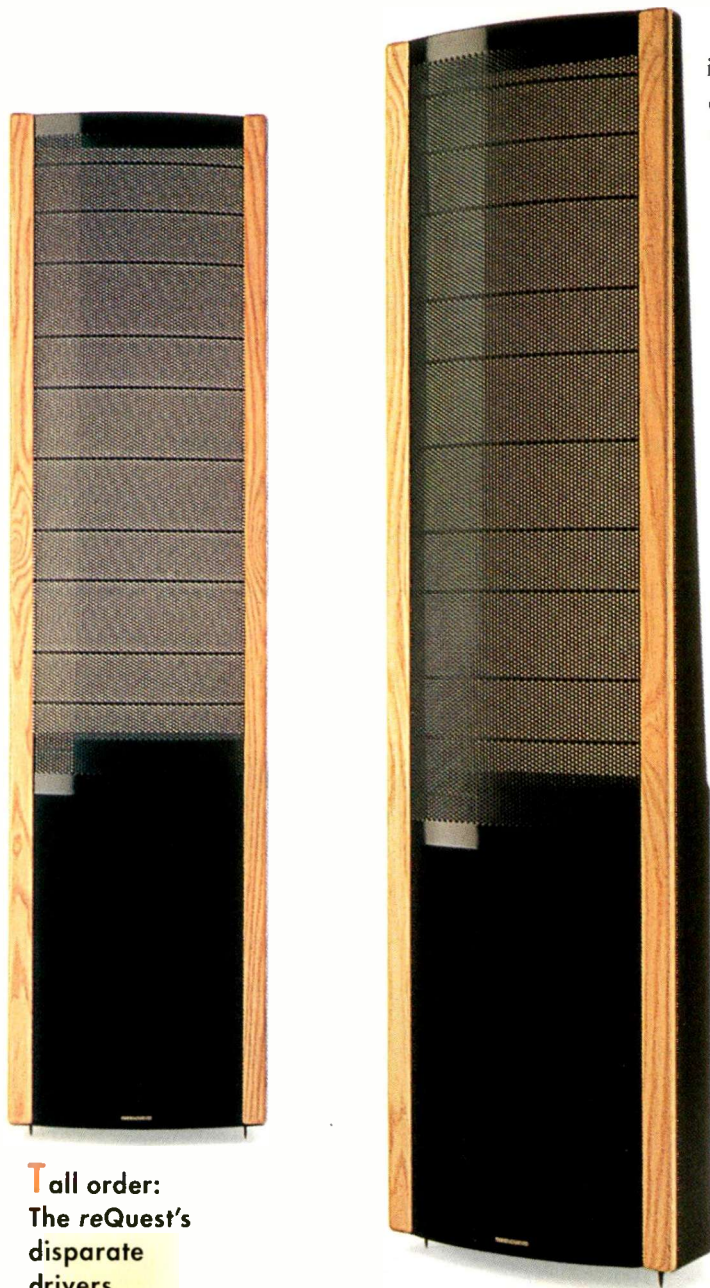


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MARTIN-LOGAN *re*QUEST SPEAKER



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Good speakers create the illusion of being at a live performance. Some audiophiles delight in that, despite knowing it's just an illusion. Others delight in picking the illusion apart, judging speakers by technical standards of accuracy. The

ideal loudspeaker would, of course, pass every technical test while creating the magic that deeply involves you in the music. In practice, all speakers incorporate trade-offs. The trick for the designer is to make the trade-offs that emphasize the beauty and the magic, even if some of them don't please technical purists.

The trade-offs Martin-Logan made in its update of its Quest loudspeaker, called the *re*Quest (\$4,495 per pair), are definitely the right kind. Like the Martin-Logan SL3 (reviewed by Ivan Berger in January '96) and Aeries (which I reviewed in February '94), the *re*Quest blends a dipole electrostatic panel for the midrange and upper frequencies with a dynamic woofer. It takes acoustic sleight of hand to knit such disparate drivers into a seamless whole, and Martin-Logan has pulled the trick off nicely.

The two driver types help make the *re*Quest's visual design a success.

The quasi-transparent electrostatic panel im-

parts an airy look. And thanks to the cone woofer, that panel is relieved of responsibility for bass reproduction, so it can be narrow enough to fit into a cabinet that's a mere 18 inches wide. Consequently, the *re*Quest doesn't dominate a room, even though it's just shy of 6 feet tall.

The theoretical virtues of electrostatics and dipoles were confirmed by the *re*Quest's midrange and treble, which were exceptionally clean and sweet. I know of few speakers at any price whose transparency, transient definition, and dynamic life can equal the *re*Quest's. In side-by-side comparison with the Quad ESL-63 full-range electrostatic, the *re*Quest had notably faster and cleaner transients, better dispersed highs, and better dynamics. The ESL-63 is still a great speaker, but in the midrange and treble the *re*Quest outperformed it in virtually every way! Martin-Logan has done an outstanding job of reducing the treble beaminess common in electrostatic speakers; the treble covers a 30° arc.

The *re*Quest's frequency response, from the lower midrange to the upper limit of hearing, was equal to that of any electrostatic I have heard at any price, including the original Quad electrostatic and the Stax, and a significant improvement over that of Martin-Logan speakers I have reviewed in the past. The *re*Quest reproduced the character of instruments and voice with remarkable neutrality, and it had an almost uncanny ability to separate individual instruments and voices in groups.

This is one hybrid whose bass is not an afterthought, thanks to a 12-inch, long-excursion woofer in a sealed enclosure. (The enclosure's rear panel could be better damped, however.) I found the woofer to be exceptionally fast and dynamic, which helped blend its sound with the electrostatic panel's; it also helped that the two drivers' outputs overlapped sufficiently at the crossover (rated at a relatively high 180 Hz).

