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JULY 1994

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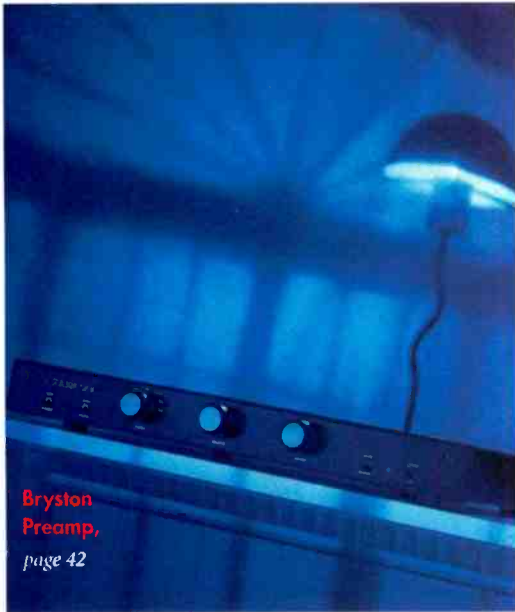
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Jazz Remasters, page 38

THE STYLOS

UNTIL NOW, high resolution sound reproduction meant sacrificing space. Until now, placing a speaker near a wall meant sacrificing the quality of sound. Who else but Martin-Logan could take electrostatic technology to a realm where music has never been before?



ON THE WALL

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AGAINST THE WALL

Using the optional base, the Stylos can stand against the wall, yet remain moveable. This is ideal for apartment living and allows easy repositioning as new demands arise. The Stylos is also the perfect addition to a home theatre system.

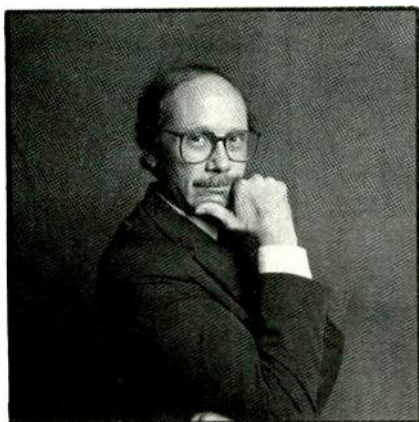
IN THE WALL

The Stylos can be built into a wall requiring vertical space of approximately 5 feet and a width of 14 inches. The designer scrim, which is included in the optional installation package, can be painted to match your decor.

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THE ELECTROSTATIC TECHNOLOGY

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The Recording Industry Association of America (RIAA) is the trade association for the big record companies; RIAA members make and distribute about 90% of the sound recordings sold in the U.S.

Over the years, their year-end statistics have shown me a good deal about what's happening in our own industry, audio, since we do business right next door.

For the RIAA, as for us, the Compact Disc is the biggest deal to come along in a very long time. At this point, the CD has been around about a dozen years, and we all know what a major impact it has had on what is sold in hi-fi stores. However, the CD has had an even greater impact on the record companies. Thus, let me give you some selected year-end figures from the RIAA for 1993, with the 1983 equivalents, together with a few from the decade in between. Perhaps we can learn from them.

The RIAA says that about 495,400,000 CDs with a value of \$6.5 billion were sold in 1993 versus 800,000 worth \$17.2 million in 1983. The 1993 figures represented a 22% gain over 1992, which was the first year that more CDs than cassette tapes were sold.

Cassettes have had a roller coaster ride during the decade. They jumped from 237 million in 1983 to 332 million in 1984, peaked at 450 million in 1988, and last year only 340 million sold, just about the same as the 1985 figure. The value has gone from \$1.8 billion in 1982, over a peak of \$3.5 billion in 1990, to \$2.9 billion last year.

As you already know, the LP has been the big loser over the decade. The RIAA lumps sales data for the LP with that for the EP, but it breaks out figures for the vinyl single. In 1983, the RIAA says, 210 million LPs and EPs worth \$1.7 billion were sold, and you should note that both figures are lower than those for the cassette. By 1993, the numbers had plummeted to 1.2 million units worth \$10.6 million—a 175-to-1 ratio in units. The vinyl single has gone from 125 million units to 15.1 million units, and \$269 million to \$51 million.

The peak for vinyl singles was in 1984, with 132 million units worth \$299 million. Cassette singles units are still climbing, by 1.2% in 1993 over 1992, though the dollar value slipped by \$300,000 to \$298,500,000.

It is too early, of course, for there to be sales figures for the new digital formats, DCC and MD, but I personally do not expect them to achieve the same rapid market acceptance that CD did. I have on my shelf a trade paper dated June 1983, and in it several pundits are holding forth on the prospects for the new medium, CD. Only one, the owner of a specialty shop, is very positive, calling the new format a "phenomenon." One company guy is saying that if you appeal to only 0.0006% of the market, "you can kiss it off." Yet another is talking about retailers of turntables making their money from the phono cartridge and, unhappily to this marketer, the CD system has no cartridge that needs regular replacement.

No, my ability to foretell the future isn't any better than anyone else's, but with CD still on the increase on the music side, it certainly looks like MD and DCC are going to have a tough future. At least, that's my bet.

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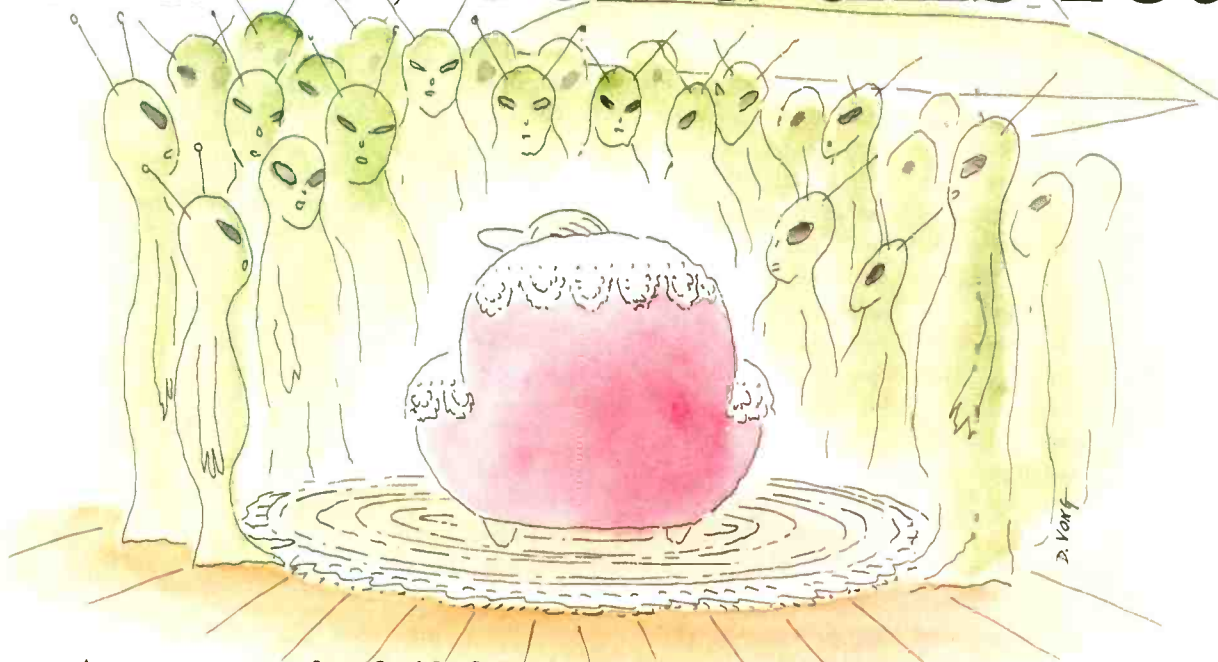
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Department of Further Amplification

Dear Editor:

Thank you for the very positive review of the NHT Model 3.3 in your February issue. You, and your readers, are very fortunate to have someone of Don Keele's technical caliber testing speakers for you. I did notice, however, a significant technical error in Mr. Keele's procedure for auditioning the 3.3. This concerns the use of an equalization filter to compensate for placement. The 3.3's are designed to be placed against the wall behind them, and to use the wall as part of the bass loading. The wall's effects are more complex than can be tested using Mr. Keele's simple passive filter, especially at very low frequencies. As much as he liked them, I contend that Mr. Keele never experienced the full potential of the 3.3's, either in terms of smoothness or low-frequency depth.

To test this assertion, we made the following measurements in our listening room: Fig. 1 shows the in-room response of the 3.3 using our recommended positioning. Fig. 2 shows the in-room response of the 3.3 using Don's placement and filter.

It's immediately apparent that the filter doesn't properly simulate the effect of the rear wall, that mid-bass smoothness suffers, and frequencies below 45 Hz are substantially attenuated. Further, the recommended location exhibits no peak at 300 Hz, as the 3.3 crossover was designed for these boundary conditions.

At any rate, thanks again for taking the time to review the speakers. I continue to find Don Keele's speaker reviews the most thorough and technically informative in the business.

Kenneth L. Kantor
V.P./ Technology, Now Hear This, Inc.
Benicia, Cal.

Mr. Keele responds: While I really did try to locate the 3.3 system per NHT's recommendations, it was just not feasible to place the speaker against the rear wall, given the current state of my listening room. (Incidentally,

my room falls within the I.E.C. guidelines for shape and size, though this doesn't affect the present discussion.) Complying exactly with the recommendations would have required major changes to the configuration of the room. This did not seem reasonable given our time and labor constraints, being a monthly magazine, and I note that a speaker takes me more than 20 work days per month to review.

In addition, I believe making such room changes together with moving the listening location and/or normal speaker location would significantly impair my listening judgment capacity at frequencies above the bass range. I therefore chose to maintain consistency with previous reviews by locating the front of the NHT 3.3 where most other systems had been located.

While I, of course, realize that actual room acoustics are much more complex than those modeled by my simple passive RC filter, I believe that the filter, on average, accurately models what happens below 200 Hz when the system is placed against the wall. Without getting into a long discussion of in-room effects, let me say that

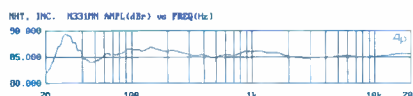


Fig. 1

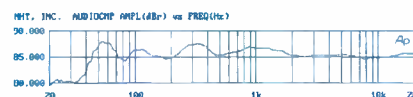


Fig. 2

under anechoic conditions in the bass range, with a perfectly reflecting rear wall, the filter should perfectly correct the response differences. Real-room effects often far exceed the correction of the filter.

Both Figs. 1 and 2 of your letter exhibit what I judge as very fine in-room response. The against-the-wall response, in Fig. 1, fits a tight 3.0-dB window if you exclude the peak at 30 Hz. The response in Fig. 2 (away-from-wall, filter-corrected) fits a 3.6-dB window if you exclude the shelf below 42 Hz. If you compare these two

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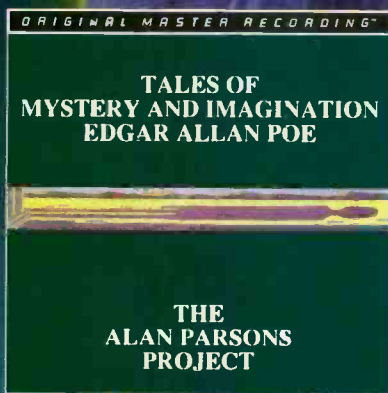
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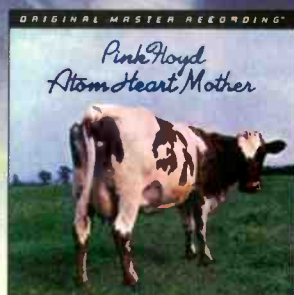


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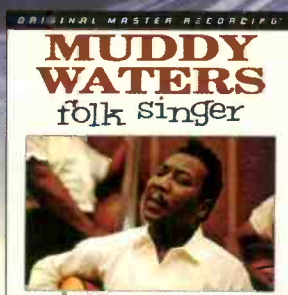
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curves, you'll see that the filter did a fairly good job of correcting the response, and I believe that the remaining differences are room-mode related and thus change from room to room.—*D. B. Keele*

Polarity: Still Questing

Dear Editor:

"The Quest for the Audibility of Polarity" (December 1993), by R. A. Greiner and Douglas E. Melton, was read with great interest. This is a very old, unresolved issue. I have always felt there was a certain magic associated with a quality, single-point, wide-range speaker and have suspected this had much to do with its coherence.

My work includes designing some very large, complex speaker systems for arenas and auditoriums. I never finish one of these projects without wondering how would it be possible to maintain a degree of time coherence for the total propagation into the house. We have measured the acoustical wave shapes many times, using a delayed sweep technique that makes it possible to observe, in real time, the acoustic wavefront of a clearly defined input impulse. (This technique was described by Herb Chaudiere of Towne Richards & Chaudiere in Seattle.)

With great care and adjustment, including adjustment of relative location of the speakers in the array, and time delay introduced into the drive of one or more of the speakers, it is sometimes possible to arrive at a very good replica of the driving pulse at the output of the instrumentation microphone. However, all that is necessary for the entire correlation to disappear is to move the measurement microphone a few feet in any direction.

It must be understood that the "shape" of any complex waveform is determined not only by its various spectral components, but by the relative timing, or phase relationship, of these components. The very asymmetrical shape of the fundamental plus second-harmonic example described in Fig. 2 of the article can be made totally symmetrical by altering the phase (i.e., time) relationship between the fundamental and the second harmonic.

The point is that I doubt any serious "observability" of polarity (or Wood effect) will likely be heard in a large-scale demonstration, using a multiway loudspeaker sys-

tem of any kind. With even the best of current speaker designs, crossover magic, or other efforts, an ideal time coherence can only be obtained over a very narrow portion of the speaker's coverage pattern. Outside of this sweet zone, there is likely enough time incoherence to totally mask any of the subtle information that may be needed to recognize absolute polarity, even if the listening environment is anechoic.

This is not to say the issue is unimportant. The audibility of polarity can be amply demonstrated if the original live source is available for comparison. Whether this has any relevance to reproduction of a recording featuring multiplicity of musical instruments is highly debatable, however.

*Richard K. Fullmer, P.E.
Acoustical Engineers Inc.
Salt Lake City, Utah*

Equipment Directory Feedback

Dear Editor:

It is always interesting to see the change in the number of products in each category in the Annual Equipment Directory from one year to the next. In 1993, I found 61 manufacturers listed as making in-wall speakers, compared to 55 in 1992. I hope you run an article on these speakers—their design, placement, and installation.

When a homeowner moves, he takes his audio system with him but not the speakers. This could be to his advantage, for it may be the one feature that enables him to get the price he wants for the house. For that to work, however, the speakers would have to be demonstrated to the prospective purchaser. Therefore I suggest manufacturers initiate a new audio product: A real estate agent's speaker demonstrator, consisting of a CD player and an amplifier in a portable case. If the amplifier is switchable, it could represent amps of different powers, and the home buyer would immediately know how big an amp to use to obtain the volume he wants without clipping.

*F. Cecil Grace
Asheville, N.C.*

Dear Editor:

I was very disappointed when the Annual Equipment Directory again failed to note which analog cassette tape decks have, and which do not have, timer-controlled recording/playback capability.

This feature is a deciding factor in my selection of a tape deck (and should be for anyone interested in off-the-air recording). I am afraid that if users do not understand the availability and importance of this feature, manufacturers may gradually eliminate it from their new models.

Would you please consider adding a question regarding this feature to your manufacturer's survey for the Annual Equipment Directory?

*Ken Massey
Indianapolis, Ind.*

Directory Editor responds: We have always accepted "timer record and play" as a suitable entry in the "Notes" column for analog cassette decks—but in last year's Directory, only one company (Sansui) mentioned it, for one model (D-X317WR). On this year's Directory forms, we'll be calling more attention to this feature by listing it in our sample answer for the "Notes" column, and if we get many such entries, we'll strongly consider devoting a separate column to it the following year.—*Ken Richardson*

Car Stereo Directory—Hurrah!

Dear Editor:

After reading the letters in the March issue, I feel I really have to write to support your May Car Stereo Directory. I agree with Frank X. Hamel that "there is a plethora of publications on the newsstands to address that need [car audio]." However, there is not an abundance of publications that cater to the more audiophilic concerns of car audio. I find *Audio's* coverage of car audio sheds a lot of light on the subject. Please keep up the good work!

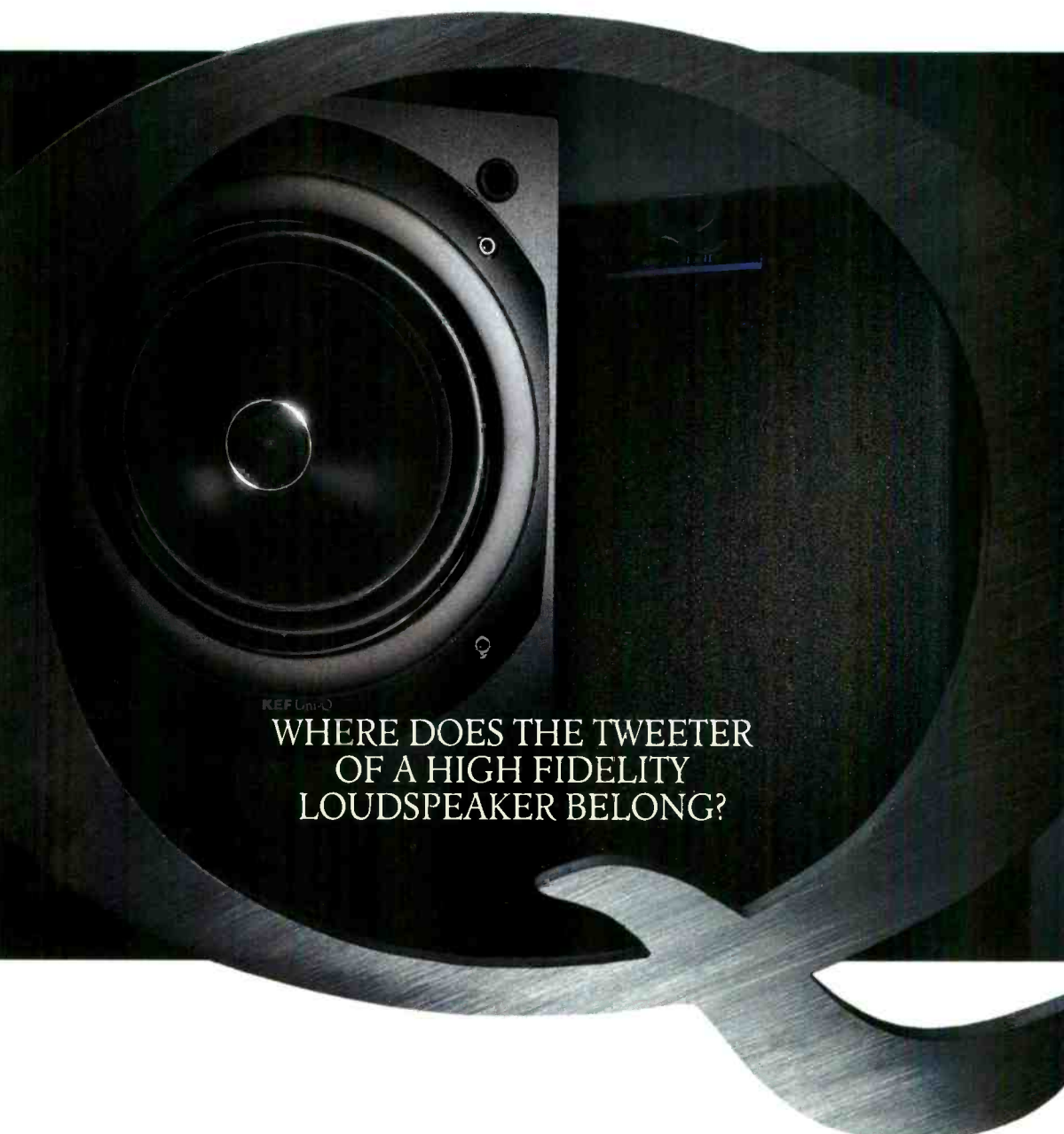
*George Chow
Vancouver, B.C.*

Advent Car EQ Erratum

Dear Editor:

Although the people at my client, International Jensen Inc., were pleased to see the Advent APX7000 car stereo equalizer with BBE circuit included in the May "What's New" column, the price was omitted. The manufacturer's suggested retail price is \$199.95.