Bass and lower midrange performance were very good, as evi-

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denced by the sound of grand piano, bass strings, guitar, woodwinds with a lower register, percussion, and organ. The bass extended solidly down to about 35 Hz, which I found a mixed blessing. There was a lot of power and life, but there was also a tendency to exaggerate. I prefer a little less bass power and a bit more definition and control. My sons, on the other hand, voted the other way. And they proved that you can crank the bass up to the rational limit for music without provoking serious distortion from the woofer or coloration from the electrostatic panel. The *reQuest* is much better in this regard than Martin-Logan's earlier hybrid speakers.

The soundstage was exceptional—extremely revealing, with excellent side-to-side and rear-to-front imaging. When I placed the speakers as far apart as I could without producing a hole in the middle, then moved them back slightly closer to-

THE *reQUEST* DELIVERS THE SUDDEN TOUCHES OF REALISM THAT ONLY A HANDFUL OF SPEAKERS CAN PROVIDE.

gether to lock in center fill, the *reQuests* provided outstanding, musically natural imaging. Although depth was placement-dependent, it was as good as that from any other dipoles I've auditioned. And the *re-*

Quest's reproduction of subtle soundstage cues from live recordings delivered the sudden touches of realism that only a handful of other speakers can provide. If I have any reservation, it's that I could occasionally hear the transition from the electrostatic panel to the cone woofer. In this sense, a full-range electrostatic speaker, such as Martin-Logan's own CLS IIz, may have an advantage.

As with most dipole speakers, you'll need to position the *reQuests* carefully to experience all the magic they're capable of providing. Only with proper placement can you minimize room interaction in the bass, obtain good performance from the dipole electrostatic, and avoid highlighting the sonic differences between the electrostatic treble/midrange and cone woofer. The *reQuest* is definitely not a loudspeaker you want to stick too close to the front wall. And placing it in a standing-wave zone while failing to spike it into your carpet is likely to produce something approaching

one-note bass from this otherwise good woofer.

I strongly recommend that you toe these speakers in slightly, 10° to 15° toward the listening position. Do not try to get the absolute maximum treble energy by pointing the center of the panels directly toward the listening position. (That's true for most speakers; angling them for maximum treble energy tends to make the highs excessive or spotlight minor response anomalies.) You do need to keep the panels close enough together to provide good center fill and avoid the kind of Venetian-blind effect where minor head movements change the soundstage and the upper-octave energy balance.

I suggest sitting at least 6 feet away from the *reQuests* (9 or 10 feet would be better yet). Because the tweeter is so tall, your ears are bound to be somewhere on its vertical axis, but you'll get the best sound if you're not too close to the electrostatic panel's

top or bottom. When placed on carpeting, the *reQuests* should be firmly anchored with spikes, for sonic reasons and to ensure that the speakers don't tip over.

The choice of amplifier is important.

Make sure it has enough current capability to handle a fairly complex load, one that drops as low as 1.2 ohms at some frequencies. And though the *reQuest's* sensitivity is rated at 90 dB SPL for 2.83 volts input at 1 meter, it sounded less efficient than that. I therefore recommend using a high-quality amp that can deliver a solid 100 watts per channel. I got away with using an 80-watt tube amp, but it didn't provide the bass control and tightness I got from higher-powered tube and solid-state amps I tried.

Get it all right, and the magic in the Martin-Logan *reQuest* will produce a convincing illusion. The cone and electrostatic will blend together, the bass will have good definition, and the soundstage will be both natural and detailed. You'll also be able to exploit the *reQuest's* outstanding dynamics as well as its superb transients and transparency.

The Martin-Logan *reQuest* is a great speaker for the money. You could easily pay twice as much and not be as spellbound. A

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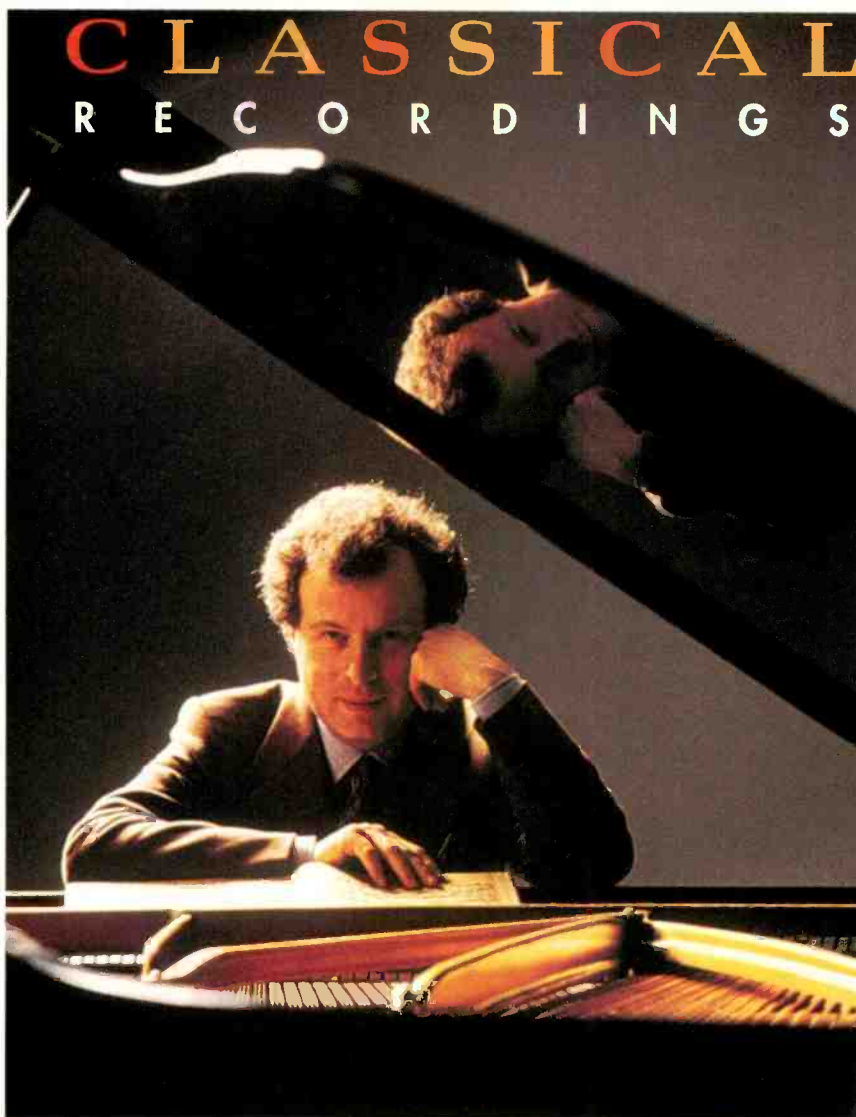
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CLASSICAL RECORDINGS



Bartók: Piano Concertos, Nos. 1, 2, and 3
András Schiff, piano; Budapest Festival Orchestra, Iván Fischer
 TELDEC 0630-13158; DDD; 76:26
 Sound: A-, Performance: A+

devotees of Béla Bartók, often regarded as the greatest-ever Hungarian composer, are quick to choose his three piano concertos as his finest work. So this recording is perhaps the ultimate Bartók: all three, played by an outstanding Hungarian pianist and with an excellent Hungarian conductor leading the Budapest Festival Orchestra.

When you first hear this fascinating album, you may be perplexed by the relatively low volume of the solo piano—at least compared with many other modern recordings, where the

soloist nearly drowns out a full orchestra. Indeed, at times (especially in the last movement of the second Concerto) you may wonder if you're listening to a piano or a tympani concerto! This mix was clearly premeditated. Bartók's percussive style on the piano is best consolidated with an orchestra when there is an equal blend with the other instruments—that is, without a marked difference of volume.

Piano Concerto No. 1 and Concerto No. 2 are somewhat similar in style, especially in the agitated rhythms of their fast movements; they are primitive, passionate, and almost brutal in their percussive intensity. The First was finished in 1926 and the Second in 1931. Both premiered with the composer at the piano, and he performed each work several times in his career.

The Third Concerto was not composed until 1945, and when Bartók died on September 26 of that year, he had completed all but the final 17 measures. These were finished by Tibor Serly, who also finished Bartók's Viola Concerto and orchestrated a number of his Mikrokosmos piano pieces. The Piano Concerto No. 3 is more sophisticated than its predecessors, and the ethereal slow movement ("Adagio Religioso") reveals a spiritual side of the composer too often overlooked.

Recorded at the Italian Cultural Institute in Budapest, the Festival Orchestra of that city must be commended for its extraordinary playing. Particularly notable is the brass in the First Concerto (end of third

Schoenberg in Hollywood

German Symphony Orchestra, Berlin; Berlin Radio Symphony, John Mauceri
 LONDON 448 619; DDD; 64:51
 Sound: A, Performance: A

Arnold Schoenberg, like other Jewish composers, fled Germany as Hitler came to power. He settled in Hollywood, but the closest he came to writing an actual Tinseltown tribute was his "Fanfare for a Bowl Concert" for the Hollywood Bowl Orchestra and Leopold Stokowski. The high priest of atonality wrote other tonal pieces, and this entertaining album contains several of them, ranging from the neo-baroque Suite for String Orchestra through the lush, chromatic Chamber Symphony to the dissonant, yet tonal, Variations (originally written for band).

Everything is performed incisively by John Mauceri and the German musicians, and it has been very well recorded. *Schoenberg in Hollywood* is part of an extensive, ongoing series by London entitled "Entartete Musik" (degenerate music, as labeled by the Nazis). Among the other composers represented in this series are Korngold, Krenek, Hindemith, Goldschmidt, and Zemlinsky. *Rad Bennett*

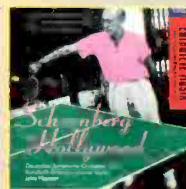


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Sarah Vaughan How Long Has This Been Going On?

JVCXR-0038-2

Sarah Vaughan was easily one of the most gifted of all jazz singers. She had an original style that clearly extended the influence of jazz on popular music in general. This album, one of the finest of her career, finds Ms. Vaughan at the helm of a stellar quartet featuring jazz giants Oscar Peterson, Joe Pass, Ray Brown and Louis Bellson. With her glorious voice and three octave range in flawless shape, Sarah and this group show their mastery of swing on such standards as "I've Got The World On A String," "Body and Soul" and "You're Blasé."

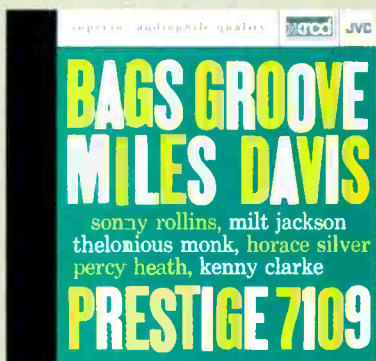


Johnny Griffin Sextet The Little Giant

JVCXR-0039-2

"★★★★1/2" – Downbeat

One of the most formidable improvisers of the post-bebop 1950s, Johnny Griffin attracted more than his share of nicknames: "Little Giant" referred jointly to his large musical stature and small size; the widely-used "Fastest Gun In The West" placed perhaps undue emphasis on his ability to perform at blistering tempos. This album features excellent Norman Simmons arrangements played by a strong sextet including Blue Mitchell and Wynton Kelly. The sonics are stunning!