*Roberta Thumim
Thumim Public Relations
New York, N.Y.*



KEF Uni-Q
WHERE DOES THE TWEETER
OF A HIGH FIDELITY
LOUDSPEAKER BELONG?

Q - S E R I E S

This question may confuse those who believe that the measure of a loudspeaker is the number of its drivers. It will also elude those who have never bothered to question conventional driver placement, which always separates the woofer from the tweeter.

In fact, the most acoustically correct location for the tweeter is precisely at the *center* of the woofer. This strategic placement creates a single sound source, allowing high and low frequencies to reach your ears at the proper time, regardless of where the speakers are placed or where you are sitting. (No wonder KEF's patented Uni-Q® is the technology of choice for advanced Home Theater applications.)

Perhaps the greatest benefit of the KEF Q Series speakers is that they sound as good in your home as they do in the showroom.



WHAT'S NEW



Onkyo RDS Tuner

The T-450RDS AM/FM tuner can decode and display information sent by FM stations using the Radio broadcast Data System (RDS). It can show program type, station call letters, traffic information, and information about the music being broadcast (such as artist, song title, and album name). The full message being transmitted

scrolls across the display, and the tuner can search for programs of a given type and switch automatically to traffic reports. Other features include direct-access tuning, six-category memory with 30 presets, and switchable bandwidth. The tuner can communicate with other components using Onkyo's Remote Interactive (RI) control system. Price: \$354.95. For literature, circle No. 101

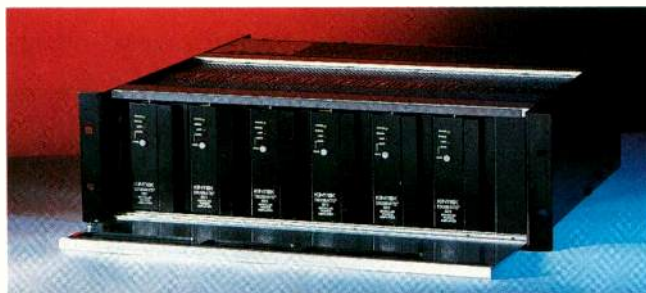
Salamander Designs Rack

Shelves of the Archetype rack are adjustable, and each shelf is isolated by neoprene. The basic system, with five 22 x 16-inch shelves, is 36 inches tall but can be expanded to 54 inches with a two-shelf extension. The top shelf can be expanded to support TVs. The steel supports are black; the shelves are available in solid wood or MDF. Price: \$199 and up. For literature, circle No. 102



Technics A/V Receiver

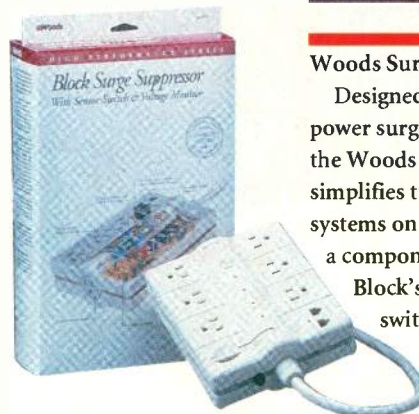
A new amplifier topology, which Technics calls Class H+, lets the SA-GX770 produce more power with less heat. The amplifier switches gently between power rails at different levels, to match signal demands. Rated power is 100 watts x 4 in surround, 125 watts x 2 in stereo. A "Help" key aids in diagnosing and curing problems caused by incorrect control settings. The AM/FM section has 10-key direct-access tuning and 30 station presets. Price: \$499.95. For literature, circle No. 100



Kintek Six-Channel Amp

Each channel of Kintek's Digimate 610 is an easily removed module. Power per channel is 125 watts into 8 ohms or 200 watts into

4 ohms, and modules can be bridged to provide 400 watts into 8 ohms. The 610 also has differential balanced inputs. Price: \$2,250. For literature, circle No. 103



Woods Surge Suppressor

Designed to protect against power surges and brownouts, the Woods Block also simplifies turning electronic systems on and off. Switching a component plugged into the Block's sensor outlet will switch power for all other equipment plugged into the Block; outlets are

spaced to accommodate plug-in transformers. When line voltage drops below safe levels or when surges and spikes exceed the Block's capabilities, alarms sound two minutes before the Block shuts everything off. Power is restored after brownouts but not after the surge limit is passed. Woods will repair, replace, or refund the cost of any equipment damaged while connected to the Block. Price: \$69.99. For literature, circle No. 104

WHAT'S NEW

Soundstream THX Preamp

Designed to simplify home theater operation, Soundstream's C•2 THX preamp has a one-touch control sequence that will turn on an entire A/V system, select a source, and set the audio processing mode (including THX and Dolby Pro Logic surround). The unit has six A/V inputs and outputs for three front, four surround, and three front subwoofer



channels plus a mono surround subwoofer channel; two program sources can be fed to separate zones within the house. Two remote controls are provided, one for setup and a universal model for system operation. Options

include a power strip that lets the C•2 THX turn up to eight components on and off in sequence, remote sensors, and connection to a whole-house A/V distribution network. Price, \$2,995. For literature, circle No. 106



T-Tech Subwoofer

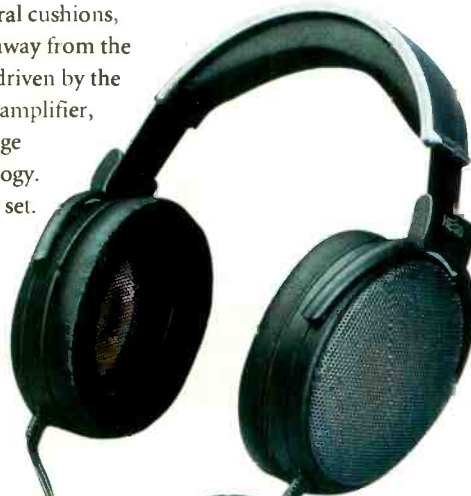
Dual 15-inch woofers, a three-chamber enclosure, and an optional active equalizer give T-Tech's Prestant-I response flat within 2 dB from 18 to 125 Hz and flat within 5 dB from 16 to

145 Hz; without the equalizer, it's within 2 dB from 30 to 100 Hz. Sensitivity is 92 dB. The enclosure has inch-thick walls and weighs 180 pounds. Finish is walnut veneer with ivory holly or ebony trim. Prices: Prestant-I, \$5,700 per pair, \$3,500 each; with stereo equalizer, \$250 additional. For literature, circle No. 107

Sennheiser Electrostatic Headphones

The HE60 headphone has a foil-polymer electrostatic diaphragm coated with a 1-micron layer of gold. A rigid, resonance-damped frame, and leather and

velvet circumaural cushions, hold the driver away from the ear. The unit is driven by the HEV70 Class-A amplifier, using high-voltage MOS-FET topology. Price: \$1,695 per set. For literature, circle No. 105



Audiovector Loudspeaker

Made in Denmark, the Audiovector 6 uses four poly-Kevlar drivers (10-inch woofer, 8- and 4-inch midranges, and 1-inch tweeter) and a steep-slope crossover. Frequency



response is rated as 30 Hz to 20 kHz, ± 2 dB, and sensitivity is 92 dB. The octagonal cabinet is available in black or white piano-lacquer finishes. Price: \$5,100 per pair. For literature, circle No. 108

“Hot” Prerecorded Tapes

Q *Why do prerecorded tapes have such high signal levels? They often make my deck's meters register well into their red zones. Does it have anything to do with commercially made tapes being copied at many times their playback speed?—Name withheld*

A High levels put loud parts of the signal farther above the noise floor, increasing the tape's S/N and dynamic range. But while it's true that these tapes are usually recorded at speeds of 16-, 32-, or even 64-times normal, this is strictly for ease and economy of mass production. It has nothing to do with the signal levels of these tapes.

Do-It-Yourself Dipoles

Q *I have four bookshelf loudspeakers that I use for surround. Can I put two of these back to back and wire them out of phase to make a homemade dipole speaker for the surround channel? If so, how should they be wired? They are standard two-way woofer/tweeter systems.—James Colasanti, Jr., Greensboro, N.C.*

A I have never tried this, but I would think that placing two speakers back to back would give you a dipole effect as long as they're wired in opposite polarity (“out of phase”).

The fact that the loudspeakers are two-way systems should have no effect on performance or how they are wired, but you do need to consider their impedance. Wiring two identical speaker systems in parallel (both across the same amplifier terminals) gives you a load with half the impedance of either speaker by itself. Use parallel wiring if this combined impedance is not so low as to load down your amplifier beyond its limits. In your case, the “hot” terminal of one speaker would be wired to the same output terminal on your surround amp as the “common” terminal of the other speaker.

If parallel wiring can't be used with your amp and speakers, wire the speakers in series but in opposite polarity. This means

wiring identical terminals (either hot or common) of the two speakers together and wiring the other two speaker terminals to your surround amp.

Dipole speaker systems used for surround should be placed with their sides facing the listener. This puts the listener in a “null,” where little of the speaker's direct output can be heard, while diffuse reflections from the two sides of the dipole reach him from other points in the room. These diffuse sounds create a surround ambience without letting the listener focus in on the speaker's location as the source of the surround signals.

Timing Accuracy of CD Players

Q *In the January 1993 “Audioclinic” you published a letter from Frank Bailey concerning the accuracy of a CD player's timing. How can I check this on my player? Can this be done at home without using expensive equipment?—Alan Buckbee, Englewood, Colo.*

A Before getting into this, please note that most cassette and open-reel recorders are much less accurate than the CD player discussed in that 1993 installment. Even with an error of 30 seconds per hour, musical pitch and tempo are so little affected that the listener is unaware of timing errors. Unless you have some very special applications, a CD player that's off by a few seconds per hour should not be cause for concern.

Okay. How do you check the timing? All you have to do is play a CD whose liner notes list either the total timing of the disc or the length of one really long track, and time it with a good stopwatch. (If the track you try is too short, you won't be able to determine timing errors.)

Start playing the disc. As soon as the first sound is heard, start the watch. After the last note of the last track dies away, stop the watch. The time shown on the watch is the actual time needed to play that CD on your machine. Your stopwatch timing and the disc's listed running time should be substantially the same.

If you discover, as Mr. Bailey did, that there is a significant timing error, there is little you can do about it besides sending the CD player to a factory-authorized center for repair.

If you have a service manual for the player, look for the passages about the “clock module.” If your player has no external trimmers for adjusting the frequency of the clock oscillator, chances are that your only hope is to replace the module and trust that the replacement is more accurate than the original was.

Calibrating Dolby Level

Q *I own two cassette decks, and neither has any Dolby level marks on its recording level indicators. From what I have ascertained in some reviews, I understand that 0 VU is not always the right calibration point for Dolby noise reduction. I find it best to record music in accordance with what the owner's manual tells me. Does this mean that I am not recording properly for Dolby NR?—Name withheld*

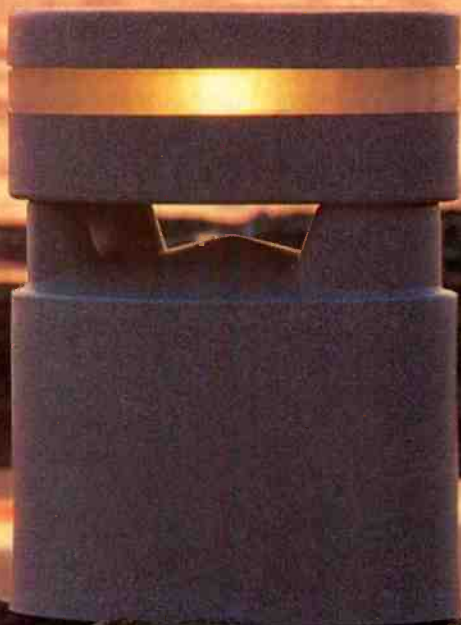
A The Dolby NR circuits in modern cassette decks are calibrated at the factory, so calibration marks on your recording level meters should be unnecessary. Such markings were useful on decks that didn't have Dolby NR, for use with external Dolby NR processors, but these processors have disappeared from the home market. The markings are sometimes found on decks having extensive capabilities for adjustment by the user.

If your playback of Dolby-encoded tapes seems to lack highs or have more highs than the source has, it is possible that its internal NR calibration adjustments need to be reset. However, excessive or deficient highs are more likely to mean that bias or equalization is not set appropriately for the tape you are using. Bias should be checked and adjusted first, because it is the simplest adjustment you can make.

If any internal adjustments must be made, you need the proper test instruments, a test tape, and a service manual. If

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

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you are unfamiliar with calibrating recorders, do not undertake it.

To sum up, good performance from a recorder that is equipped with Dolby noise reduction does not depend on some special or secret method of adjusting recording levels. Rather, it is a matter of having the internal workings of the cassette deck adjusted properly.

Padding Loudspeakers?

Q *My system includes one preamplifier that feeds two power amps for my main loudspeakers and one amp to operate some extension loudspeakers. Two of these speakers are mounted in a wall. I would like to place individual volume controls at each one of these in-wall speakers to balance the channels and to control the volume, but I've received conflicting advice about how to do this. The dealer who sold me the in-wall speakers said to use a 70-V line to control the volume in order to keep the controls from overheating. Another dealer told me not to use the 70-V system. He said I should use a mono "L" pad at each loudspeaker, set between two-thirds and full volume. Yet another dealer told me to use an "L" pad and that there would be no problem when using it from zero to full volume. I do have some 150-watt mono "L" pads, but should I use them? I want to stay away from controls at the power amplifier.—Bryant W. Krueger, Evansville, Wisc.*

A If the power amplifier that supplies the in-wall loudspeakers supplies signal to other extension speakers, I can see where you wouldn't want to control the volume from the power amplifier's input.

On the other hand, if the in-wall speakers are the only ones fed by that amp, I would avoid using "L" pads at each loudspeaker. Fortunately, you have pads that can handle the heat produced by high power levels. If your amp can supply the required amount of acoustical output, even with some loss of power in the pads, I guess it can work all right. (I hate to see power wasted.)

Given my choice, I'd place the power amplifier near the in-wall speakers and run long signal leads to its inputs. I'd place a ganged volume control, whose resistance is about 10 kilohms per section, at the inputs of the amplifier. This way you only need to adjust one control, channel balance will be

maintained, and you'll produce the desired listening level.

The difficulty of having a monophonic, or single, "L" pad at each in-wall loudspeaker is that you must move from one place to another to set volume. Maintaining channel balance will be very hard to do. If your wiring can be arranged properly, how about mounting both pads between the two in-wall loudspeakers? This will allow you to stand in a good place to hear the volume change and the shifts of channel balance, and to compensate for these as necessary.

Recording from Car Stereo

Q *I'm trying to record from my car stereo head unit's preamplifier outputs to the line inputs of a home cassette deck. I can make good recordings, but only if the volume control on the head unit is turned up. I would like to have the capability of recording independently of the volume control, as is done with home stereo systems. One idea I had was to connect the cassette deck to the volume control of the car stereo. The volume control, however, has six terminals, and I don't know which ones to use. If I write the manufacturer of this stereo system, will they provide me with a schematic diagram so that I can figure out how to make my connections?—Raymond Barnes, New Rochelle, N.Y.*

A Because it's a challenge making the right connections, it would be best if you could learn how to set the volume on your car stereo system to produce good recordings rather than attempting wiring which you may not previously have worked with. If your car stereo unit's volume was controlled with a voltage-controlled amplifier (as is true of most units that use up/down pushbuttons rather than knobs for volume control), your task would be far more challenging. But the fact that the control you describe has six terminals suggests that your unit uses a conventional control arrangement, which offers you some hope.

The six terminals are usually arranged in two groups of three terminals each, one group for each channel. Picture your stereo system with the volume knob facing you and the six terminals facing up. (If they're not actually arranged this way, make the necessary mental adjustments so you can

picture them as I've described.) The terminals in each group should be, from left to right, ground, the "wiper," and the "hot" side of the control. With an ohmmeter, measure resistance between each terminal and chassis ground. Resistance between the chassis and the ground terminal should read virtually zero. Resistance between the wiper and the chassis should vary as you rotate the shaft of the control, and resistance between the chassis and the remaining lead should be relatively high, perhaps 10,000 ohms, regardless of the position of the volume control's shaft.

Once you've identified the terminals, you'll need to make one more test. Turn the head unit on and tune it to an AM or FM station. With a reasonably good d.c. voltmeter, check for the presence of d.c. voltage between the left and right terminals of the control. Hopefully you won't find any, but if you do, it will be rather low, probably something on the order of 0.1 V.

Next, get two shielded cables, each with one end having a phono plug attached (or whatever plug matches your cassette recorder) and the other end bare for connection to the volume control. Connect one cable to each channel's section of the volume control. The shields go to the ground side of each control section. The center conductors go to the "hot" sides of the control sections if no d.c. voltage was measured in your earlier test. If d.c. was present, place a 10- μ F electrolytic capacitor between the control and the center conductor of the cable. If the d.c. voltage at the hot terminal of the control was negative, then connect the negative terminal of the capacitor to the control and connect the positive terminal to the cable; do the opposite of this if the voltage at the hot terminal was positive.

Your remaining consideration is whether or not you have sufficient signal to drive your recorder to full recording level. You'll have to decide if it is really worth the trouble of working all of this through.

As for obtaining a schematic, it is reasonable to assume that the maker of your equipment will provide a service manual; there probably will be a charge for this. It used to be standard practice for a schematic diagram to be included with any piece of audio gear. Personally, I think it is a disgrace that this is no longer the case. **A**

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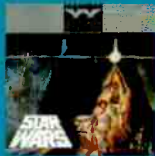
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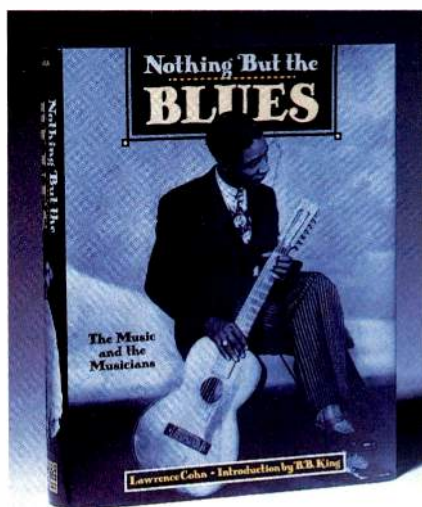
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Nothing But the Blues

edited by Lawrence Cohn

ABBEVILLE PRESS, hardcover,
432 pp. (8½ x 11 inches), \$45

One of the nice things about being editor of *Audio* is that I get first crack at reviewing books like this extraordinary one. Basically, this is a group of 11 essays on various aspects of the blues, written by some famous people and some people who should be famous to those interested in the blues. For the many accompanying photos alone, I find the book worth reviewing and recommending.

The guy who put this together was Larry Cohn, formerly a VP at CBS/Epic and Executive VP and COO of Playboy Records and Music. More recently, he has been at the center of the huge and wonderful Roots 'n' Blues Legacy reissue program at CBS/Sony. Several of these discs have received strong reviews in these pages, not the least of which was the two-CD boxed set of the complete recordings of Robert Johnson, which won the Grammy and Handy Awards.

Now, I usually don't care for book reviews that mainly recite chapter titles with authors and subject matter, but for this book, I think it may be the best way of presenting its quality and diversity. Further, by giving the authors' names and some back-

ground (which I've taken liberally from citations in the book), some of the strength and weight of their knowledge will come across; if you recognize some of them, then you'll understand how good the rest are. (That's what happened to me.)

The first chapter, "Workin' on the Building/Roots and Influences," is by Sam Charters, whose seminal three-LP set, *Chicago/The Blues/Today*, has been reissued on CD by Vanguard. I was living in Chicago, on Wells Street in Old Town, when I first came to know the blues well, and some of the artists on Charters' set I had listened to in clubs on that street. In the July 1992 issue, I reviewed the paperback reissue of Charters' book *The Roots of the Blues*, which told of his search among the griot musicians in west Africa for the beginnings of the form. Some of this material is recounted here. Charters continues on his historical bent, giving many interesting items on the instruments, artists, and songs present at the birth of the blues in America, and his technique is more or less followed by the other writers. While this book is a history of the blues in the U.S., it is also filled with anecdotes.

Next is "Goin' Up the Country/Blues in Texas and the Deep South" by David Evans. This multifaceted professor of music at Memphis State University also is a producer for High Water Records and has two books to his credit, *Tommy Johnson* and *Big Road Blues*. His excellent 55-page chapter covers many of the classic country blues singers—Robert Johnson, Leadbelly, Son House, Blind Lemon, Bukka White, Furry Lewis, Big Joe Williams, Speckled Red, Skip James, Peetie Wheatstraw, Sleepy John Estes, Muddy Waters, Elmore James, and Lightnin' Hopkins, to name but a few.

Richard Spottswood has to his credit *Ethnic Music in America*, an excellent reference, and he is the editor of the Library of Congress series *Folk Music in America*. His

chapter, "Country Girls, Classic Blues, and Vaudeville Voices/Women and the Blues," is devoted to women blues singers such as Ma Rainey, Bessie Smith, Memphis Minnie, and Sippie Wallace.

"Holy Blues/The Gospel Tradition" is by Mark Humphrey, a writer and performer, and focuses on church music, as opposed to the devil's music, blues. He covers performers such as Blind Willie Johnson, Rev. Gary Davis, Mahalia Jackson, and Sister Rosetta Tharpe.

Humphrey also did the next chapter, "Bright Lights, Big City/Urban Blues," which covers some of the more polished and citified bluesmen. There's a very nice long section on Lonnie Johnson and one nearly as fun on Leroy Carr. Humphrey then does shorter takes on Big Bill Broonzy, Big Joe Turner, T-Bone Walker, Muddy Waters, Howlin' Wolf, Sonny Boy Williamson II, and B.B. King.

Bruce Bastin has written two books, *Crying for the Carolinas* and *Red River Blues: The Blues Tradition in the Southeast*. His chapter, "Truckin' My Blues Away/East Coast Piedmont Styles," brings a more sociologist or field anthropologist orientation to this folksy, country area. He starts by telling of the Fort Valley State College *folk* festival held at this black Georgia college

during the 1940s! He mines gold from record company letters, commenting "How many remarkable facts are tucked away in those sentences!" Here's the quote from a letter

**WHILE THIS HISTORY
OF THE BLUES
IS FILLED WITH FACTS,
IT IS ALSO FILLED
WITH ANECDOTES.**

to Gabriel Brown concerning his renewal contract for "another year . . . and you will note that for the second year I have again increased your recording fee."

"A Lighter Shade of Blue/White Country Blues" is by Charles Wolfe, who has written nine books and been nominated for Grammys three times. This chapter isn't about what I call blues, though it does cover such important artists as Jimmie Rodgers, Gene Autry, Hank Williams, Riley Puckett, and Uncle Dave Macon. It's plenty of fun to read.

John Cowley, a music scholar in this area with many articles to his credit, gives us the next chapter, "Don't Leave Me Here/Non-

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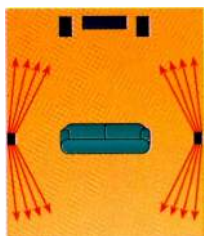
Dipoles are ideally suited for surround channel use because their off-axis sound is inherently diffuse. As shown in the drawing at right, a dipole speaker radiates sound toward the front and back of the room, and not toward the seating position (here referred to as the null area). This sound is then reflected off of the front and back walls to create a diffuse soundfield which integrates entirely with your main and center channel speakers.

While dipoles are ideally suited for surround use, conventional dipole designs have always suffered

from a complete lack of bass. This limits the full potential of a home theater system because movie sound engineers often add bass to the surround channels for greater dimensional realism through the bass region. PARADIGM ADP-SURROUND speakers do not suffer from this limitation. They have been adapted to retain a balanced level of bass when mounted on (or near) the side walls of your room.

The result is sensational... complete sound integration with the front speakers at all frequencies right down to the bass, providing a home theater soundstage that is seamless and nothing short of astonishing! With ADP Surround Series speakers PARADIGM continues it's tradition of superior performance and unsurpassed value...

The ADP-Surround Series sets completely new performance standards in surround speakers!



ADP-150 DESIGN FEATURES

- ▶ **High-frequency drive unit** (beware of inexpensive cone-type tweeters found in virtually all surround speakers - their performance is substantially inferior).

Polyamide dome has low mass and high internal damping for balanced wide-band frequency response.



High-temperature voice-coil with aluminum former and ferro-fluid cooling/damping further reduces distortion and ensures long service life.

- ▶ **Ultra-compact 5 1/2" PARADIGM built bass/midrange drive unit.**

High-pressure diecast aluminum chassis to minimize mechanical vibration, ringing and flexing. Although common in expensive speakers, a diecast chassis at this price level has been unheard of... until now!



Polypropylene cone for smoother response, extended bass performance, and improved freedom from unwanted resonances and distortions.

Multi-layer voice-coil, kapton former and oversized magnet structure ensures better musical accuracy and long term reliability.

- ▶ **4-driver, 2-way Adapted Dipole design in sealed enclosure balanced for mounting on (or near) side walls.**

Superior high-frequency drive unit is mounted in specially designed baffles which ensure uniform and smooth total energy output.



Dividing network uses close tolerance, high power components in a time-corrected, quasi-Butterworth configuration.

Enclosure made from inert high-density hardboard to limit unwanted panel resonances.

ADP-100 DESIGN FEATURES

A lower cost option that utilizes the same adapted dipole design as the ADP-150. The ADP-100 uses a 5" bass/midrange driver unit with a stamped steel chassis, polypropylene cone and a 5/8" polymer dome tweeter. As with the ADP-150, the ADP-100 enclosure is made from inert high-density hardboard and the dividing network uses close tolerance high power components in time-corrected, quasi-Butterworth configurations.

SPECIFICATIONS

DESIGN

4-driver, 2-way adapted dipole in sealed enclosure.

CROSSOVER

2nd order electro/acoustic at 3.0kHz. Frequency- and phase-corrected.

ADP-150:

HIGH FREQUENCY DRIVER

19mm (3/4") polyamide dome, aluminum former, ferro-fluid cooled and damped.

BASS/MIDRANGE DRIVER

135mm (5 1/2") high-pressure diecast chassis, polypropylene cone, kapton former.

LOW FREQUENCY EXTENSION*

65Hz (DIN)*

FREQUENCY RESPONSE

diffuse soundfield design from 90Hz to 20kHz

SENSITIVITY- ROOM/ANECHOIC

89dB/86dB

SUITABLE AMPLIFIER POWER RANGE

15 - 100 watts

MAXIMUM INPUT POWER†

80 wattst

NOMINAL/MINIMUM IMPEDANCE

6ohms/4ohms

RECOMMENDED PLACEMENT

mounted on or placed near side walls.

INTERNAL VOLUME

8.5 litres/.30cuf

HEIGHT, WIDTH, DEPTH

27cm x 23cm x 17cm / 10 1/2 in x 8 3/4 in x 6 1/2 in

WEIGHT

10.5kg/23lbs per pair

ADP-100:

HIGH FREQUENCY DRIVER

14mm (5/8") polymer dome, formerless voice-coil, ferro-fluid cooled and damped.

BASS/MIDRANGE DRIVER

125mm (5") polypropylene cone with aluminum former.

LOW FREQUENCY EXTENSION*

85Hz (DIN)*

FREQUENCY RESPONSE

diffuse soundfield design from 110Hz to 20kHz

SENSITIVITY- ROOM/ANECHOIC

88dB/85dB

SUITABLE AMPLIFIER POWER RANGE

15-80 watts

MAXIMUM INPUT POWER†

60 wattst

NOMINAL/MINIMUM IMPEDANCE

6ohms/4ohms

RECOMMENDED PLACEMENT

mounted on or placed near side walls.

INTERNAL VOLUME

5.0 litres/.18cuf

HEIGHT, WIDTH, DEPTH

22cm x 23cm x 16cm / 8 1/2 in x 8 3/4 in x 6 3/8 in

WEIGHT

7.2kg/16lbs per pair

AVAILABLE FINISHES:



Black Ash (both models) White (both models) Black Gloss (ADP-150 only) Rosewood Glass (ADP-150 only)

* DIN 45 500. Listening rooms reinforce bass. This reasonably indicates the audible (approximately -3dB) low frequency performance that can be achieved in most rooms.

† Maximum Input Power indicated is with typical program source, providing the amplifier is clipping no more than 10% of the time.

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Commercial Blues: The Field Trips, 1924-60." If you've read this far into this review, you probably have several recordings originally done by perhaps the most famous of the field recordists, John Lomax or his son Alan. Their biggest find was Leadbelly, who was in the Angola, Louisiana prison for a violent assault. Crowley says that Alan Lomax reported that "The officials of the Louisiana prison in their wisdom had decided all history to contrary, that Negroes work better when they are not singing." However patronizing Lomax may sound, you can also hear his disappointment, but imagine being in prison and being further denied the liberty of singing.

"Jump Steady/The Roots of R & B" is by Barry Pearson, who is a professor of English at the University of Maryland, a musician who has toured Africa and Central and South America, and a writer who has done two books and many articles, reviews, and liner notes. He engages in some of the scholarship that I enjoy most; for example,

**THE BLUES COMES
IN MANY SHADES,
BUT ALL ARE HERE
IN THIS FINE BOOK.**

he cites Jerry Wexler, later to become famous for his work at Atlantic Records, as the *Billboard* editor who in 1949 "selected 'rhythm and blues' as a heading for the top 15 records projected for African-American customers." RCA Victor had used the term a year earlier in its catalog. There's a wonderful story about the signing of John Lee Hooker to a contract by the Bihari brothers and the subsequent rocketing to number one on the *Billboard* charts of his "Boogie Children."

Jim O'Neal, author of the next chapter, "I Once Was Lost But Now I'm Found/The Blues Revival of the 1960s," is one of the founders of *Living Blues*, probably the most important periodical about the blues. He also is one of the owner-operators of Rooster Records and the Stackhouse Recording Studio in Clarksdale, Mississippi. The popularization and dilution of the blues during this decade by folkies and later rockers did lead, of course, to wider appreciation of the originals and, some feel, to the finest decade of rock, with the explosion of British groups such as The Stones (named for a Muddy Waters song) and The Beatles as well as musicians such as Eric

Clapton, John Mayall, and Jimmy Page. There were plenty of American groups and musicians as well, and I think that without their blues forerunners, there would have been no groups such as Led Zeppelin, The Allman Brothers, or The Grateful Dead. Indeed, I hear a fair amount of blues in Bob Dylan. O'Neal tells of Chess packaging Muddy Waters albums as folk music(!); Mobile Fidelity has just rereleased an excellent clean-up of the Chess disc from this era, *Muddy Waters: Folk Singer*, which has Muddy at the height of his powers, but no folkie. This era is when my ears came of age—or at least I did—so don't wonder why this chapter is my favorite.

The last chapter is titled "Standing at the Crossroads/The Blues Today" and is by Mary Katherine Aldin, a prolific writer as a staff editor for *Living Blues*, columnist for *Blues and Rhythm: The Gospel Truth*, and notator of more than 30 record albums. She also produced and was host of a blues radio show in Los Angeles from 1977 to

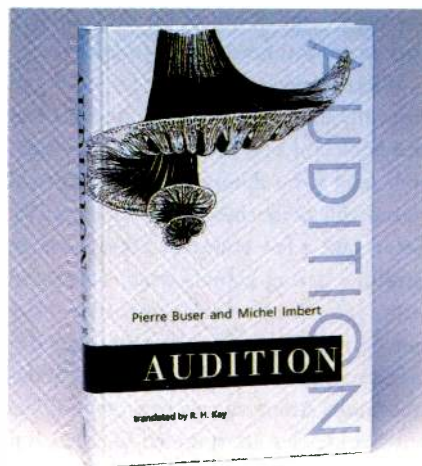
1988. This short but pungent chapter is an appreciation of the masters who're still doin' it, such as John Lee Hooker, Johnny Winter, and Etta James, and of the young bloods starting to turn heads around—artists like Robert Cray, Joe Louis Walker, and Lucky Peterson. Yes, the blues is alive and well; long may it live!

A fine way to end the book are the 150-plus discography and the 100-plus bibliography. I have many of the CDs on the first list, and I agree that it provides "an overview of recordings that are essential to any blues collection, that best typify the genre, and are reasonably easy to obtain." For many, it alone will be worth the price of the book.

Let me, at this point, get my few nits picked and out of the way. The book's heavy enough that you can't read it in bed 'cause it'd give you an extra belly button; neither would you want to commute by bus or train with it—too big in the briefcase. Coffeetable for sure.

If it's not obvious by now, I highly recommend Larry Cohn's *Nothing But the Blues*.

Gene Pitts



Audition

Pierre Buser and Michel Imbert;
translated by R. H. Kay
MIT PRESS, hardcover, \$45

The brain is the most complex structure known to science. Its components are so diverse and its connections so intricate that neurobiologists are only just beginning to understand how it functions. Among the brain's many remarkable achievements, its ability to make sense of the complex mixtures of sound that reach our ears is one of the most extraordinary.

Audition was written by two neuroscientists at the Université Pierre et Marie Curie in Paris. It was originally published in French and is now available in English translation. The book begins with an introduction to the physics of sound. Its next few chapters deal largely with auditory psychophysics—for example, limitations in our ability to hear tones of different frequencies or to distinguish between different tones, and ways in which values of pitch and loudness may be organized to form scales. The remainder of the book focuses largely on the physiology of the ear and brain. It describes the structure of the ear and examines how sound is there transduced into electrical signals that are relayed to the brain.

The authors also explore various structures in the central nervous system that are concerned with sound. They catalog the types of neuron (nerve cell) that are found in each structure and describe how these neurons are distributed. They also examine the responses of neurons to various sounds and discuss briefly how these responses

change as signals travel up the auditory pathway to various regions of the cortex.

What general features have emerged from the many investigations described in this book? For one thing, we find that neurons tend to be choosy as to what types of sound will cause them to produce signals. Let us take a few examples. Some neurons produce strong signals when presented with tones in a particular frequency range but do not respond to tones in other frequency ranges. A small proportion of neurons emits strong signals when two different frequencies are sounded together but respond poorly when either of these frequencies is sounded alone. Some neurons are activated best by sounds at particular

amplitudes and less well at lower or higher amplitudes. For yet other nerve cells, the higher the amplitude of the sound, the stronger the signal that is produced, until some saturation point

is reached. A proportion of neurons responds best to amplitude-modulated or to frequency-modulated tones. Some neurons are activated most strongly by sounds that are coming from a particular region of space, and a small proportion even prefers sounds that are moving around in space.

Exploring these brain structures from a broader perspective, we find that neurons are often arranged such that those activated by the highest frequencies are located at one end of a continuum, those activated by progressively lower frequencies lie adjacent to each other, and those preferring the lowest frequencies are at the other end of the continuum. For example, a neuron that responds best to a tone at 2,000 Hz will be located between neurons that respond best to tones at 2,200 and 1,800 Hz, so frequencies are represented in the brain in the form of maps.

Other characteristics of sound are also mapped in the brain. These include parameters that are concerned with the location of a sound source, such as differences in the intensity of a sound at the left and right ears or differences in time of arrival of a sound at the two ears. We also find maps of amplitudes and of durations between the onsets of different sounds.

So what do we make of all this? The authors in general avoid speculating as to how such findings relate to perception and tend to confine themselves to experimental observations. As a result, the reader gets the impression that something is missing from the picture. For example, how do neurons with various response characteristics communicate with each other so that we perceive sound of different pitches and loudnesses? How can we characterize the neural networks responsible for perceiving sound in different spatial locations? Of course, it's not reasonable to expect too many answers, but posing such questions at least sets the physiological work in perspective. To take another example, the

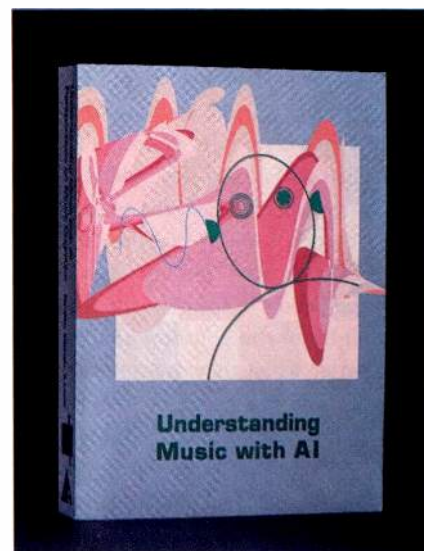
maps of various sound parameters, such as frequency, must surely provide a basis for performing neural computations that ultimately lead to perception or behavior. What are these maps doing? What specific advantages are conferred by representing sounds in this fashion?

The impression given by the authors that auditory physiology is long on facts but short on theory is particularly unfortunate since there exist some beautiful lines of research (not described in the book) that do relate neurophysiological findings closely to perception and behavior. One example is the work of Nobuo Suga and his colleagues at the University of Washington on the brain mechanisms involved in bat echolocation. Another is that of Masakazu Konishi and his colleagues at the California Institute of Technology concerning how the owl localizes sound. A third intriguing line of research has been carried out by Robert Capranica and his colleagues at Cornell University on the brain mechanisms involved in perception of vocalizations by frogs.

These studies and others like them are not only fascinating in their own right but also pave the way for future research by showing what types of organization we should expect to find in the auditory system. The next few years should be exciting ones for scientists in this field.

Diana Deutsch

**IT IS EXTRAORDINARY
HOW THE BRAIN MAKES
SENSE OF VERY COMPLEX
SOUND MIXTURES.**



**Understanding Music with AI:
Perspectives on Music Cognition**
*edited by Mira Balaban, Kemal Ebcioğlu,
and Otto Laske*
THE AAAI PRESS/THE MIT PRESS,
paperback, 512 pp., \$39.95

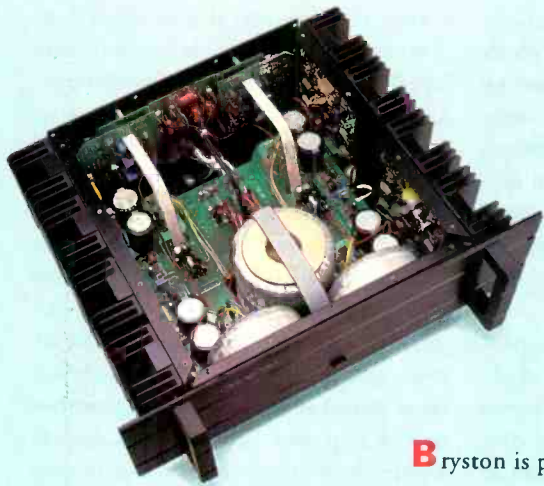
This book about music and artificial intelligence (AI) might initially appear to be of limited interest to audiophiles, but since it speaks to the future of audio entertainment, the text is of potential interest to anyone eager to stimulate his thinking about future directions. Many audiophiles and engineers will surely begin to experiment with the increasing opportunities for interactive control on the listener's part.

Already, some PC-based software comes with the music soundtrack encoded in the form of note-level instructions (i.e., commands specifying the pitch, loudness, and timing of individual notes) for synthesizers conforming to the Musical Instruments Digital Interface (MIDI) Standard. From the standpoint of audio, this is a potentially revolutionary development because, although the sequence of notes is fixed by the encoding, other aspects of the musical performance (e.g., orchestration) can be altered at will by the listener. Thus, the experimentally inclined listener can begin to take an active role in shaping the auditory experience.

The next step in this direction might be to replace the MIDI instruction streams with computer programs that could generate synthesizer commands on the fly in response to listener specifications initiated by

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a mouse, joystick, breath controller, or music keyboard. Each program would effectively provide a framework for a panoply of musical experiences, with the ultimate result depending strongly upon the choices made by the individual listener. An even more ambitious audio system might cast the listener in the role of full-fledged fellow performer: The synthesizer commands would not merely be generated in response to listener control gestures; rather, they would be improvised in response to a real-time listener accompaniment on a musical instrument.

The common theme in all these interactive audio systems is that the musical content must be specified not by a digitized audio waveform but instead via an explicit, step-by-step encoding of musical structure. The MIDI Standard specifies this structure at the level of notes, but a more sophisticated formalism might enable the listener to directly access and control higher levels—phrasings, musical styles—as well.

From this perspective, the present state of digital audio can be likened to the earliest days of digital computing, when the power of the computer was used entirely for “number crunching.” As computing evolved, however, researchers began to explore the use of the computer for more abstract “symbolic manipulation” tasks in which the numbers within the computer could represent such things as objects, properties, relationships, and decisions. The MIDI-based systems mentioned above are a first step in that direction, but the development of formal specifications for higher level musical structure remains an extremely challenging task. If digital audio systems are ever to fully negotiate this evolutionary leap toward the intelligent manipulation of abstract musical structures, it will likely require a prolonged and resourceful application of AI and cognitive science to music.