Miles Davis Bags' Groove

JVCXR-0046-2

This CD includes recordings from two sessions. The first recorded Dec. 24th, 1954, was a classic date that matched trumpeter Miles Davis, vibraphonist Milt Jackson, pianist Thelonious Monk, bassist Percy Heath and drummer Kenny Clarke. There are two very different versions of "Bags' Groove" recorded at this session (Monk's solo on the first take was one of his best). The remainder of the disc comes from a session on June 29th of that same year that saw Horace Silver at the piano and the addition of Sonny Rollins on saxophone. These recordings represent timeless music that defies easy classification. The XRCD version presents this music in the purest sonic quality available and deserves a place in every jazz collection.

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movement), the flawless intonation of the upper strings in the slow movement of the Third Concerto, and the amazing precision of the percussion section throughout the recording. Conductor Iván Fischer does an admirable job in keeping the ensemble tightly synchronized with the soloist, even in such intricate passages as the slow movement of Concerto No. 2.

Pianist András Schiff has not only performed Bartók for most of his life, he has also made a careful study of the composer's recordings of his own work. Schiff's interpretation here is unimpeachable, bringing us to the heart of the composer without boring us with too much erudition. The success of this recording makes one wish that performers could always study composers' performances of their own works, throughout history. *Patrick Kavanaugh*

Valentina & Alexei, Vol. 1

Valentina Lisitsa and Alexei Kuznetsoff,
duo pianists

AUDIOFON CD 72053; 62:48

Sound: A, Performance: B+ to A+

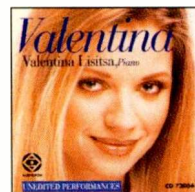
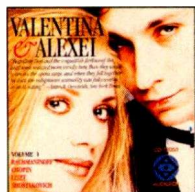
Valentina

Valentina Lisitsa, piano

AUDIOFON CD 72056; 68:17

Sound: A, Performance: B to A-

An important and rare element in Audiofon's recording formula, which it adopted for these discs, is that everything is achieved without editing-in retakes at any point. Each piece or section is a true performance whose integrity can only be simulated in edited recordings, and then only with a combination of great discipline and luck.



That technique is applied here to a husband-and-wife pair of young Russian pianists, Valentina Lisitsa and Alexei Kuznetsoff, who display formidable technical mastery and almost intimidating energy in a mixed bag of pieces.

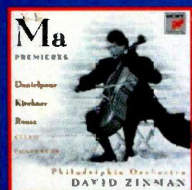
Lisitsa's recital, *sola*, is the more miscellaneous and, partly for that reason, the less successful. She begins with a Mozart sonata that is, at times, excessively rushed. Then come three Beethoven contradances, a Chopin berceuse, the Weber "Rondo Brillante," a pair of Schubert songs transcribed by Liszt, three Rachmaninoff preludes, and finally Prokofiev's Piano Sonata No. 7—all better played than the Mozart but so disparate in nature that their juxtaposition is rather jarring. Lisitsa is at her impressive best in the pieces that go for glitter, where her aggressiveness pays off.

CONCERTOS

Concertos for Cello and Orchestra by Danielpour, Kirchner, and Rouse

Yo-Yo Ma, cello;
Philadelphia Orchestra, David Zinman
SONY CLASSICAL SK 66299; DDD; 79:13
Sound: A+, Performance: A+

Versatile cellist Yo-Yo Ma has been instrumental in commissioning new cello concertos. This is welcome because, until recently, the concerto form seems



not to have been a focus of most composers of contemporary music. Ma is a perfect soloist for these three adventurous and generally atonal concertos. In keeping with the modern composers' intentions, Sony's recording balances put less of a sonic spotlight on his cello than is the norm with 19th-century cello concertos.

Richard Danielpour's work is based on a dream about a messenger who brings bad news to a great assembly and then is sentenced to death for doing so. The cello has a touching musical role as a pleading, imploring, and, finally, praying voice against the unsympathetic orchestra. Leon Kirchner's 18-minute *Music for Cello and Orchestra* progresses from a 13-minute caustically dissonant opening to an achingly lyrical tonal section, concluding with a diatonic chorale alluding to Bach. Christopher Rouse's strongly expressive musical style shows tragic depths and violent outcries, encased within a solo concerto structure. His two-movement concerto begins with a combat between the solo cello and orchestra and ends with a hushed and moving adagio, revealing the dark side of his nature.

These three complex works require several hearings to understand and appreciate, something that even the most adventurous live symphony series cannot provide but for which CDs are made to order. *John Sunier*

The duo-piano disc not only displays greater maturity and flexibility of style but contains fewer bits and pieces. It begins with Rachmaninoff's Suite No. 1 for two pianos, followed by a Chopin rondo, a Liszt fantasia on Mozart's *Don Giovanni*, and Shostakovich's Suite, Opus 6. All are welcome and infrequently recorded.

Aside from a couple of moments in the duo disc when the attack is less than unanimous,

there are no obvious errors that would have required a fix were there no embargo on retakes, which makes the pianism all the more remarkable. To what extent the close-up, evidently studio-bound miking exaggerates the energy and dash of the playing is hard to tell. Some listeners doubtless will find its quality rather overbearing, while others will find it utterly thrilling. Surprisingly, however, the stereo is not exaggerated in headphone listening, which can make a duo-piano team come on like an assault squadron.

Keep an eye—or, rather, an ear—on both Valentina & Alexei and Audiofon. I may have some reservations about their work here, but both do a host of things right and give evidence of the will to hone their abilities toward perfection. *Robert Long*

Boccherini: Flute Quintets, G. 437-442

Jean-Pierre Rampal, flute;

Regis Pasquier, violin; Bruno Pasquier, viola;

Roland Pidoux, cello concertante;

Mathilde Sternat, cello

SONY CLASSICAL SK 62679; DDD; 68:54

Sound: A-, Performance: A+

Flutist Jean-Pierre Rampal observed his 75th birthday last year. In his long, celebrated career, he has recorded virtually all of the known flute repertoire. Therefore, it is not surprising that when a number of previously unknown flute quintets by Luigi Boccherini were recently discovered, Rampal would be the first to record them.