All of this brings us (at last!) to a consideration of *Understanding Music with AI*. This rather lengthy volume collects 21 reports from authors at research centers around the world, all working to advance the state of the art in the emerging field of AI and music. This book is primarily targeted at professionals in the fields of music, music technology, AI, and cognitive science, but the editors hope that it will also

“be of benefit to readers generally interested in the relationship of music and technology.” Alas, this benefit is apt to be limited, for there is a big difference between augmenting a collection of technical reports with introductory remarks (which this book does) and explicitly committing oneself to the clearest possible explication of a new field for a wider audience (which a text or tutorial monograph would do). While I found many of the articles to be of interest, I was mostly left to my own devices in trying to construct an orderly view of the field as a whole.

This criticism notwithstanding, *Understanding Music with AI* does provide an interesting snapshot of a highly ambitious undertaking still in its infancy. The individual articles all share a commitment to computer modelling of musical activities but differ widely in their specific concerns. The editors have helpfully grouped them in seven distinct sections that can be characterized briefly as follows: The meaning and scope of “cognitive musicology,” the role of abstract representations in modelling musical activities, approaches to computer-generated or assisted composition, algorithmic composition as a tool for the analysis of existing music, engaging computers directly in the musical performance, computer-based approaches to perceiving meter and time quantization, and systems that learn and adapt in response to human feedback. One current research area largely absent from this compendium is the attempt to discover high-level musical structure through the use of neural networks (some examples are presented in Section 6 but only with respect to perceiving meter). In fairness, though, it must be admitted that this endeavor too is in its infancy, and I mention its absence as an observation rather than criticism.

As might be expected, the readability of the articles themselves varies tremendously from one to the next. For example, the first chapter of Section 5, on musical performance, presents a detailed examination of the application of a generative grammar to the simulation of rhythmic improvisation

and more general composition. This chapter is likely to be heavy going for anyone not already well versed in formal grammatical models.

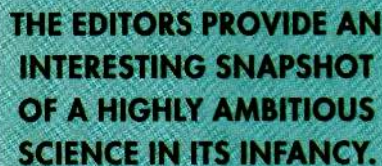
In contrast, the next chapter lightly summarizes a set of research projects from Japan’s Waseda University (and collaborating institutions) aimed at integrating vision technology into automated musical performance. These include a robot that can read a musical score in real time and play an electronic organ with its 10 fingers, a system for translating between printed music and braille music, a computer system that can follow a human conductor, and a system that can recognize dance patterns in real time and select appropriate musical responses. In this chapter, one can discern an outline for a truly 21st-century audio system!

Another bit of easy reading is the transcription of a rambling conversation between co-editor Otto Laske and AI luminary Marvin Minsky that serves as this volume’s Foreword. The exchange is stimulating, but what this conversation makes most clear is the enormous challenge that

still lies ahead in applying AI to a realm of activity as diverse and poorly understood as that of making music.

In the final analysis, *Understanding Music with AI* is most likely to appeal to those who

seek to experiment directly in this field themselves. The editors might have broadened this appeal by including an introductory chapter with a deliberately tutorial design, but their top priority was clearly to reach other researchers. Readers seeking a more introductory perspective may begin by tracking down the now rather dated issue of *ACM Computing Surveys* devoted to computer music (Vol. 17, No. 2, June 1985). Those who wish to focus on the somewhat narrower topic of computer-generated music might turn to David Cope’s *Computers and Musical Style* (A-R Editions, 1991) or to *Readings in Computer-Generated Music* (IEEE Computer Society Press, 1992). Lastly, more information about neural-network-based approaches can be found in *Music and Connectionism* (MIT Press, 1991). Mark Dolson



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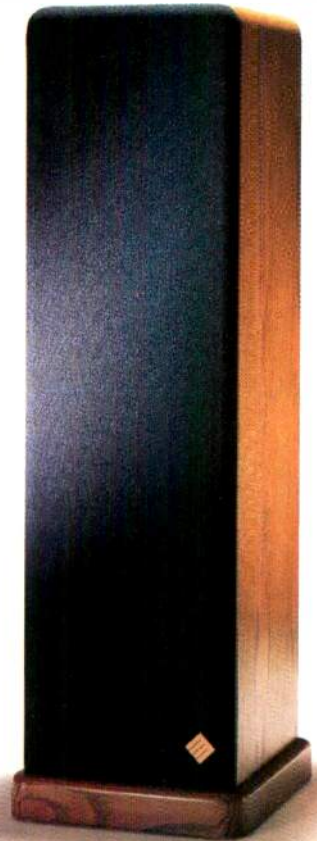
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EDWARD TATNALL CANBY

THE INFORMATION CARPET: A SHORT STORY



When Jayne hit the Information Highway she did so at speed. In years past, she had acceded gratefully to each new pre-Highway fringe benefit, especially those for her pearl-colored Princess phone. Including, of course, a companionable cordless to go with the Princess. This she now seldom used—no need; the Highway would soon come to her ever-more-delicate pushbutton fingertips, all in one place. She no longer had a husband, either. That need had vanished when her two daughters went off to a superb boarding school. The girls at the school were kept successfully informed, if not apart from the boys, so that no scandals or other inconveniences in Jayne's life had yet oc-

curred. Jayne thought it a marvelous school, and so did her daughters when they reluctantly came home for a few hours at Thanksgiving or Christmas. Summers, the girls went off with the boys to travel.

Jayne and her husband had converted to stereo early on, before the girls began to arrive. Rather, *he* had converted; at that point the only stereo Jayne knew was a stereotype, out of some novel, unexplained, but she figured it had something to do with typewriters. The stereo gear arrived in a huge truck and was instantly consigned to the basement. Good wifely

**DETAILS ABOUT THE
INFORMATION HIGHWAY
WERE ALWAYS SCARCE,
EXCEPT ABOUT FINANCE.**

instinct! Down near the house foundation it boomed and blasted, while upstairs it was only a rustle and a shake. When he left, amicably enough, he took all the equipment and she got the house. A bargain, she thought. So did he.

Thus, life before the Superhighway had evolved, on the whole, pleasantly for Jayne. She had even, in a fit of reminiscent affection, disconnected the phone's caller ID so that her ex-husband could call without her checking the call first. A new and more powerful cordless had allowed her to move, phoning, into the neatly laid-out garden just off the front porch when the weather was right. The flowers were tended in season by the local garden people, completely changed three times each summer by a bearded young man who stripped up one garden and laid down the next, all in a few minutes. Such handsome blooms! She didn't know one from another, which was okay so long as the colors were bright and cheery. "Not too much blue this time," she told him once. "Sorry, ma'am, but it's standard. Can't make changes, you know, without rebuilding the assembly line." She was only momentarily regretful; it was so nice to be outdoors in the little breeze whipped up by her automatic fan.

The Information Highway did not come unannounced. For years, it seemed, when she turned on the news she heard about the Highway and not much else. She would just sigh and wait for the next news.

The Highway details, however, were always scarce, except for the financial ones. Indeed, she had not the slightest idea what sort of a Highway it might be except that it would come straight to her door, in all its multitudinous majesty. All those channels, side by side, like the warp in a carpet? Or was it

Illustration: *Sru Suchit*

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the weft? She envisioned, perforce, a broad, flat sort of thing, made of some rich material, dyed crimson, laid down across the lawn and up the front steps like the red carpets put out for dignitaries. And it would continue on under the heavy front door and thence . . . where? She was not sure.

Would it be rolled into the living room to end up next to her accustomed easy chair? That would be nice. But what about the bedroom? A branch up the stairs, no doubt, and maybe it would come in a durable fabric that would do for a stair carpet? Two birds with one stone! She turned this over in her mind and thought that life really was helpful these days.

Soon she was absent-mindedly speaking to herself of the Information Carpet. And when she called her phone friends—she had no others—it was the same.

The Highway, when it approached, sent its scouts ahead, insidiously. It was Information, all right, but rather solid in nature. First the new dishwasher. It was in the cellar, and you sent the dishes down to it via pushbutton. When they were done, they came back up. Soon it was the laundry; it too went up and down. Just push "#" on the Princess. Long since, Jayne had bought a garage-door opener with a wireless beeper. She loved it, even when it did not operate. Then she would park the car, which had almost no mileage on it (where did she need to go?), and car-phone an obliging neighbor to open the door by hand. I'm getting flabby, she thought uneasily. Maybe I can use one of those Highway channels?

When a child stole a carton of cream from the front porch, she added another pushbutton. It automatically locked or unlocked all the doors and windows in the house with a satisfying *crrrunch* that reassured her as to any further burglars, not to mention rapists.

All in all, these incursions left Jayne contented. The flabbiness could wait. She would do exercises on the Carpet's channels. Next came a small video screen for the Princess, with buttons to choose. It showed bright colors and stayed on day and night, presenting her with thousands of advertisements. This she did not mind at all because they were so pretty, like her gardens, one right after another. But the added video kept bumping into her, and this was annoying. Often it really hurt. It was worse

when the same screens were added to her cordless and car phones.

But where *was* the Information Carpet, that broad highway which would unroll to her very doorstep? Her stairs, she noted, really were badly worn.

Then came those multi-billion dollar deals en route to various proposed Highways, always future. Various Carpets? She listened and was bemused. A billion, what was that? Nothing much in *her* life, she thought, yawning. But a phone friend sent

**WHEN IT APPROACHED,
THE HIGHWAY SENT
ITS SCOUTS AHEAD,
INSIDIOUSLY.**

her almost instantaneously a fax, handwritten, of a billion dollars, which looked like this: \$1,000,000,000. She was appalled—her small calculator didn't work with billions. *Nine* zeroes for one scrawny movie collection? She tried to figure it—if each movie were worth a thousand bucks, how many . . . ? This was beyond her ability, and she put the thought aside. If you had to ante up all those billions to get your Highway, she hoped they wouldn't send all the movies at once.

One day, at last, a man who had been climbing telephone poles for days came up to Jayne's door, smiling. In his hand was something thin and shiny that stretched behind him across her automatic replaceable lawn and to the street. "It's the Information Highway!" he said, beaming. "Your Carpet to Fame!" Jayne opened her mouth in wonder. But not a sound came forth. She was instantly, permanently, voiceless.

No—it wasn't laryngitis. Nor emotional shock. The doctor, next day on the Princess, said that by a new adaptation entitled "Inst Evolution," her speech genes had simply self-destructed, according to ancient natural principles, but faster. Like the appendix and the tail, her voice was now vestigial. No further need for it with the Highway coming on so soon.

"Who cares," whispered Jayne, for she could still whisper, even to her Princess. And she walked over to take a look at that worn stairway, one last time. **A**



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IVAN BERGER

AM RADIO NEWS



Neither AM stereo nor AMAX certification (an AM quality standard) have made much of a dent in the market yet, but this situation may be about to change.

The FCC finally made Motorola's C-QUAM system (already in use by most AM stereo stations) the official standard, which should encourage many more stations and radio makers to adopt it. The Commission has also announced that it would give preference to stereo AM stations applying for slots in the new frequencies (1,605 to 1,705 kHz) recently added to the AM broadcast band.

Already, there's a headphone-style personal portable radio, Sony's SRF-42 (\$34.95) with AM stereo. Icing the cake, the SRF-42 is also AMAX-certified. And GE's \$59.95 Model 7-

2887 monophonic portable, the latest in its Superadio line, is AMAX-certified as well. The GE features switchable AM bandwidth, a 0.7-watt (700-mW) amplifier, and a two-way, 6½-inch speaker system.

For several years, *Audio* has been asking which tuners and receivers in our car and home Directory issues offered AM stereo or met the AMAX standards for high AM quality; we've received few positive replies. Last October's home Equipment Directory listed three tuners (by Audio Design Associates, Carver, and Denon) and no receivers with AM stereo, and only one tuner (Denon's TU-680NAB, reviewed in the April 1993 issue) that was AMAX-certified. In our May '94 Car Stereo Directory, three companies (Audiotek, Chrysler's Mopar, and Sanyo) listed

AM stereo; none listed AMAX. (Delco could have listed both, but they don't furnish Directory listings.)

By the time you read this, we'll be processing forms for our October '94 Equipment Directory. Perhaps we'll see more AM progress there.

Forgotten Sound

Touch a button on a modern tape deck, and you won't hear much. Unless you're looking, you may not be able to tell if the button did anything until you hear the music start. But press the buttons on an old professional tape deck like the Ampex 350 shown in the "Behind the Scenes" column in June 1993, and you'd hear the solid "clunk!" of relays, a moment of hum while the motors got up to speed, and then the whisper of the tape across the heads. I miss it.

If I knew someone around here who still had a 350 running, I just might go and tape that sound. I'd use my quiet little pocket DAT machine with the wimpy micro-buttons, of course. Who'd want to lug a 350 around, these days?

Centennial Stride

James P. Johnson is best known as the father of the stride piano and for



writing more than 250 popular songs (including "The Charleston") as well as scores for at least 16 musicals. The classically trained composer's symphonic music has been virtually lost for over 40 years, according to MusicMasters, which is celebrating the centennial of his birth with a CD of his symphonic

Illustrations: Beata Szpura

and popular works. Release of the CD, *Victory Stride*, was timed to coincide with Black Music Month, in June. The disc also marks the 10th anniversary of the Concordia Orchestra, which recorded it with conductor Marin Alsop and pianist Leslie Stiefman.

Novice, No Vice

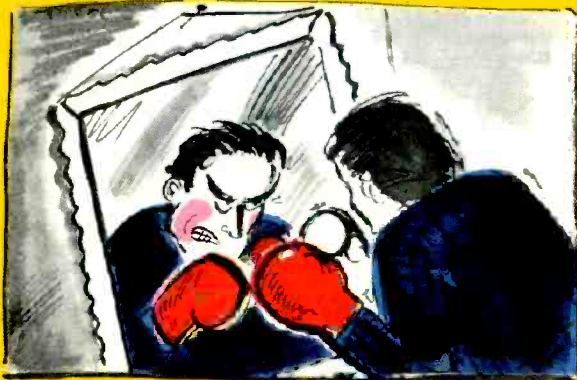
Audio readers (not to mention editors) follow the field of component audio. So when someone asks us what components to buy, we usually have answers. But what do we say when someone asks us about which under-\$200 boombox to get?

It's easy to get on our hi-fi high horses and say that a \$150 boombox with an AM/FM tuner, CD player, cassette recorder, amp, and speakers is junk. To us, it is—but if all you have is \$150 or so, the choice is that or no music at all.

What I told the young buyer who asked me was that he should take one or two CDs of music he knew well and play it on as many boomboxes as the stores would demo for him. Whichever sounded best—well, least bad, anyway—was the one to get. And of two units at the same price, the one with the fewer features and facilities would probably prove best; if one unit offers CD plus dual cassette transports at the same price as another with CD but only one cassette section, the odds are that quality had to be shaved somewhere to allow for the extra transport.

Carver vs. Carver

Bob Carver, founder of Carver Corp. and its head during its early years, has left the company and is now engaged in



litigation with it. Mr. Carver claims the corporation owes him more than \$600,000 in patent royalties (and interest) on his amp designs; the company maintains it actually overpaid him \$200,000 for royalties. Mr. Carver also claims that, as he did not renew his employment contract in 1990, his two-year non-compete agreement has ended; the company contests this. Mr. Carver has formed a new company, Zeus Audio, in Snohomish, Wash.

Covert Tracks

It's common for CDs to hold more than LPs, but uncommon for them to hold more than their track list discloses. At least two new CDs do just that.

One such disc is *Eclectic Stew*, produced for charity under the auspices of Philips Car Systems and its North American distributor, A•S•C. All proceeds go to the Jacob Wetterling Foundation for prevention of non-family child abduction; the music tracks were donated by the artists (Legion of Boom, Maxi Priest, The Story, Nova Mob, Kalahare, Paul Metz, Tina & The B-side Movement, Ipso Facto, Gumbo, Mister Doo, Bash & Pop, Red C, Michael McDermott, House of Large Sizes, Zu Zu Petals, and Sonia Dada) and their labels. The disc also contains "a hidden section of digital test tones"; according to a Philips spokesman, buyers have to figure out for themselves how to find them.



I don't have the disc, and Philips wouldn't tell me more, but I think I can guess where the track is hidden: Just before track 1. That guess is based on a CD I do have, Willie Nelson's *Moonlight Becomes You* (Justice Records JR 1601-2), which incorporates a technique called the Justice Soundboard. If you

load this CD, press play, and then hold down the rewind button for about 8 seconds, then you should hear a spoken message from Nelson; otherwise, you won't. (Justice says this works with most but not all

players; it worked fine on my home and car CD players but not on the compact system in my office.)

Eclectic Stew is not available in stores but can be ordered for \$9.99 plus \$3.50 postage from A•S•C (9600 54th Ave. North, Minneapolis, Minn. 55442; phone, 800-524-6638). *Moonlight Becomes You* should be available in stores, or Justice Records will owe Willie Nelson an apology.

When I was young and snobbish, I advised my friends not to waste their money on junk and to save up for something decent. Now that I'm older, I've reconsidered

this; I don't think it's money wasted. When that boombox buyer puts something better in his living room (he may not even have a separate living room right now), he can retire the boombox to the kitchen or his bedroom, take it along to picnics, or whatever. Someday, he may give it away to a young friend or even toss it away when it breaks; the less you spend, the less time it takes to get your money's worth.

Tuning for Travellers

Travellers in Europe can now buy portable radios that help them find the kind of programming they want when they change cities. With a radio that incorporates the new Area Bank feature, you could listen to the news in Hamburg, enplane for Barcelona, and get local news there after just a button-push or two. The system so far caters to only a handful of cities, and not all program choices are button-selectable in every city on the list.

ANTHONY H. CORDESMAN

ROLLS OF THE DICE



If you have ever dreamed of attending a Consumer Electronics Show to hear the best in high-end audio, beware of answered prayers! There are always some great demonstrations, but there are many more demonstrations where loudness is the only measure of merit. Last January in Las Vegas, things were worse than ever. The influence of home theater was heard all over the show, even in the hallowed halls of the high end. As a result, almost every exhibit was 10 dB louder than it should have been, a situation aggravated by the fact that home theater requires a subwoofer. It was not only the year of the "loud," it was the year of the "boom."

There were, however, some excellent sound demonstrations, many interesting new components, and

some impressive advances in recordings. Three demonstration systems were particularly impressive, and each of them included new speakers designed to test the limits of what technology can achieve in a home system. I couldn't identify all of the analog and digital sources in these systems, but Mobile Fidelity Sound Lab had a great system using Nelson Pass' Aleph electronics and Apogee Studio Grands to demonstrate their new LPs, mastered with Mobile Fidelity Sound Lab's ANADISQ system. Arnie Nudell

**HIGH-END MAKERS
ARE DEVOTING EQUAL
EFFORT TO ADVANCES
IN TRANSISTOR AND
TUBE ELECTRONICS.**

and Paul McGowan of Genesis demonstrated their new Genesis II speaker using their Stealth electronics, and Cary Christie at Infinity demonstrated his new Epsilon speaker system using Mark Levinson and Audio Research electronics.

Although the loudspeakers in these systems were expensive even by the standards of the high end, there were also some excellent and affordable high-end speakers. John Bau's new Spica TC-60 and Jim Thiel's Thiel 1.5 sounded strikingly good under show conditions. Digitally corrected speakers from Meridian and Quadrature produced very promising sound. I had not previously been impressed by the sound of "digital" speakers, but these manufacturers showed that this technique can combine flat power response with excellent transient performance, imaging, and musically natural transparency.

It is harder to single out specific electronics in terms of sound quality and features. Show conditions only hint at what most digital and analog sources, preamps, and amplifiers can do, and many displays were static. However, virtually every manufacturer of digital equipment had an improved digital-to-analog converter, many had new CD transports, and several demonstrated new jitter-reduction devices. Both Audio Alchemy and Theta Digital displayed relatively low-cost devices to reduce the jitter that older CD transports feed to a D/A converter.