These quintets are unique in many ways, including the scoring itself. One expects a "flute quintet" to be scored for flute and string quartet (two violins, viola, and cello), until one remembers that Boccherini was a virtuoso cellist. These flute quintets have only one violin part but use two cellos. The first cello's part, originally performed by Boccherini himself, is often more virtuosic than the flute's.

Rampal gives us his expected brilliance but is often overshadowed by Roland Pidoux, who performs the demanding part of the cello concertante. Pidoux's playing is clean and his intonation flawless, even when his part is all over the fingerboard. The recording was made in Paris's Deutsche Evangelische Christus Kirche but was miked closely enough to produce an intimate sound.

Since this CD is a world premiere recording, there are no other versions of these quintets for comparison. Nevertheless, it will be a while before other artists will try to top these performances. This recording will be enjoyed by all who appreciate Boccherini's style of chamber music, whether they cheer more for the flute or the cello. *Patrick Kavanaugh*



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ROCK~POP RECORDINGS



El Corazón Steve Earle

E-Squared/
Warner Bros. 9 46789, 45:14
Sound: A, Performance: A+

Steve Earle's battles with his demons are well documented, although lately he seems to have completely exorcised them. In fact, with the excellence of Earle's recent "comeback" albums (*Train a Comin'* and *I Feel Alright*) as well as the growing success of his E-Squared record label, he's on a big-time roll. Which brings us to his latest release, *El Corazón*, a harrowing, exhilarating ride of an album. Earle's fearless heart leads him from bluegrass ("I Still Carry You Around") to Ernest Tubb-style country ("The Other Side

of Town," complete with 78-rpm-like scratches and pops) to the sizzling fuzz-toned rock of "N.Y.C." (with guest backing from raunch 'n' rollers The Supersuckers) as well as to gentle acoustic songs ("Fort Worth Blues").

Earle's greatest strength as a songwriter is his lyrics, which often sound like they have been ripped straight from real life. In fact, he often sets his songs as conversations. "If You Fall" finds a bitter fellow at a bar admonishing a smitten friend on the pitfalls of love, while "Poison Lovers," a stunning duet with Siobhan Kennedy, portrays a couple who never had a chance.

Emmylou Harris guests on "Taneytown," a blood and guts story about a young black man in rural America who goes to town seeking fun but encounters a group of racists. And Earle displays a satirical

sensibility on the album opener, "Christmas in Washington," which finds Democrats "gettin' into gear for four more years of things not gettin' worse" and Republicans cackling, "He cannot seek another term, there'll be no more F.D.Rs." As the song unfolds, it turns into a call for renewed social activism, witness its refrain: "Come back, Woody Guthrie, come back to us now/Tear your eyes from paradise and rise again somehow."

Not many albums astound from beginning to end, but *El Corazón* does. All the little touches are nigh

SLOBBERBONE

Barrel Chested
DOOLITTLE RECORDS
DRC D 7019, 48:34
Sound: B-, Performance: A-

A godsend to pop and the perfect antidote to electronica's inhuman gurgles, alternative country bands have, over the past year, produced a herd of winning records. *Barrel Chested*, by Texas-based Slobberbone, is among them, fitting in nicely between cowpunk prototypes Uncle Tupelo and garage rockers The Replacements. And that's not a bad place.

Led by songwriter/vocalist Brent Best, Slobberbone paints a poetic canvas filled with down-and-outers, lost-in-lovers, and dead-end-kidders, using three-chord honesty and literate angst. "You can find me here tonight, and I'll be drinkin'," Best pouts on "I'll Be Damned," a defiant anthem full of passion and frustration. "He's gonna steal your heart and then your soul," Best sings on "Billy Prichard," as a stinging, Alice Cooper-esque guitar break kicks in. Truly potent moments grace *Barrel Chested*, making it a very welcome, very human, tour de force.

Bob Gulla



on perfect, from recording quality and production (by Ray Kennedy and Earle) to the care put into sequencing—a subliminal element of the album's brilliance. It bears repeated listening and gets better and better each time through.

Michael Tearson

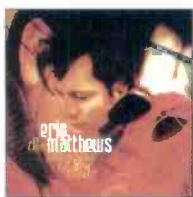
The Lateness of the Hour

Eric Matthews

SUB POP SP404, 45:36

Sound: A, Performance: A-

A year or two ago, it seemed as if the indie-rock underground were going to embrace a revival of ornate instrumental textures and lushly produced pop music largely inspired by The Beach Boys' *Pet Sounds*. Dubbed "Ork Pop," it was a trend ushered in by Cardinal, a short-lived collaboration between Australian songwriter Richard Davies and Oregon trumpeter and arranger Eric Matthews.



But the rap on Matthews' 1995 solo debut, *It's Heavy in Here*, was

that it was a pretty package with nothing inside. He makes up for it on his second Sub Pop effort, *The Lateness of the Hour*. Here, Matthews proves that—though not Brian Wilson—he nevertheless has something to say, with songs that are the aural equivalents of Monet's paintings: They convey romantic and idealistic messages through impressionistic lyrics and big, brilliant splashes of symphonic color.

Matthews creates multilayered mixes with guitar, strings, harpsichord, marimba, and grand piano. But his primary axes are his gentle, breathy vocals and his brash trumpet, which is employed where most other indie-rockers would insert a guitar solo. Combined with his maturing songwriting skills, it's enough to make you believe that *The Lateness of the Hour* could still represent the dawning of a new day in the underground.

Jim DeRogatis

Tom Leach

SLOW RIVER/

RYKODISC SRRCD 27, 39:50

Sound: B, Performance: A-

Tom Leach is another broken man sitting at home with a four-track recorder getting it all down on tape. Reportedly culled from more than 100 songs on five cassettes, this modest 13-cut collection (three additional cuts are called "guitar" and are just scraps of guitar licks) is far more focused than such beginnings would suggest. Leach has an av-



erage man's voice, but its simplicity complements his salt-of-the-earth observations and gives the folksy proceedings real grit.

Though he resides in Boston, Leach spent time in Georgia, where he met Athens songwriter Vic Chesnutt, who teamed with Leach for a limited-edition single of Leach's song "The Doris Days," which appears here in a

skeletal demo. And like Leach's finest songs ("Hello Friend," "Savior"), it features an immediately accessible melody that recalls the simplicity of the finest back-porch country music. Leach disregards the flavors of the month for simple traditional music. But then, a good hummable tune should never go out of style.

Rob O'Connor

BOB DYLAN

Time Out of Mind

COLUMBIA CK 68556, 72:52

Sound: B+, Performance: A+

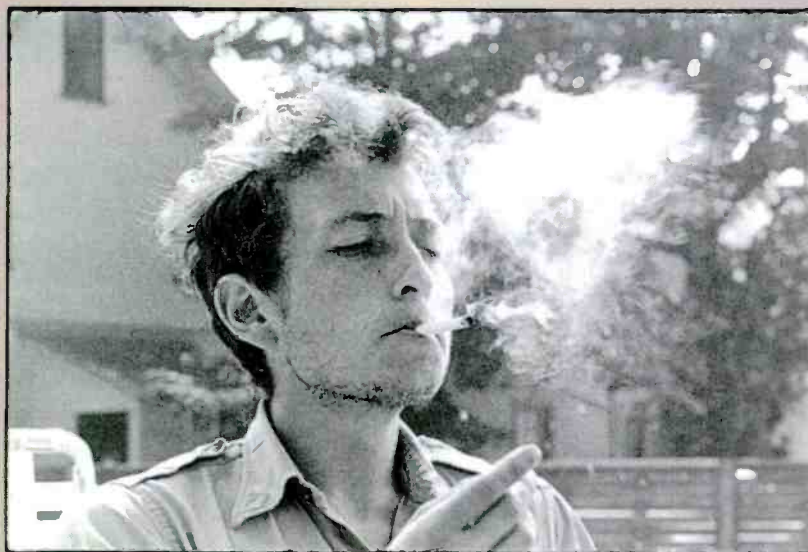
Something is happening here, but now even Bob Dylan doesn't know what it is. He feels out of it, utterly disconnected from the world around him, and he doesn't like it one bit. Dylan is 56 years old now, and with more than 40 hallucinogenic-folk-political-protest-country-religious-acoustic/electric albums under his belt, some feared he had nothing left to say. *Time Out of Mind* easily shakes off any such doubts. The old masks and shields have fallen away; he finally seems ready to expose



"Can't Wait," and "Cold Irons Bound"—Dylan's paying off some deep emotional debts. When he howls that "The universe has swallowed me whole," the phrase rings true. Even his love songs share his desolate, even desperate state of mind. ("Don't know if I saw you if I would kiss you or kill you," from "Standing in the Doorway," is as warm and fuzzy as he gets.)

Dylan continuously realigns the dark shadings and moods throughout this 72-minute journey of lost, confused love.

Whether his raspy voice is treated/processed or left *au naturel*, it's always front and center in producer Daniel Lanois' amorphous soundscapes. The organic accompaniment seems to hover about the songs, so there's plenty



his scarred body and soul in his music. The words aren't the cruel piercing instruments of "Subterranean Homesick Blues" or even *Blood on the Tracks*; he's settling into a different role, more of a plain-speaking commentator than critic.

Time Out of Mind is steeped in the blues. Stuck in the "lonely graveyard" on his smoldering rants—"Million Miles,"

of room for Dylan to be Dylan. Some sort of reconciliation takes place during his 16-minute trek over the "Highlands," where he rolls out one of his finest stream-of-consciousness tunes ever. Yes, Robert Allen Zimmerman, the kid from Hibbing, Minnesota, has done it again. Bob Dylan has painted yet another masterpiece.

Steve Guttenberg

Photograph: © David Gahr

JAZZ ~ BLUES

RECORDINGS



The Complete 1961 Village Vanguard Recordings

John Coltrane

IMPULSE IMPD4-232

Sound: B-, Performance: A



hey don't play music like this anymore, and we're poorer for it. Saxophonist John Coltrane was one of the last popular acoustic jazz artists to actually change the music. Sure,

there are still musicians pushing the jazz envelope, but none have the stature Coltrane enjoyed in 1961. Most of the new, button-down jazz artists are content to replace old plumbing; Coltrane tore down walls.

Coltrane's Vanguard sessions have been released in a few configurations over the years, including *Live at the Village Vanguard* and *Impressions*. But this is the first to collect all of the recordings, including three unreleased tracks, that were made during a five-night stand at the venerable Village Vanguard in New York City.

The Vanguard dates weren't epochal. Coltrane had recorded "My Favorite Things" the previous year but had yet to assay his spiritual masterpiece, "A Love Supreme." It was at the Vanguard, however, that forces were gathered for the oncoming journey. And what forces: the twin basses of Reggie Workman and Jimmy Garrison, pianist McCoy Tyner, drummer Elvin Jones, and the brief meteor of Eric Dolphy. This

was the flight crew that would launch Coltrane into a world of modal, passionate, intuitive improvisation, the likes of which have not been heard in years.