The use of electronics to connect a CD transport and D/A converter may sound like gilding the lily, but a brief trial of Audio Alchemy's Datastream processor indicates you can use it with components that have either Toslink or standard coaxial digital connectors to achieve much of the

Photograph: David Hamsley

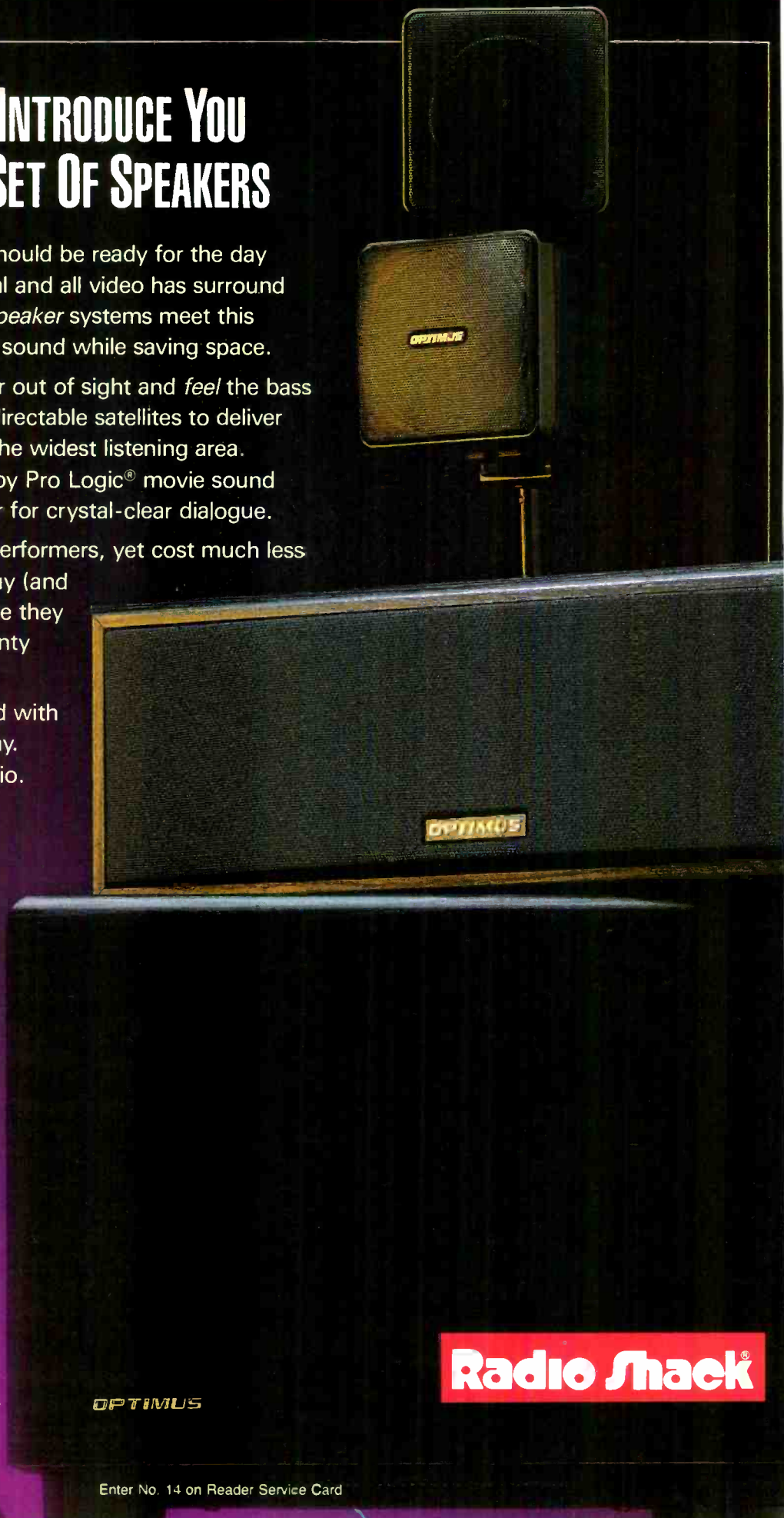
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sound quality normally associated with the use of AT&T or AES/EBU connections. The differences are not that subtle.

Analog Productions, AudioQuest, Chesky, Mobile Fidelity, Reference Recordings, Sheffield, and Wilson Audio introduced some notably superior recordings. It is impossible to mention all of their new reference discs in this space, but Mobile Fidelity used a new analog-to-digital converter designed by Mike Moffat of Theta Digital to remaster a Muddy Waters recording (UCCD 593) that seems certain to become a classic. Reference Recordings played advanced copies of one of their new CDs, *Pomp & Pipes* (RR-58CD), that not only was exceptionally clean and musical but may well become the ultimate demonstration disc for deep bass.

For analog fans, refinements were apparent in most of the analog equipment on display. Graham introduced an improved version of its tonearm, and VPI introduced a new and more affordable version of its reference turntable, the TNT Jr. Both Sheffield Lab and Mobile Fidelity introduced new LPs, including some superb jazz and blues recordings. Analog Productions, AudioQuest, Chesky, and Reference Recordings also introduced new records—many on heavy vinyl. Some preliminary listening to the new Sheffield LPs by Pat Coil (TLP-31 and TLP-34) and to Mobile Fidelity test pressings reinforced my belief that the sound quality of the best analog recordings still rivals or surpasses that of the best digital.

The only manufacturer claiming a breakthrough in preamplifiers or amplifiers was Carver, which introduced new power amplifier circuitry called Lightstar. Many manufacturers demonstrating such equipment, however, had at least one new amp or preamp, and quite a number introduced units with advanced remote controls. It was also clear that high-end manufacturers are devoting as much effort to advances in tube electronics as to advances in transistors.

One of the more interesting developments in tubes was the introduction of several exceptionally sweet and transparent but very low-power triode amplifiers. (Where are horn speakers now that we really need their efficiency?) Quicksilver displayed a budget tube amp, the Great Little

Amp, at \$1,195 that indicates affordable tube amps offer a great deal of promise. At the other end of the spectrum, Mark Levinson was displaying the chassis for a very high-power, basic amplifier that may become the mother of all reference amplifiers—this transistor unit was massive and had fuses as big as some output tubes.

The key undercurrent in this year's show was the rapid growth of home theater and the implications of this for the high end. High-end opinion on this issue seemed to



split into three camps—the indifferent, the threatened, and the hopeful. The indifferent camp feels that the high end can go its own way in splendid isolation. The threatened camp believes that consumers and dealers are shifting rapidly to expensive audio/video components, and that this means a further rapid shrinkage in the volume of high-end sales and the conversion of much of the media, both audio and audio/visual, to surround sound and additional digital processing at considerable cost to sound quality.

The hopeful camp, of which I happen to be a member, feels that a major shift in the market to focus on audio/video is inevitable, but that it could help high-end audio as well as hurt it. Market economics are clearly driving many mid-fi and high-end dealers to emphasize audio/video. Yet home theater is likely to produce broader popular interest in sound quality and high-quality audio reproduction. It is also likely to lead more consumers toward high-end sound *if* audio and audio/video remain compatible and *if* home theater equipment allows the buyer to steadily upgrade the quality of musical reproduction.

A few demonstrations were reassuring. Cello, Meridian, and VMPS not only demonstrated real music but did so at musically natural volumes. Counterpoint also

provided some good demonstrations of music—although its demo helped reinforce a personal aversion to the soundtrack of *Bram Stoker's Dracula* that has become almost as serious as my dislike of the soundtrack of *Top Gun*.

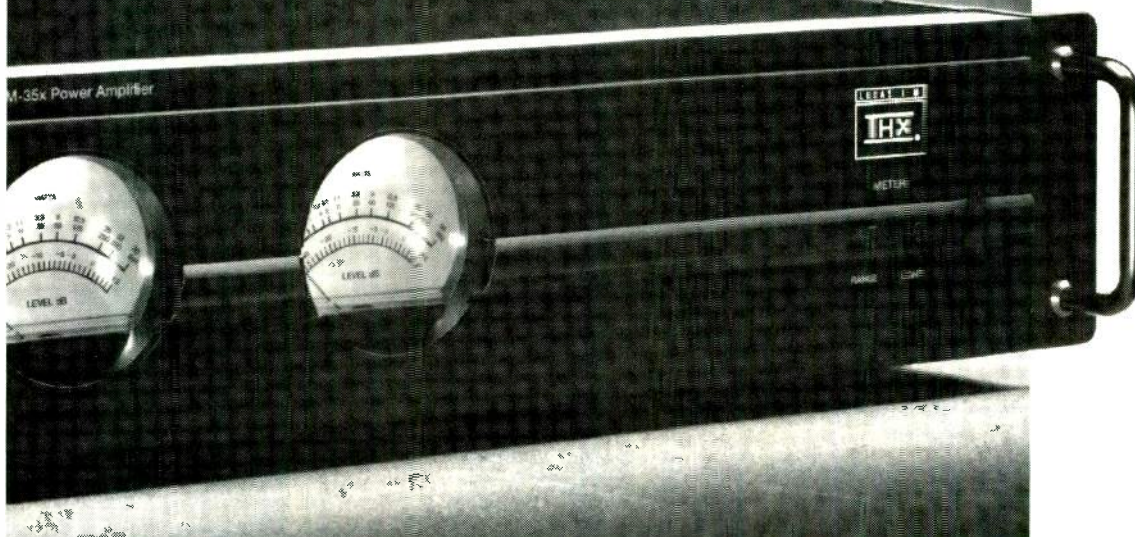
Widespread debates over the impact of THX were intensified by the announcement that Dolby's AC-3 system had been accepted as the tentative standard for HDTV. The AC-3 system not only adds surround sound to television, it also offers six discrete channels with the ability to provide fully discrete left and right rear-channel information. If television goes to six-channel sound, the likelihood of multichannel becoming the norm will increase even further.

Further, Dolby Labs announced that it has formed a new company, the Core Group, to record CDs using the standard Dolby process (call 1-800-241-4115 for information). The two initial recordings, while unlikely to make audiophiles rush out to convert their systems, are at least as good in handling multichannel music as the best of the four-track LPs I can remember from the brief days of "quadraphrenia."

All these developments are unsettling, but more is involved than the issue of the number of channels. The argument over which system to use and how to configure it also involves major debates about the required type of rear-channel speakers and the frequency range and dispersion of the center- and front-channel speakers. There is further debate about the risk of introducing phase distortion, data compression, and multichannel sampling techniques that can lose or alter a great deal of the original signal.

Phase distortion was an issue that few of those advocating multichannel systems wanted to address. Further, the debate over data compression is not simply about how to fit six channels of information onto LaserDiscs or AC-3 television broadcasts. There is an equally important debate over how this data compression will interact with other forms of compression in the recording and playback process, with the introduction of satellite and cable TV systems using additional and different sampling and compression systems, and with the effect of converting the six-channel AC-3 output into two channels for

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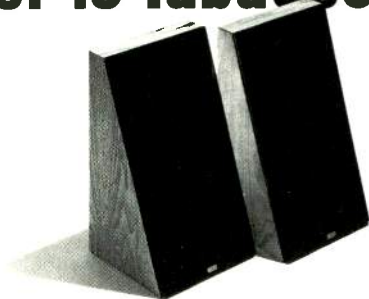
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home recording. None of the standards set for any of these processes seem more than "acceptable," and daisy-chaining random combinations has the potential to produce some very grim results.

If you then add the digital signal processing built into many home theater electronics to simulate concert halls, rock concerts, or jazz clubs—most of which sounds cheap, hard, and nasty—and random amounts of digital delay, you have the potential for a final output that bears only passing resemblance to the original recording. Music is likely to suffer badly.

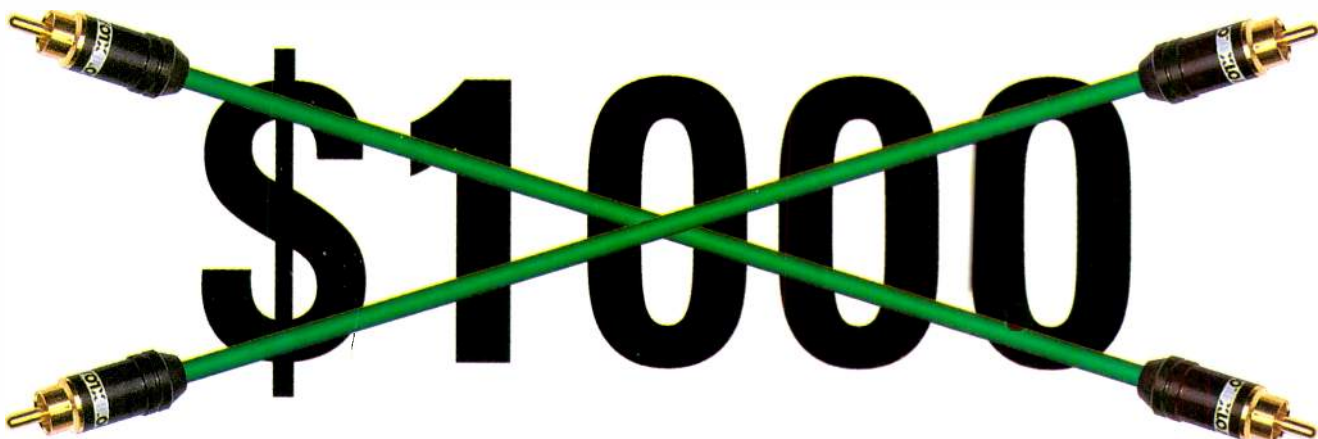
This may seem like an argument for the pessimists, but it may really be an argument against indifference. It is clear that the evolution of the sound part of audio/video is much too important to be left to designers whose overwhelming focus is movies, TV, and the "information highway." The audio community needs to speak up and aggressively challenge each new step in ways that encourage superior fidelity and sound quality. Most of the people I

**THE SOUND PART OF A/V
IS TOO IMPORTANT
TO BE LEFT TO DESIGNERS
WHO FOCUS ON VIDEO.**

met in the professional audio/video community seemed receptive to such input but unlikely to borrow trouble if those consumers who care about sound and music remain silent.

It's clear that the rise of home theater and multichannel signal processing is even more of a culture shock than the conversions from mono to stereo, tube to transistor, or LP to CD. Yet I've also heard at least two control centers with simple and very clean multichannel stereo processors (the Adcom GTP-600 tuner/preamp and Proceed PAV THX preamp) which show that you may be able to get the best of both worlds. I'm not giving up my reference stereo components, but it is clear that a multichannel home theater system can be very musical. Stay tuned to the next decade. It should be very interesting! A

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S P E A K E R

measurements

V

PHOTO: PITO COLLAS



S psycho-acoustic data

the current controversy about loudspeaker cables is not new, although in previous years the arguments were somewhat different. In the '50s and '60s, the arguments had to do with the d.c. resistance of the speaker cable (and of chokes in the crossover network, which typically have more d.c. resistance than the cable); it was claimed this resistance interfered with the amplifier's control of the speaker. The low output impedance of a good amplifier brakes the speaker voice-coil after the signal has stopped, and excessive resistance between the amplifier and speaker would impede this damping action. The solution to this supposed problem was to eliminate the crossover network by using separate amplifiers for each component of the speaker system, and to use short, heavy speaker cables.

Interest in the damp system faded, although it has been renewed recently. One reason for the loss of interest was that articles were published—including mine in 1957 in *Audica* [1]—showing that the fraction of an ohm inserted by the cable and crossover network between the amplifier and speaker had

EDGAR VILLCHUR

TABLE I—High-frequency losses, in dB, of the best cable designed specifically for loudspeakers, and of a relatively inexpensive ribbon cable for digital data transmission, compared to the losses of #18 zip cord. Loss data from Davis [2], difference data at 20 feet extrapolated.

Best Speaker Cable, 10 Ft.		#18 Zip Cord, 10 Ft.		Difference, 10 Ft.		Difference, 20 Ft.	
10 kHz	20 kHz	10 kHz	20 kHz	10 kHz	20 kHz	10 kHz	20 kHz
-0.3 dB	-0.9 dB	-0.5 dB	-1.45 dB	-0.2 dB	-0.55 dB	-0.4 dB	-1.1 dB

Best Ribbon Cable, 10 Ft.		#18 Zip Cord, 10 Ft.		Difference, 10 Ft.		Difference, 20 Ft.	
10 kHz	20 kHz	10 kHz	20 kHz	10 kHz	20 kHz	10 kHz	20 kHz
-0.25 dB	-0.8 dB	-0.5 dB	-1.45 dB	-0.25 dB	-0.65 dB	-0.5 dB	-1.3 dB

TABLE II—Just noticeable differences, in dB, for unmasked pure tones.

	1 to 4 kHz	10 kHz	16 kHz
Average jnd	1.72 dB	2.12 dB	3.05 dB
Minimum jnd	0.51 dB	0.47 dB	1.01 dB

no significant effect on speaker damping, which was controlled by the total mechanical, acoustical, and electrical resistance in the rest of the system. The d.c. resistance of the voice-coil of a typical 8-ohm speaker, for example, is about 6 ohms, 23 times the resistance of 20 feet of #18 zip cord for the two legs of the speaker cable, and this resistance has exactly the same effect on the damping of the system as the resistance of a 460-foot cable of #18 zip cord. Another reason interest in the biamp system faded was that no one was able to demonstrate an audible difference between that system and a standard one.

Fred E. Davis swept away some of the cobwebs of the current debate about speaker cables last year. He made rigorous measurements of the total frequency response of an amplifier/cable/speaker system with different cables, from the exotic and expensive to #18 zip cord [2]. The present article

Edgar Villchur developed the acoustic suspension woofer and the dome tweeter; these designs were first described in his disclosure articles in Audio in October 1954 and October 1958. The AR-3 speaker, which embodies both designs, is on permanent exhibition at the Smithsonian Institution. Villchur is president of the Foundation for Hearing Aid Research, a nonprofit research organization, and a vice president of RDL Acoustics, a manufacturer of loudspeakers.

examines whether we can expect the differences in frequency response measured by Davis to be audible. Davis' data is compared to data in the psychoacoustic literature on just noticeable differences (jnd's) for intensity in the frequency range in which there were response differences between the different cables.

The Davis Measurements

Davis plotted total system response between 30 Hz and 20 kHz with each of 12 cables, and with two amplifiers and two speakers. There were no measurable differences in the response of any of the systems at low frequencies, confirming that cable resistance does not affect speaker damping.

Table I shows Davis' data for high-frequency losses caused by different cables in the speaker/amplifier combination that exhibited the greatest cable effect. The first column shows the losses, in dB, at 10 and 20 kHz of the system with the two best cables (those which produced the least high-frequency loss). One of the cables was designed specifically for loudspeakers and the other for transmitting digital data. The second column shows the losses of the system with #18 zip cord. The third column shows the increase in loss for a 10-foot length of #18 zip cord; losses below 10 kHz are not shown because the increases were less than 0.2 dB. It is of interest that the best of the 12 cables was a relatively inexpensive

(\$4.00/foot) ribbon cable designed for digital interconnections, and that two of the exotic speaker cables measured by Davis, not represented in Table I, showed a greater loss at 20 kHz than the #18 zip cord. The Davis measurements were made with 10 feet of speaker cable, but since it is not unusual to place loudspeakers 20 feet from the amplifier, the fourth column of Table I shows response differences for 20-foot cables.

The difference in system response created by substituting 20 feet of #18 zip cord for 20 feet of the best speaker cable is a loss of 1.1 dB at 20 kHz and of 0.4 dB at 10 kHz. When the #18 zip cord is compared with the best ribbon cable, the difference at 20 kHz becomes 1.3 dB.

Psychoacoustic Studies of Just Noticeable Differences

A study of jnd's (also called difference limits, or DL's) for the intensity of pure tones was done in 1987 by Florentine et al. [3]. Their findings were consistent with the findings of previous studies, but they extended the frequency range of their study to 16 kHz. The size of the reported jnd's varied with frequency, level, and the individual subject.

The smallest detectable differences were in the octaves between 1 and 4 kHz: The jnd in this frequency range, averaged over all subjects and intensity levels (using the standard of 70.7% certainty of response), was 1.72 dB. The lowest jnd in the group—for the most sensitive subject at the intensity level that gave the subject's lowest jnd—was 0.51 dB. The subjects were between 20 and 24 years old and had normal hearing to 20 kHz.

The smallest detectable difference at 10 kHz, averaged over subjects and intensity levels as above, was 2.12 dB, and the smallest individual jnd was 0.47 dB. The smallest average detectable difference at 16 kHz was 3.05 dB, and the smallest individual jnd was 1.31 dB. These subject responses are represented in Table II.

The values in Table II are for single pure tones in quiet. In music the frequency range between 10 and 20 kHz contains many partials at a given moment; further, the sound in this range is strongly masked by the sound below 10 kHz, a phenomenon called the upward spread of masking.

Although studies in the psychoacoustic literature do not match these musical conditions exactly, they are close enough to provide guidelines. It can be predicted that at a given level the jnd for a band of sound between 10 and 20 kHz will be decreased from that for a pure tone, but that this jnd will be increased by a significantly greater amount by the masking effect of musical sound below 10 kHz [4].

Davis said that the differences in frequency response he measured between cables were "at the threshold of audibility." The data on just noticeable differences cited here predicts that the differences in frequency response created by different cables are almost always below the threshold of audibility. To predict from indirect data, of course, is not the same as to prove from direct experimental data: Controlled, double-blind tests with groups of listeners, actual cables, and varied musical program material—in which everything remains the same except the cable—will show whether the differences between cables are audible to most listeners, to a favored few, or to none.

Lipshitz and Vanderkooy [5] estimated that when level differences occurred over a wide band, they were detectable down to 0.2 dB. Lipshitz agreed with me (in a phone conversation) that this figure is not applicable to speaker cables, where the level differences are all in the highest audio octave.

If at least some people can hear differences in frequency response caused by different speaker cables, it would be a trivial design problem to correct the small high-frequency loss by electronic equalization in the amplifier. The cost would also be trivial, but the high-frequency loss could be eliminated entirely, something the best of the cables tested by Davis did not accomplish.

Cable Effects Other Than High-Frequency Loss

Claims have been made that the purity of the copper in the wire affects sound purity; that the cable introduces nonlinear effects; that the cable needs to be "broken in" for several days; that the sound of the system can be improved dramatically by submitting the cable to special field treatments; that keeping the cable away from room surfaces, or tuning the distances between cable and room surfaces, will improve the sound; that cables work better when wired in one direction than the other; that the characteristic impedance of the cable ought to match its termination; that measurements of the cable's d.c. resistance are inaccurate because they do not allow for skin effect at high frequencies, etc.

Skin effect (the increase of resistance with frequency that occurs when the flow of alternating current is concentrated toward the outer surface of

the cable) varies directly with the square root of the frequency and with the cable diameter; the change of resistance under particular conditions can be looked up in engineering handbooks. The d.c. resistance of 20 feet of #18 zip cord is approximately 0.26 ohm; the increase of resistance at 20 kHz because of skin effect is a negligible 0.013 ohm.

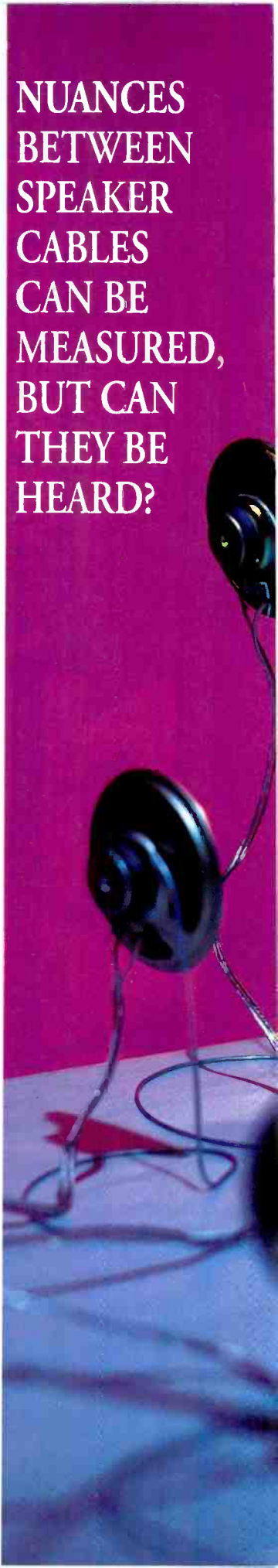
Interest in the characteristic impedance of speaker cable is probably derived from a misleading analogy between speaker cable and TV or FM antenna cable. The analogy is a tempting one because audio wavelengths (in air) are comparable to TV and FM wavelengths, the lengths of the cables are comparable, and we know that TV and FM cable is designed to have a characteristic impedance that matches the antenna to the receiver and avoids signal reflections. What makes the analogy break down is the difference between the speed of sound in air and of the audio signal in the wire, and the difference between audio frequencies and TV or FM frequencies. Audio wavelengths *in the wire* are measured in miles, while the distributed impedance of "300-ohm" TV cable is a fraction of an ohm at audio frequencies. Reflections caused by an impedance mismatch at audio frequencies become a problem only when the cable length is in units of miles rather than feet.

As for the other effects attributed to cables, I will digress a bit. Scientific method allows investigators to form a hypothesis in any way they please, out of a cold assembly of facts, intuition, or a drunken haze. The hypothesis does not need to seem reasonable; it didn't seem reasonable when Newton proposed that things don't fall but are attracted to one another because of their mass. Once the hypothesis is proposed, however, it must be demonstrated rigorously. I have never seen any of the hypotheses about speaker cables listed above put to a controlled test. For those who think some of these hypotheses are likely to hit pay dirt, there is still time. A

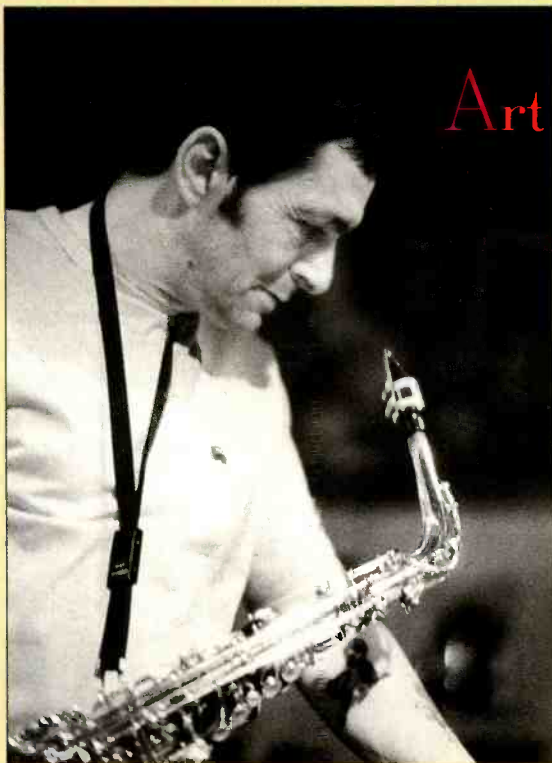
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1. Villchur, E., "Loudspeaker Damping," *Audio*, October 1957.
2. Davis, F. E., "Speaker Cables: Testing for Audibility," *Audio*, July 1993.
3. Florentine, M., S. Buus, and C. R. Mason, "Level Discrimination As a Function of Level for Tones from 0.25 to 16 kHz," *Journal of the Acoustical Society of America*, Vol. 81, No. 5 (May 1987).
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NUANCES
BETWEEN
SPEAKER
CABLES
CAN BE
MEASURED,
BUT CAN
THEY BE
HEARD?



classic **JAZZ** remasters



Art Pepper



Photograph: © Gerry Bahl/Frank Driggs Collection

Dave
Brubeck
Quartet

Joe Morello,
Paul Desmond,
Dave Brubeck,
and Gene Wright.



Photograph: Courtesy Dave Brubeck

Bruce and Jenny Bartlett

What a joy it is to hear old recordings of a favorite musician remastered on CD, especially when the remastering is done so well that you can enjoy the music more than before. A stellar example is the four-CD reissue of Dave Brubeck's recordings from 1946 to 1991, *Time Signatures—A Career Retrospective*, produced by Russell Gloyd and Amy Herot. It's astounding how good some of these 30-year-old recordings

sound! The balance among instruments is just right. Tonally, the cymbals are bright and crisp; acoustic bass sounds full; piano and sax are warm rather than thin. And there's very little tape hiss.

The mastering job was handled by Mark Wilder, a recording engineer with Sony Music Studios. Since the '70s, he's worked at Vanguard Records, PolyGram, and finally Sony. We spoke briefly with him about his work.



Sonny Rollins



Photograph: © David Gahr



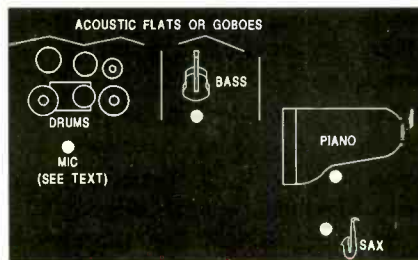
What was your philosophy in remastering the Brubeck tapes, to transfer them as is or to clean them up?

In making the Brubeck compilation, we wanted the CDs to remain true to the original master tapes. Around 1984 to 1987, however, many CDs were remastered with a high-frequency roll-off (treble cut) to reduce tape hiss. That was the philosophy of the time: To make remastered CDs hiss-free. Unfortunately, it was a destructive process.

Dave Brubeck complained about the sound of his early remastered CDs. Fortunately, we've learned a lot about remastering since then. I wanted to give him better treatment than that; I wanted to do it right. Our current philosophy is to adhere to what was on the originals. We don't add equalization or reverb.

How does the sound of those early recordings compare with jazz recordings today?

It's amazing how well recorded the group was back then. The sound is so three-dimensional, bigger than life. Yet it's amazing how little the engineers did to get that sound. They just put one mike a few feet from each instrument, and mixed live to three-track—for left, center, and right. Then they edited the tape and mixed down to two-track.



Early stereo setup for the Dave Brubeck Quartet: see text.

The old stuff sounds better than what we're doing now. We've been going in the wrong direction, sound-wise, for many years.

The layout of the stereo stage was more realistic then, too. Drums were on the left, piano on the right, sax and bass in the middle. It's easy to hear what each musician was playing because they were separated spatially. These days, you hear each instrument in stereo, on top of each other. The drums spread all the way between the speakers, and so does the piano.

What mikes were used?

Columbia was heavy into Neumann M-49 and AKG C-12 mikes back then. Both are large, tube-type condensers. On the Brubeck groups, the engineers used one mike per instrument, and each mike was at a very respectful distance, about 1½ to 3

feet away. I saw a photo of a mike used on sax player Paul Desmond, and the mike is way out—maybe 9 feet up. An average recording engineer seeing this would say, "That looks like a room mike," but you still hear all the air off the reed, and still hear all the tone. They got the placement quickly. Distant miking like this sounds great; I think we overdo close miking.

What was the typical recording and editing procedure in those days?

Recording back then was almost a factory process. They recorded live to three-track in three-hour sessions. Then the tape went to the editor and then to the mixer, who mixed three tracks to two. Little or no equalization was used.

We compared the master tapes with early pressings, and they were very similar. It's amazing how little the mastering engineers did to the sound.

Studio engineers worked so fast back then. They might record Duke Ellington in the morning, Doris Day in the afternoon, and Brubeck the next day. There was only one hour between sessions, and each session had a totally different setup. In spite of the speed of these sessions, you never hear a blown solo or a blown fader move. And there's never a dramatic sound change at an edit point.

Who were the engineers working on the Brubeck sessions?

Fred Plaut and Frank Laico were two of Brubeck's recording engineers. Plaut is a true balance engineer; he's my idol. I don't know how he could pull off what he did in three hours.

Besides Brubeck, another artist whom Plaut recorded was Michael Olatunji, an African drummer. I've never heard drums sound so beautiful in my life. Plaut did a lot of Broadway recordings as well, and he worked so fast—from Friday to Monday on one Broadway show I know of.

Battle of the Remastering Giants

Another set of audiophile reissues features Art Pepper and Sonny Rollins. But these CDs have an interesting twist: They offer a choice of remastering engineer!

In an unusual move, Analogue Productions (which is associated with Acoustic Sounds, the reissue house in Salina, Kansas) released two different CD versions of Art Pepper's '50s classic, *Art Pepper*

The philosophy of the mid-'80s was to make remastered CDs hiss free. It was a destructive process.

Photograph: © David Gahr

Meets The Rhythm Section. One version was mastered by Doug Sax, the other by Bernie Grundman. These are two of the most respected engineers in the business.

Doug Sax masters all of Analogue Productions' reissues, and he does a superb job. So why was Grundman chosen to master an alternative version?

The story begins at the original 1957 recording session done for the Contemporary Records label. Grundman was once an engineer at Contemporary Studios; he knew Pepper's album intimately as a fan and as an LP mastering engineer. Since the album was one of his favorites, Grundman had always wanted to master the LP reissue.

Analogue Productions' president, Chad Kassem, first considered using Grundman when he was recommended by music producer John Koenig. John is the son of Lester Koenig, who produced Pepper's original session.

Kassem had a tough choice. If he gave the job to Grundman, he might insult Sax. But Grundman was a veteran of Contemporary Studios and might do a more faithful transfer. In the end, Kassem decided to release two versions: One mastered by Sax, the other by Grundman. Both transfers were supervised for quality by John Koenig. While Kassem will not reveal which version he prefers, he says that audiophiles can make up their own minds about which sounds better!

From the same company, another reissue with a choice of Sax or Grundman remastering is Sonny Rollins' 1950s jazz classic, *Way Out West*. Both Pepper's and Rollins' reissues are on 24-karat gold-plated, limited-edition Compact Discs, pressed in Japan by Superior. Like Brubeck, Pepper and Rollins play melodic jazz in a quartet format.

Engineer Roy DuNann recorded the original 1957 Rollins sessions at Contemporary's studio in Los Angeles. DuNann used AKG C-12 and Neumann U-47 condenser microphones, which fed an Ampex 350 two-track tape recorder running at 15 ips.

In remastering, Grundman used his own custom electronics in the mastering console and in the Studer tape transport. He chose an Apogee A/D converter with a Harmonia Mundi redithering module. Grundman added reverberation to the dry master tapes using an EMT 250 plate and

Ocean Way's live chamber. In contrast, Sax used a Mastering Labs (TML) console, an MCI tape machine with TML tube electronics, and a custom TML A/D converter. Sax added reverb with a Lexicon 480L.

Is there an audible difference? Which version sounds better? After an evening of intensive listening and quick A/B tests, it's remarkable how similar the two engineers' work sounds. This is not totally surprising however, considering that both engineers were trying to make a perfect copy of the same master tapes. There are the kind of subtle differences, though, that audiophiles love to discern.

Both recordings sound clear, clean, and smooth, with extended highs and lows. Almost no tape hiss is audible at normal listening levels. On the Art Pepper CD, Sax provides a gentle, listenable sound overall. Grundman's work has a more modern sound—crisper, better defined, and closer. Bass is the same in both discs. Cymbals on Sax's CD are slightly sweeter and more effortless, but on Grundman's they are a little crisper and more harsh. The amount of reverberation is the same on both versions. With Sax's job, the reverb on the piano and drums is positioned nearly

DISCOGRAPHY

Dave Brubeck, *Time Signatures—A Career Retrospective*, Columbia/Legacy C4K 52945.

Sonny Rollins, *Way Out West*, Analogue Productions CAPJS 008 (remastered by Sax) and CAPJG C08 (remastered by Grundman).

Art Pepper, *Art Pepper Meets The Rhythm Section*, Analogue Productions CAPJS 010 (remastered by Sax) and CAPJG C10 (remastered by Grundman) from Acoustic Sounds, P.O. Box 2043, Salina, Kans. 67402.

left; with Grundman, the reverb is in the center. Doug Sax put the saxophone reverb half-left, while Bernie Grundman put it farther left.

On the Sonny Rollins disc, the overall sound of Sax's effort is slightly bright; the sound on Grundman's has a better tonal balance (at least on my speakers, Thiel



Photograph: Courtesy Dave Brubeck

Brubeck's early sound is so "3-D," bigger than life, yet the engineers did little to get it.

CS3.5s). Sax gave the bass and saxophone a bit more edge, presence, or definition than Grundman did. Drum clicks and hi-hat cymbals are crisper and more detailed on the Sax version but verge on being too bright or harsh. Grundman gave them a sweeter sound.

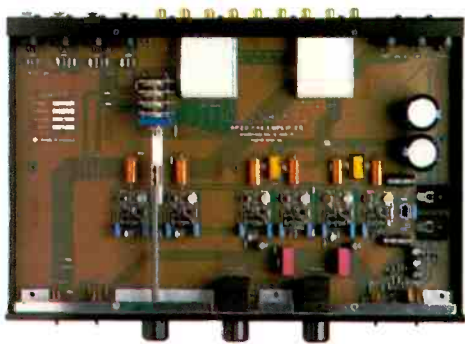
Differences in the stereo spread are quite audible: Sax's is narrower; Grundman's is wider. Sax placed the saxophone reverb half-left, while Grundman put it far left. Sax gave the drum reverb a little spread, but Grundman made it almost mono.

While we didn't find a clear winner, you'll probably find it very interesting to compare the work of these two master mastering engineers for yourself.

Thanks to the careful work of Wilder, Sax, and Grundman, both jazz lovers and audio technophiles can again savor the quality of these excellent recordings.

Authors' Note: The authors gratefully acknowledge Mark Wilder, Joanne Sloane, Iola Brubeck, and Dave Brubeck for their help with the Brubeck portion of this article.

BRYSTON BP20 PREAMP



As audiophile preamplifiers go, the Canadian-made Bryston BP20 is a steal. A suggested retail price of \$1,395 isn't bad for a line-level preamp these days—at least in the company that the BP20 keeps—yet this Bryston bespeaks quality both inside and out. And as we'll see shortly, it acquires itself superbly both on the test bench and in the listening room.

The Bryston BP20 is utterly simple in concept and use. It aims merely to select the program source; provide control of volume, balance, and mode (stereo or mono),

and transfer the result to a power amplifier without altering dynamic range or contributing noise and distortion of its own. The BP20 handles line-level signals exclusively; an internal phono preamp, configured for either moving-magnet or moving-coil cartridges, should be available by the time you read this.

Three rotary controls dominate the front panel: "Source," "Balance," and "Volume." Pairs of small toggle switches lie to the left and right, somewhat lower than the rotary controls. The leftmost chooses "Tape" (monitor) or "Source," and the adjacent one selects "Stereo" or "Mono" operation. The first to the right of the knobs activates partial muting; the one at the far right is "Power." A two-color LED between the latter pair glows red when power is first applied and green when the preamp is stable and has come out of muting.

Some dyed-in-the-wool purists may object to use of a balance control rather than separate left-and-right volume adjustments, but I think that's carrying purism to a ridiculous extreme; a balance control—

especially one as fine as Bryston's—is infinitely easier to use and more accurate than individual volume adjustments for each channel. I had a quibble about the panel markings on my test unit, which was from the original production run. The toggle switches operated "backwards"; i.e., when the toggles pointed down to the original's "Monitor," "Mono," and "Mute" markings, the monitor was off, the system was in stereo, and the sound was on. In each case, "down" meant "function off." By popular demand ("more like torchlight storming of the factory gates," says Bryston) this was changed after the first 50 units were made. Current units are labelled above and below the toggles, and the toggles point to their actual settings.

Input and output connectors are arrayed along the back panel in reverse of the usual order, i.e., with the inputs toward the left rear (viewing the preamp from the front) and the outputs on the right. This was probably done to minimize the signal path within the preamp, which makes good sense. There are two sets of balanced inputs ("Bal 1" and "Bal 2") followed by five pairs of unbalanced inputs ("Video," "CD," "Tuner," "AUX 1," and "AUX 2"). The BP20's balanced inputs use gold-plated

SPECS

Rated THD: Less than 0.0025% at 3 V out.

Frequency Response: 20 Hz to 20 kHz, ± 0.05 dB.

S/N, 20 Hz to 20 kHz: Unbalanced input, 100 dB re: 500 mV; balanced input, 103 dB re: 1 V.

Maximum Output: Unbalanced output, 15 V; balanced output, 30 V.

Sensitivity: 500 mV.

Dimensions: 19 in. W x 1³/₄ in. H x 11 in. D (48.3 cm x 4.4 cm x 28 cm).

Weight: 8 lbs. (3.6 kg).

Price: \$1,395.

Company Address: U.S., Brystonvermont, R.F.D. 4, Berlin, Montpelier, Vt. 05602; Canada, Bryston Ltd., 57 Westmore Dr., Rexdale, Ont. M9V 3Y6.

For literature, circle No. 90



XLR connectors with standard pinout: Pin 1 for ground, pin 2 for the noninverting input, and pin 3 for the inverting input. The unbalanced inputs employ gold-plated RCA jacks.