With just a couple of live albums in mind, producer Bob Thiele laid tape on only nine of the many selections Coltrane played during this stand. So what we have are multiple versions of Coltrane classics, including "India," "Impressions," and "Naima."

But Coltrane's group was literally reinventing these songs each night. On "Spiritual," Coltrane played soprano one night and alternated between soprano and tenor the next. There are four versions of "India," some with and some without oud player Ahmed Abdul-Malik and oboist Garvin Bushell. And Roy Haynes even replaced Jones on one take of "Chasin' the Trane." One evening, "India" is a slow, contemplative meditation; another night, it's taken at nearly double speed.

Coltrane's solos were wonders of spontaneous invention as ideas flowed out in a stream of consciousness. His cascading layers of notes in the classic "sheets of sound" are like a tenor sax feedback loop. When Coltrane played soprano, he was hearing sounds beyond the jazz lexicon, inspired more by the wail of the Indian shenai than Sidney Bechet.



Dolphy supplied the counterpoint to Coltrane's passion. His work on alto saxophone is joyfully insolent on the first version of "Chasin' the Trane," while his bass clarinet on "India" sounds distressingly pained.

Jones is at the core of Coltrane's music. His rhythms churned and spun, but always, there was the pulse, the ching-a-ching that lashed all the elements together and kept them from spinning off like a centrifuge gone wild. And interlaced with him were the bassists, Workman and Garrison, usually playing separately, but

Illustrations: © Greg Christie

together on a couple of takes of "India" and "Miles' Mode." They were the navigators, calmly at the center, finding the way through treacherous territory. Tyner was the architect, sometimes just playing a simple chordal stab here and there, at others, creating complete orchestrations.

These sessions are captured on four CDs in the sequence in which they were played. There are occasional dropouts, and the stereo image wanders as musicians move about, but there's an ambience to these performances that only adds to their aura. In the Coltrane iconography, *The Complete 1961 Village Vanguard Recordings* are not monumental, but they are a monument to collective improvisation, to a spirit of expression and exploration that poked the mainstream back in 1961 but which is virtually absent today. *John Diliberto*

Eyes... in the Back of Your Head

Gerri Allen

BLUE NOTE CDP 7243 8 38297, 54:59
Sound: A, Performance: A

On this revealing album, Gerri Allen performs either solo or with light accompaniment from percussionist Cyro Baptista and coloration from alto saxophonist Ornette Coleman and trumpeter Wallace Roney (the latter two performing with Allen separately).

Ultimately, it's a pleasure to hear Allen's masterful pianistic conception in such a stark light. Whether playing with a pseudo-classical feel or getting downright weird (occasionally beating on the piano and clanging around underneath its hood), she never runs out of ideas.



HERBIE HANCOCK and WAYNE SHORTER

1 + 1

VERVE 314 537 564, 60:01
Sound: A, Performance: B+

An introspective, almost chamber-jazz recording, *1 + 1* puts Wayne Shorter and his soprano sax (more often a flavoring in his work than the whole meal) together in a room with Herbie Hancock and an acoustic piano. The results are alternately scabrous and sublime, often within the same tune. Shorter's sometimes biting tone plays foil to Hancock's dynamic and lyrical piano, all recorded with a spare clarity usually reserved for string quartets.



Despite these two musicians' reputations as fierce creators, some pieces seem derivative way beyond being casually influenced. The tribute to an imprisoned Burmese leader, "Aung San Suu Kyi," bears a strong resemblance to circa-1978 Oregon, Hancock's piano on "Manhattan Lorelei" recalls Ellington, and "Meridiane—A Wood Sylph" liberally evokes the spirit of Debussy. Still, Hancock and Shorter play together enchantingly, and except for the ultra-short "Hale Bopp Hip-Hop," the music does everything but swing. But swing, isn't what *1 + 1* is about. *Hank Bordowitz*

The album also succeeds compositionally (only one song, "Little Waltz," is a standard), and with little time wasted between tracks, song changes are barely noticeable. In fact, the album seems to suggest an ebb and flow of moods, a propulsive, shifting soundscape of sorts. Baptista's drums and shakers come in and out like rain showers in a tropical forest, the horns like exotic birds that have happened upon Allen's part of the jungle. *R. Dante Sawyer*

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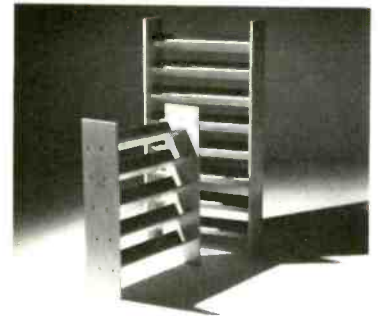
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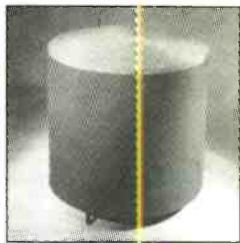
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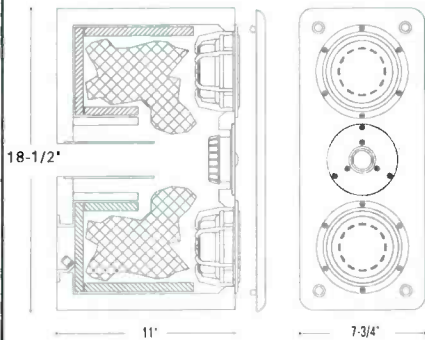
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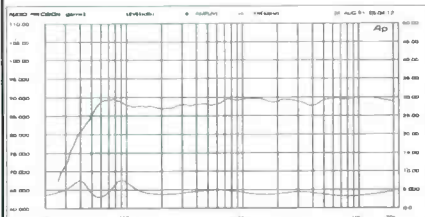
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PlayBack

TRIBUTE GROUNDGUARD RF GROUND-LOOP ELIMINATOR

Just about everybody who has his A/V system connected to a cable TV feed has encountered hum as a result, caused by a ground loop between the cable and AC grounds. Various cures are available, ranging from the cheap and dirty to the not so cheap but more refined. The Tribute GroundGuard (\$99.95), developed by the cable manufacturer Tributaries, is in the latter category.