Two pairs of unbalanced outputs (again via gold-plated RCA jacks) and one set of balanced outputs (via gold-plated XLR connectors) are provided. The tape inputs and outputs are unbalanced (via gold-plated RCA jacks) and are situated between the final unbalanced inputs and the unbalanced outputs. The tape inputs provide a sixth unbalanced input—selected by the “Tape/Source”

**THE BRYSTON BP20
IS A STEAL, A PREAMP
THAT BESPEAKS QUALITY
BOTH INSIDE AND OUT.**

toggle—or can be used to loop the signal through an external processor. At the far right of the back panel (viewed from the front) is a five-pin DIN jack that carries a.c. power to the BP20 from its external transformer.

Circuitry

Internal layout and construction are superb. With the exception of the unbalanced jacks, all components mount directly to one main board that extends across the entire width and depth of the chassis. The unbalanced jacks are mounted on a second board, with the signals conveyed to and from the main board by two ribbon cables. There’s no point-to-point wiring in the BP20 whatsoever.

The power-supply circuitry (except for the line transformer, which is external) lies at the far right of the main board and uses a discrete bridge rectifier (four 1N4004 diodes) that feed a pair of 4,700- μ F/50-V electrolytics. Two IC regulators (a 7824 for the positive supply and a 7924 for the negative), mounted on individual heat-sinks, supply ± 24 V to the electronics. A pair of 1,000- μ F/25-V electrolytics serves as the final filter. A fifth diode provides a separate power source for the power-on muting system, which disconnects all output lines (via a relay) until the system has stabilized.

Six identical operational amplifiers are used in the signal path, three per channel. Each is fabricated from discrete components (eight transistors and sundry passive devices) laid out in individual compact “blocks” on the main board. This arrangement would seem to provide the best of both worlds: The short signal path and predictable parasitic elements characteristic of an IC op-amp and the ability to hand-select individual components that discrete designs provide.

Perhaps of paramount importance is the ability to engineer the discrete blocks with active devices that offer both low noise and high output swing. (Most IC op-amps work from ± 15 V supplies; the BP20’s electronics operates from ± 24 V.)

The input amplifier operates in balanced mode when connected to either of the balanced inputs; when switched to any of the unbalanced feeds, the inverting input is referenced to ground. In the unit I tested, this amplifier operated with a voltage gain of 6 dB; its output was padded down by a like amount before the signal passed to the “To Tape” jacks, so the voltage gain from an unbalanced input to the tape outputs was precisely unity (0 dB). In current units, the buffer amp has unity gain, so no pad is needed. The tape loop comes after the input stage and is unbalanced, like the output from the first-stage amp. After being routed through the “Mono,” “Mute,” “Balance,” and “Volume” controls, the signal is amplified by a second noninverting stage and then handed directly to the unbalanced output connector and to pin 2 of the balanced XLR output. A unity-gain inverting stage derives the other half of the balanced output and feeds pin 3 of the XLR.

Measurements

Circuit topology of the Bryston BP20 is utterly classic and provides unbalanced

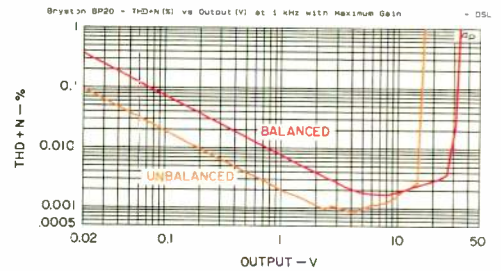


Fig. 1—THD + N vs. output at 1 kHz.

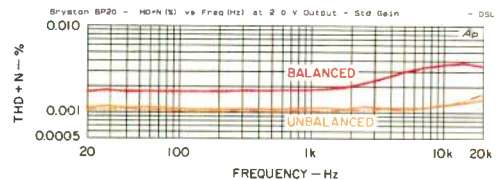


Fig. 2—THD + N vs. frequency.

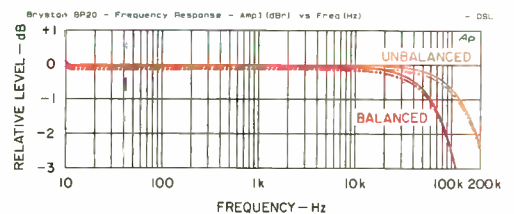


Fig. 3—Frequency response.

and transformerless balanced inputs and outputs. The circuitry works as well as it does—despite employing a gain stage prior to the volume control—because of the high power-supply voltages from which the BP20’s operational amplifiers work. You can pump upwards of 10 V rms into any input without fear of front-end overload, and that level should be more than adequate for any conceivable audiophile application.

Output drive capability is equally impressive (see Fig. 1); I measured a level of 16.1 V rms at the unbalanced output (and twice that at the balanced output) before distortion increased noticeably. At a typical output level of 2 V rms, THD + N is no greater than 0.0016% across the audio band when using the unbalanced inputs and outputs (Fig. 2). From a balanced

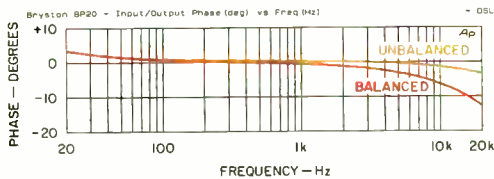


Fig. 4—Input/output phase linearity.

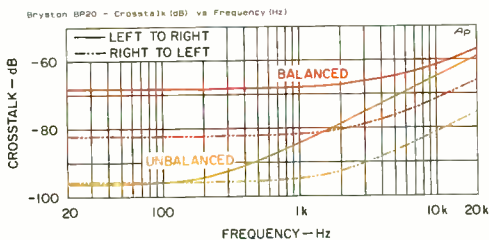


Fig. 5—Interchannel crosstalk.

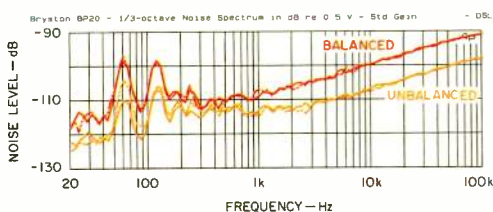


Fig. 6—Noise spectrum.

input to the balanced output, THD + N remains under 0.002% from 20 Hz to 2 kHz and hits a maximum of 0.0037% at 16 kHz. The higher level of THD + N in this configuration is probably due to the additional amplifiers employed in the balanced mode and to the fact that, with the volume control set for standard gain in the unbalanced mode, the levels through the balanced arrangement are higher than they would be from the unbalanced output. In either configuration, however, THD + N is nothing to be concerned about.

For the record, in testing the Bryston BP20, I decided to make all “unbalanced” measurements from an unbalanced input (the CD input in this case, but all are the same) to the unbalanced output. For the “balanced” measurements, I used the “Bal 1” input (“Bal 2” is identical) and the balanced output and used the same volume

setting I employed for unbalanced measurements. As a result, system gain for the balanced measurements was 6 dB greater than that used for the unbalanced measurements. Note also that in Figs. 2, 3, and 6, solid curves are for the left channel and dashed curves for the right.

Frequency response (Fig. 3) is within +0, -0.03 dB across the audio band with unbalanced operation and +0, -0.12 dB with balanced operation. Again, the difference comes from the additional electronics needed for balanced drive. The -0.25 dB point occurs at 60 kHz, unbalanced (30 kHz, balanced), and response is down 1 dB at 125 kHz and 62 kHz for unbalanced and balanced operation, respectively. Minor performance differences between the two operational modes can also be detected in input/output phase linearity (Fig. 4), crosstalk (Fig. 5), and the noise spectrum (Fig. 6). In each case, unbalanced operation produces the superior numbers, but not by much.

Does this mean you should forgo balanced operation and use the BP20’s unbalanced connections? Not really. The benefits of balanced operation rarely show up on the bench but can be a major factor in the real world. When properly implemented, balanced connections eliminate ground loops and reject interference pick-up on the connecting cables. This can be important when running long lines between a source component and the preamp—or between the preamp and the power amp—especially when operating in an electrically noisy environment. (This is one reason why professional installations use balanced connections.) If you’re using a balanced source and a power amp with a balanced input, by all means try balanced wiring. You’re likely to find it superior when the runs get lengthy.

With the balance control at its detent, channel gains matched within ± 0.045 dB in both operational modes. To my mind, that certainly validates Bryston’s decision to use a balance control rather than having separate volume controls for each channel. The A-weighted noise was -98.6 dB re: 0.5

V (the EIA/IHF reference output) from the CD input and was -91.7 dB from the “Bal 1” input. Either way, available dynamic range (referenced to maximum output level) comes out at a stunning 122 dB. Input and output impedances (49 kilohms and approximately 50 or 100 ohms, depending on the output tested) suggest that there will be no problems interfacing the BP20 with other equipment. Ditto when it comes



to maximum gain (11.2 dB unbalanced, 17.2 dB balanced).

The muting switch dropped the signal level by just over 20 dB. Channel separation, although setting no new records, should be adequate. I measured 84.1 dB at 1 kHz with unbalanced connections and 67.6 dB at that frequency with balanced operation in the worse (left-to-right) direction. Overall separation is better than 61 dB from 20 Hz to 10 kHz in either mode.

Use and Listening Tests

The Bryston BP20’s sound quality was stunning—utterly effortless and transparent with every type of music I tried. This was true whether using the balanced inputs (fed from my Sansui CD-X711 CD player) or the unbalanced inputs (fed from my Sony DAT deck or from the Sansui CD player). I try to minimize wire runs in my system (I used no more than a half meter from the source to the Bryston preamp and no more than a meter from the BP20 to my Apt 1 power amp), so the benefits of balanced connections were not as apparent as they might be in a more far-flung setup. But with either connection, the BP20 delivered uncommonly detailed reproduction, which I especially appreciated in the high treble and during quiet passages. There just doesn’t seem to be a “noise floor” under this preamp or a high-level ceiling over it. Believe me, that’s high praise indeed!

Edward J. Foster



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SIGNET SL280ex SPEAKER



The SL280ex is the top of Signet's speaker line, which the company classifies as "affordable high end." Signet is a sister company of Design Acoustics, both divisions of Audio Potentials, which was recently formed by Jon Kelly, former president of Audio-Technica. Kelly bought these well-known brands from Audio-Technica and will continue to market and develop the lines. Signet, started in the mid-'70s as a line of high-end phono cartridges from Audio-Technica, now is mainly in the speaker business.

The Signet SL280ex is a floor-standing, two-way, vented system using an 8-inch woofer and a 1-inch aluminum dome tweeter. The drivers are at the top front of the enclosure, and are centered horizontally, with the tweeter above the woofer. The front baffle of the SL280ex is designed to be as narrow as possible in order to minimize diffraction. The spacing between the woofer and the tweeter has also been minimized by overlapping the woofer frame and tweeter mounting plate. Minimizing the interdriver spacing improves

vertical coverage in the crossover's frequency range.

Two ports, 7 $\frac{3}{4}$ inches long and with a 2 $\frac{1}{2}$ -inch inner diameter, are on the rear of the enclosure, about one-third up from the bottom. Input connections are accomplished with a bi-wirable pair of five-way binding posts mounted on the upper rear of the enclosure. Gold-plated jumper straps are provided for normal, single wiring.

The cabinet of the SL280ex is constructed of medium-density fiberboard (MDF) and strengthened with three internal shelf braces at harmonically unrelated locations. These braces rigidly connect the front baffle, sides, and back of the cabinet to maximize the cabinet's structural integrity and minimize wall vibrations. The manufacturer states that these braces also reduce internal standing waves by acting as partitions. The front baffle is a substantial 1 inch thick, and the remaining walls are $\frac{3}{4}$ -inch thick. Cabinet walls are lined with open-cell acoustic foam, and additional polyfill fiber is used for supplemental internal damping.

SPECS

Type: Two-way, tower-style, third-order alignment, vented-box system.

Drivers: 8-in. cone woofer and 1-in. Ferrofluid-cooled, soft-aluminum dome tweeter.

Frequency Response: 30 Hz to 25 kHz.

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

Crossover Frequency: 2.5 kHz.

Impedance: 8 ohms nominal.

Recommended Amplifier Power: 20 to 200 watts per channel.

Dimensions: 34 $\frac{3}{4}$ in. H x 9 $\frac{3}{4}$ in. W x 12 $\frac{3}{4}$ in. D (88.3 cm x 24.8 cm x 32.4 cm).

Weight: 45 lbs. (20.5 kg) each.

Price: \$900 per pair in black vinyl, \$1,300 in hand-rubbed walnut veneer.

Company Address: 1920 Enterprise Pkwy., Twinsburg, Ohio 44087.

For literature, circle No. 91

The drivers of the SL280ex are specially built for Signet by the Norwegian manufacturer SEAS. Similar SEAS drivers are found in much more expensive high-end systems. The 8-inch long-throw woofer has a large ferrite magnet attached to a cast magnesium basket, and contains a polypropylene cone with butyl-rubber surround. The SL280ex utilizes a third-order,

TO MINIMIZE LOBING, SIGNET OVERLAPPED THE WOOFER FRAME AND TWEETER MOUNT.

vented-box alignment with the box resonance placed below the system's 3-dB down point. Signet states that this alignment has superior transient response when compared to a conventional, fourth-order, vented design (where the box tuning coincides with the 3-dB down frequency), and has more bass extension than a typical acoustic suspension (closed-box) system.

The tweeter has an aluminum dome suspended by a soft polyamide surround assembly. The rigid aluminum dome assures that mechanical breakup resonances are above the audible frequency range. The magnetic voice-coil gap is filled with Ferrofluid to improve power handling and damping. Shaped acoustic foam is used around the tweeter on the cabinet's front, to minimize diffraction and absorb energy that would "otherwise cause time-delayed, re-radiated acoustic output," according to Signet.

The crossover of the SL280ex is built on a p.c. board mounted behind the woofer and is attached to the input terminal plate. Heavy-gauge air-core inductors, high-quality polypropylene capacitors, and ceramic power resistors are used. The crossover contains six components (two resistors, two inductors, and two capacitors), making up second-order networks that drive both the woofer and the tweeter.

Internal wiring uses 14-gauge, multi-strand, oxygen-free copper cabling. The wires are attached to the drivers with clips. The input terminals are gold-plated and permit the use of large spades and double

bananas as well as heavy-gauge bare wire.

The grille consists of a 1/2-inch MDF frame wrapped in cloth. It mounts to the front of the cabinet via plastic projections that mate with rubber receptacles on the cabinet's front.

Measurements

Figure 1 displays the anechoic frequency response of the SL280ex with and without grille. Measurements were taken at a distance of 2 meters and a height midway between the woofer and tweeter (level with the top of the woofer frame), and with an input of 5.66 V rms. Referenced back to 1 meter, the curves are tenth-octave smoothed.

Without the grille, the response is reasonably flat and fits a tight, 3.5-dB window between 55 Hz and 20 kHz. Between 130 Hz and 15 kHz, the response fits a much tighter, 2-dB window. Significant details include a slight high-frequency roll-off above 13 kHz, a minor dip at 4.5 kHz, and a slight (2-dB) shelf between 60 and 180 Hz. Below 45 Hz, the response rolls off at about 18 dB/octave and is down about 10 dB at 30 Hz, referenced to the 100-Hz level. Above 20 kHz (response not shown), a sharp (high-Q) dip at 23.9 kHz (76 dB with a Q of 38) was exhibited, followed by a sharp, high-level peak at 25.8 kHz (101 dB with a Q of 27). These anomalies, caused by tweeter dome resonances, are above the range of human hearing.

Averaged over the range from 250 Hz to 4 kHz, the SL280ex's sensitivity measured 87.8 dB, essentially equal to Signet's 88-dB rating. The right and left units matched within a close ± 0.75 dB over the range from 100 Hz to 20 kHz.

With the grille on, the response shows some roughness above 2 kHz, with maximum deviations of 1 to 3 dB at 3, 5.1, and 16 kHz.

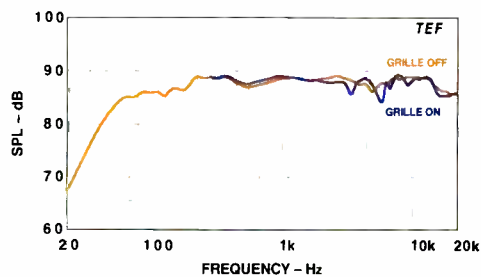


Fig. 1—One-meter, on-axis frequency response.

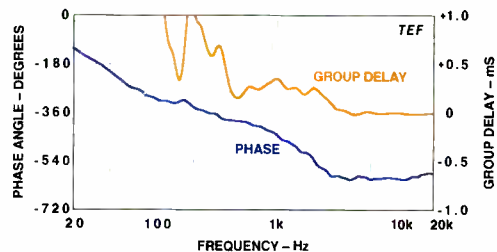


Fig. 2—On-axis phase response and group delay.

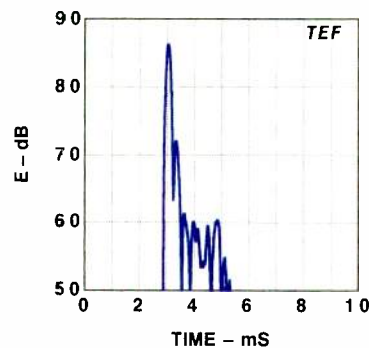


Fig. 3—Energy/time response.

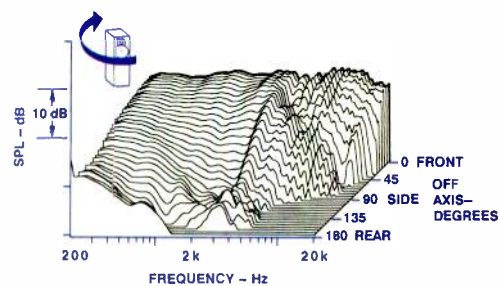


Fig. 4—Horizontal off-axis frequency responses.

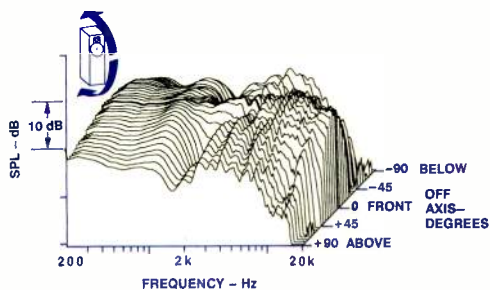


Fig. 5—Vertical off-axis frequency responses.

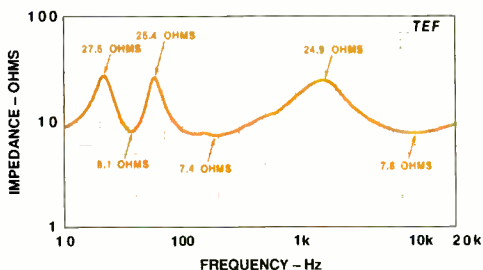


Fig. 6—Impedance.

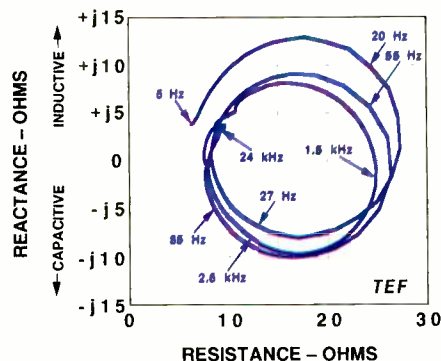


Fig. 7—Complex impedance.

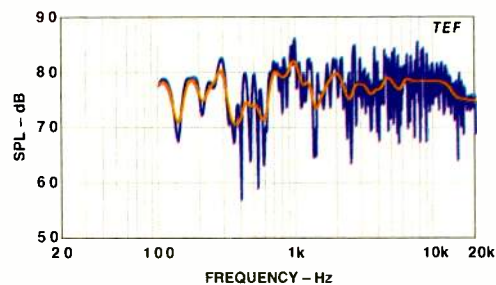


Fig. 8—Three-meter room response.

The phase and group-delay responses of the SL280ex are shown in Fig. 2. The phase curve is fairly well behaved but lags about 170° between 1 and 10 kHz. This rotation is due to a combination of crossover design and the offset between the acoustic centers of the midrange and tweeter. The group-delay curve indicates that the woofer's midrange output lags the tweeter by about 0.25 mS. Peaks and dips in the group-delay curve correspond to minimum-phase undulations in the phase curve.