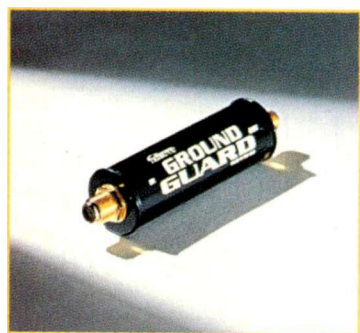
Housed in a small cylinder with a gold-plated F connector on each end, the active ingredient is a tiny, hand-wound precision transformer. Tributaries says that the transformer isolates the signal line from ground while keeping insertion loss to less than 3 dB, even at extremely high frequencies where transformers typically roll off. The circuit is said to maintain flat response all the way out to 1 GHz. At the same time, Tributaries says, the transformer's ground isolation is effective to a much higher frequency (about 1 MHz) than that of typical capacitor-based circuits, enabling it to combat other side effects of ground leakage, such as herringbone patterns or diagonal lines in the picture and buzz in the sound.

Not having those problems, I wasn't able to evaluate the GroundGuard's effectiveness in ameliorating them, but it was at least as effective at banishing hum as the Mondial MAGIC isolator I had used previously. Which is to say, it completely eliminated what otherwise would be a major annoyance in my system. As claimed, insertion loss was minimal—also an important consideration in my system. And in usual Tributaries style, construction is first-rate. As a bonus, the device incorporates neon discharge tubes at the input and output to suppress voltage surges, such as from lightning strikes; fortunately, I haven't had an opportunity to evaluate that feature directly! (Gordon J. Gow Technologies: 1307 East Landstreet Rd., Orlando, Fla. 32824; 800/521-1596; www.tributariescable.com.) Michael Riggs

GRADE: A

For literature, circle No. 120

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Pass Laboratories Aleph Ono Phono Preamp

Continuing interest in LP reproduction has led to the introduction of some truly great phono preamps, the Pass Aleph Ono among them. It works equally well with the highest-output moving-magnet and lowest-output moving-coil cartridges, maintaining the same dead-silent background for either type. Its parallel J-FET circuitry offers the sweetness, air, and detail of the best tube and FET devices together with the low noise typical of bipolar preamps. The soundstage and bass are excellent, and low-level resolution is good enough to take full advantage of even the most advanced moving-coil designs. Adjustable gain and loading enable the user to achieve a near-ideal match with any cartridge. In fact, there are provisions for two switchable loadings. RIAA equalization is said to be accurate across the audio band within 0.1 dB. The Aleph Ono has separate inputs for moving-magnet and moving-coil cartridges and has both balanced XLR and unbalanced RCA outputs.

Priced in the luxury class, at \$2,000, the Aleph Ono delivers commensurate sound quality. It's a great companion for the Pass Aleph P and Aleph L preamps or for any other state-of-the-art line-stage



GRADE: A

preamp—and ideal for the analog fanatic who loves to experiment with different cartridges. (Pass Laboratories: P.O. Box 219, Foresthill, Cal. 95631; 916/367-3690; www.passlabs.com.) Anthony H. Cordesman

For literature, circle No. 121

MIT iconn Speaker Connectors

Traditional speaker cables have a fixed connector at one end. That's fine if you never change amps or speakers, but if you frequently change your gear, you may need several pairs of speaker cables, equipped with banana plugs, spade lugs, etc. It's either that or become handy with a soldering iron or crimping tool to change connectors.

Music Interface Technologies (MIT) now offers its Terminator speaker cables with threaded ends to accept the company's screw-on iconn connectors. The iconns come in spade, pin, banana, and bendable Flexipin versions and in various sizes and grades, at prices from \$3.50 to \$12.50 per pair. Slip-on plastic jackets, black for ground and red for the hot lead, make it easy to tell which is which. A nut secures the connector tightly at a workable angle.

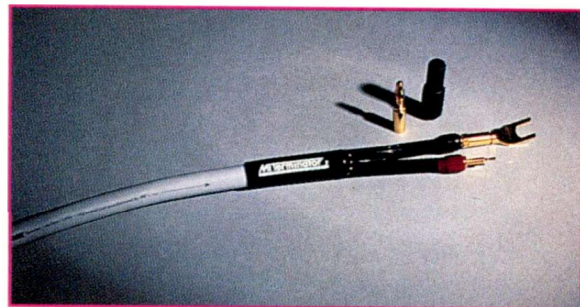
The iconn connectors came in handy when I wanted to switch from 16-gauge zip cord to a heavier-gauge wire on a bookshelf system that used N.E.A.R. 10M II speakers. I couldn't get the first cable I tried onto the speaker,

GRADE: B+

because its large spade lugs didn't fit into the limited space around the speaker's binding posts. With a pair of MIT Terminator 3 cables and the banana-plug iconns, I was able to upgrade my cables easily, even mixing connectors to use spade lugs at the amplifier ends. The only problem I had was trying to use the MIT cables with my McIntosh MC275, an old amp with screw terminals recessed in barrier strips: The iconn system doesn't have small enough spade lugs to fit. MIT says that its Flexipins would work for screw terminals, but that was the only connector type the company didn't send me for evaluation.

If you are into upgrading or changing speaker systems and amplifiers, the iconn system definitely makes swapping a lot easier. (MIT: 3037 Grass Valley Hwy., Suite 8212, Auburn, Cal. 95603; 916/888-0394.) John Gatski

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