Figure 3 shows the SL280ex's energy/time response with the grille off. The test parameters accentuate the response from 1 to 10 kHz, which includes the upper crossover region. The main arrival, at 3 mS, is very compact but is followed by a narrow peak that is 15 dB down and delayed about 0.22 mS. Delayed responses are evident but are more than 27 dB down from the main peak.

Figure 4 presents the horizontal "3-D" off-axis responses; the bold curve at the rear of the graph is the on-axis response. Because the on-axis response ripples are carried over into the off-axis curves, the horizontal coverage is excellent and the off-axis response is uniform. Significant narrowing of response occurs only above 16 kHz.

The vertical "3-D" off-axis curves are shown in Fig. 5. The SL280ex was measured at 2 meters, with the center of rotation around a point midway between the tweeter and woofer. The bold curve in the center of the graph (front to rear) is on axis. An examination of the ±15° curves in the crossover region reveals that the response is quite flat on axis but has slightly better response for upward than downward angles. This implies a slight amount of lobing but also indicates that the vertical directional lobe is aimed somewhat upward, an ideal situation for seated and standing listeners.

Figure 6 shows the SL280ex's impedance from 10 Hz to 20 kHz. Be-

low 100 Hz, the dip and two peaks, which is characteristic of the vented enclosure, are seen. The dip at 38 Hz indicates the tuning frequency of the vented box. The minimum impedance, 7.4 ohms at 190 Hz, is fairly high, while the maximum impedance is 27.5 ohms at 21 Hz.

Between 20 Hz and 20 kHz, the impedance has a max/min variation of about 3.7 to 1 (27.5 divided by 7.4). Cable series resistance should be limited to a maximum of about 0.12 ohm to keep cable-drop effects from causing response peaks and dips greater than 0.1 dB. For a typical run of about 10 feet, wire as small as 18 gauge could be used.

Figure 7 shows the complex impedance of the SL280ex, from 5 Hz to 24 kHz. The three main loops coincide with the impedance-magnitude peaks at 21 Hz, 58 Hz, and 1.7 kHz seen in Fig. 6. Figure 7 reveals a minor anomaly, of unknown origin, at

**THE THICK WALLS
AND INTERNAL BRACING
REDUCE VIBRATION
AND ADD STRUCTURAL
INTEGRITY.**

the complex impedance values of about 10 ohms resistance (on the horizontal axis) and 5 ohms inductive reactance (on the vertical). This occurs at about 560 Hz.

Above 20 Hz, the impedance phase angle (not shown) reached a maximum of +32° (inductive) at 49 Hz and a minimum of -37° (capacitive) at 72 Hz. The high minimum impedance and moderate phase angles of the SL280ex will not be a problem for any amplifier, even with a pair of these systems in parallel.

No significant cabinet resonances were evident when the speaker was subjected to a high-level, low-frequency sine-wave sweep. Only slight side-wall activity was noted in the range from 290 to 310 Hz. Maximum reduction in cone excursion occurred at 38 Hz, the box resonance of the vented system. The reduction in cone displacement at this frequency was very good: Covering the ports showed that they normally reduce cone motion by two-thirds.

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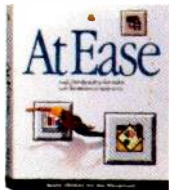
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In a perfect vented-box system, with very low box losses, the loading would essentially stop the motion of the woofer at box resonance. At this frequency, most of the sound would be radiated by the port.

The woofer's maximum displacement was a robust 0.6 inch, peak to peak, before distortion became excessive. The woofer did not generate any objectionable noises

**THE SIGNETS SOUNDED
QUITE CLEAN AND
EFFORTLESS THROUGHOUT
THE BASS RANGE.**

when subjected to higher input power. Throughout the low-frequency range, at high sine-wave input levels, the SL280ex sounded quite clean and effortless. Only at frequencies significantly below the 38-Hz box resonance did distortion rise to unacceptable levels with high drive power. Some outward dynamic offset was evident in the range from 60 to 100 Hz at levels above 14 V rms.

The 3-meter room responses of the SL280ex, with both raw and sixth-octave smoothed data, is shown in Fig. 8. The speaker was in the right-hand stereo position, aimed at the listening position. The test microphone was at ear height (36 inches), at the listener's position on the sofa. The system was driven with a swept sine-wave signal of 2.83 V rms (corresponding to 1 watt into the rated 8-ohm load). The direct sound and 13 mS of the room's reverberation are included.

Because the mike height was about 6 inches above the SL280ex's axis, an additional curve was taken with the system aimed upwards about 3° to cancel the height difference. This adjustment is easy to do with the speaker's supplied spikes. The resultant curve (not shown) was essentially identical to the curve in Fig. 8.

Overall, the averaged curve of Fig. 8 fits within a fairly tight, 11.5-dB window. Above 1 kHz, it fits a much tighter window of 6.5 dB. Above 7 kHz, the averaged curve follows closely the on-axis response of Fig. 1 and exhibits the same high-frequency roll-off.

Charts of harmonic distortion versus power for the musical notes of E_1 (41.2 Hz) and A_2 (110 Hz) are shown in Figs. 9 and 10. The power levels were computed using the rated impedance of 8 ohms, with a maximum of 50 watts (20 V rms) set as the upper limit. Initially, a level of 100 watts, 28.3 V rms, was selected for these tests, because the speaker's 100-watt output at 41.2 Hz sounded quite clean. Unfortunately, at 440 Hz this power level caused a voice-coil rub in the woofer, presumably due to overheating (which caused mechanical distortion of the coil). After damaging two woofers, I had to request replacement woofers to complete my tests. I subsequently lowered the power to 50 watts, which resulted in no apparent damage to the SL280ex after this test. Realize that 100 watts of sine-wave power at 440 Hz is quite a brutal test and does not represent typical program material. Signet says that the field failure rate of the woofers has been very low.

The E_1 (41.2-Hz) harmonic data is shown in Fig. 9. The distortion is low, only 4.7% second harmonic and 5.1% third. Higher harmonics are 1.1% or less. Even at 100 watts (data not shown), the distortion was less than 7.3%. The distortion in this test was quite low because the test frequency approximately coincides with the tuning frequency of the Signet's vented box, where the displacement of the woofer is minimized. With a 50-watt input at 41.2 Hz, the system generates a fairly loud 98 dB at 1 meter.

Figure 10 shows the A_2 (110-Hz) harmonic data. The only significant distortion at this frequency consists of a low 1.7% second harmonic and 2.1% third at full power. Higher harmonics are negligible. For an input of 50 watts at 110 Hz, the system generates a very usable 103 dB at 1 meter. The A_4 (440-Hz) distortion data (not shown) consisted of 4.1% second

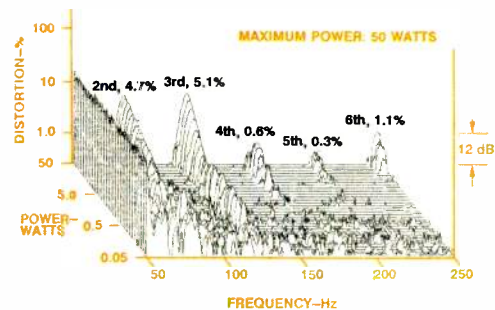


Fig. 9—Harmonic distortion for E_1 (41.2 Hz).

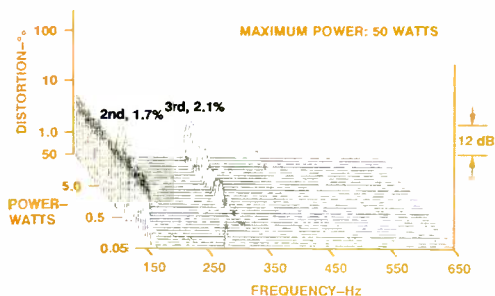


Fig. 10—Harmonic distortion for A_2 (110 Hz).

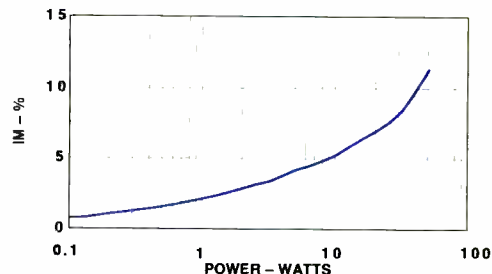


Fig. 11—IM distortion for A_4 (440 Hz) and E_1 (41.2 Hz).

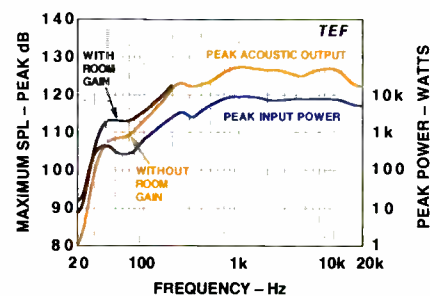


Fig. 12—Maximum peak input power and sound output.

harmonic at full power. Higher harmonics were negligible.

Figure 11 displays the IM distortion created by tones of 440 Hz (A_4) and 41.2 Hz (E_1) of equal power. The IM distortion rises to the moderate level of only 12% at full power. The 8-inch woofer of the SL280ex handles both frequencies of this test.

Figure 12 shows the short-term peak-power input and output capabilities of the SL280ex, as a function of frequency, measured using a 6.5-cycle, third-octave tone burst. The peak input power was calculated by assuming that the measured peak voltage was applied across the speaker's rated 8-ohm impedance.

The peak input power starts at 13 watts at 20 Hz, rises rapidly to 400 watts at the 40-Hz box resonance, drops somewhat to 230 watts at 63 Hz, and then—after a minor peak and dip at 250 and 315 Hz—rises to a maximum of 7.5 kW at 1 kHz. Above 1 kHz, the power stays at about 7 kW and then falls somewhat at 20 kHz. Between 50 and 100 Hz, significant dynamic offset was exhibited, giving the cone a net outward movement. Some harshness was evident around 315 Hz, which resulted in a lowering of the maximum input.

The peak acoustic output of the SL280ex rises rapidly, reaching 100 dB at 32 Hz, 110 dB at 80 Hz, and 120 dB at 180 Hz. With room gain, 110 dB is reached at a respectably low frequency of 35 Hz. Above 200 Hz, the maximum SPL rises into the range from 122 to 127 dB. This makes Signet's SL280ex quite suitable for reproducing the peak levels of live music when it's used with an amplifier having enough peak power capability.

Use and Listening Tests

The SL280ex's owner's manual is short but instructive and covers such topics as unpacking, placement, connections (including bi-wiring), power handling, care and maintenance, and troubleshooting. Signet recommends placing the SL280ex systems at least 2 feet from each of the side walls and no closer than 6 inches from the rear wall. The company also suggests angling the speakers in, to adjust the soundstage width and reduce reflections from the side walls.

The speakers were supplied to me in the less-expensive, black vinyl, version. They

were quite attractive, and finish and fit were excellent.

My equipment lineup included my usual Krell amplification, Onkyo and Rotel CD players, B & W 801 Matrix Series 3 speakers, and Straight Wire Maestro cabling. I placed the Signets at the positions I normally use and angled them in toward me. Most listening was done without the grilles.

First listening revealed a smooth and well-balanced sound that competed very well with that of my reference B & W speakers. The one significant feature was a somewhat elevated treble that added an extra sheen to string instruments and was most noticeable on vocals. Bass response

**THE SL280ex IS
AN OPTIMUM MIX
OF NEAR HIGH-END
PERFORMANCE, VALUE,
AND GOOD LOOKS.**

was not quite as extended or robust as with my reference speakers but was nevertheless quite satisfying, smooth, and powerful down to about 35 Hz.

On Faith Hill's hit country album *Take Me As I Am* (Warner Bros. 45389), the Signets were quite dynamic and involving, but they were somewhat more forward sounding than my reference speakers on Hill's vocals. The B & W systems sounded moderately distant by comparison. Although they were brighter, the Signets did not exhibit any vocal harshness. In the bass through upper mids, the Signets were quite close to the B & Ws in level, smoothness, and balance.

On more energetic rock material, such as Queen's *Greatest Hits* (Hollywood 61265-2), the Signets did not exhibit the hard-kicking low end of the 801s but did play loud and clean. On material whose bass content extended no lower than 35 Hz, the bass capabilities of the SL280ex and the 801 were quite similar. The Signets handled pipe-organ pedal notes quite impressively, considering the size of their woofers. The added brightness of the Signets made Queen vocals sound somewhat harsh, though some of that harshness

was presumably due to the dirtiness of the recording. On more traditional material, such as big-band jazz, the Signets did an extremely good job on the brass section. The moderate forward sound of the Signets fit such material very well.

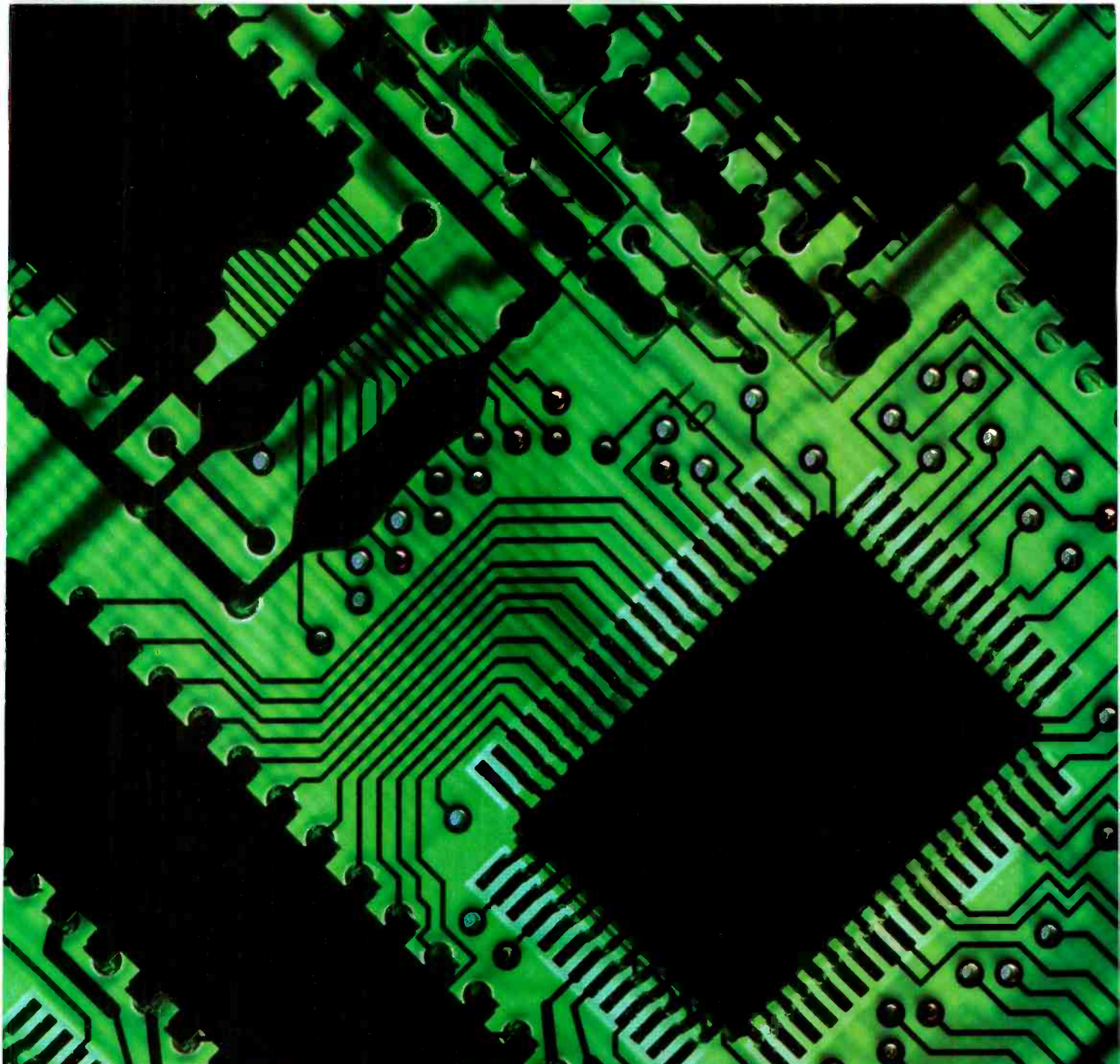
On pink noise, the Signets exhibited a smooth, well balanced response but were somewhat treble-heavy compared to the B & Ws (whose high-frequency response is not actually flat but slopes downward slightly). No appreciable tonality was evident on pink noise, which speaks for the SL280ex's smoothness. The Signet passed the stand-up/sit-down test with flying colors, exhibiting hardly any change in sound. The SL280ex's level and sensitivity were essentially the same as the reference speaker's.

On third-octave, band-limited pink noise, the Signets' clean output at 40 Hz and above was very good. Usable output extended down to the third-octave band centered on 31 Hz. Vent turbulence and wind noise were quite low when the SL280ex was driven at or near the 38-Hz box resonance. The output at 20 and 25 Hz was not usable, but the speaker overloaded quite gracefully at these lower bands.

The Signets' imaging and soundstage capability is first-rate. The SL280ex's handling of Maro's percussion and moving images on *Asimetrix*, a World Music jazz CD recorded and produced in Venezuela (Dorian Discovery DIS-80118), was quite impressive. On classical instrumentals, the Signets were always very listenable, reproducing hall acoustics and room ambience very faithfully. On another new Dorian Recordings release, *Joseph Haydn: Symphonies for the Esterházy Court*, performed on period instruments (Symphonies Nos. 35, 23, and 42, Dorian DOR-90191), the Signets were so engaging, and I enjoyed the music so much, that I listened to the whole CD in one sitting!

All told, I much enjoyed having the Signets in my system. Considering their relatively low cost compared to some other high-end loudspeakers, their price belies their excellent performance and quality. Signet has done its homework in creating a system that offers an optimum combination of balanced and near high-end performance, good looks, and value.

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PANASONIC CQ-DC1 CAR TUNER/ DCC PLAYER

CQ-DC1 with a bidirectional search system. Although still far slower than the "instant access" possible with such optical media as Compact Disc and MiniDisc, it is far faster than the fast forward and fast rewind of earlier DCC tape units. The faster search applies to DCCs but not to analog tapes. A "Scan" button advances the tape from one selection to the next and plays the first 11 seconds of each selection;



Panasonic (or more properly, Matsushita Electric Corporation, Panasonic's parent) has been a staunch supporter of the Digital Compact Cassette format ever since it was developed by Philips. It is no surprise, therefore, that one of the first car DCC players should come from Panasonic. Available since the summer of 1993, the CQ-DC1 DCC player/tuner takes full advantage of DCC's features. Therefore, of course, it can play analog cassettes as well as the newer digital tapes.

The CQ-DC1 will also allow you to enjoy your CD collection in two ways: It can control up to two six-disc changers and, naturally, can play DCC tapes made from CDs (provided you have a home DCC recorder). A 12-character LCD shows such information as album title, song title, and artist name, which are frequently encoded on prerecorded DCC tapes. The display can also show track time, total album time, and current time and date.

One of my earliest objections to DCC was its slow track access. Happily, Panasonic has managed to speed up the process in the

"Skip" speeds the tape drive through long blank stretches, often found at the ends of a cassette.

SPECS

Tuner Section

FM Usable Sensitivity: 13.2 dBf.
AM Usable Sensitivity: 25 μ V.
50-dB Quieting Sensitivity: 15.2 dBf.
S/N, Mono: 70 dB.
Frequency Response: 30 Hz to 15 kHz, ± 3 dB.
Capture Ratio: 1.5 dB.
Alternate-Channel Selectivity: 75 dB.
Channel Separation: 42 dB at 1 kHz.
Image Rejection: 65 dB.
I.f. Rejection: 100 dB.

Tape Player Section

DCC Frequency Response: At 44.1-kHz sampling rate, 20 Hz to 20 kHz, ± 1 dB; at 48-kHz sampling rate, 20 Hz to 22 kHz, ± 1 dB; at 32-kHz sampling rate, 20 Hz to 14.5 kHz, ± 1 dB.
DCC S/N: 90 dB.
DCC THD: 0.01%.
Analog Tape Frequency Response: With normal tape (Type I), 30 Hz to 17 kHz,

± 3 dB; with metal tape (Type IV), 30 Hz to 20 kHz, ± 3 dB.

Analog Tape Wow and Flutter: 0.08% wtd. rms.
Analog Tape S/N: Without noise reduction, 52 dB; with Dolby B NR, 62 dB.

General Specifications

Power Requirements: 12 V d.c. (11 to 16 V); less than 1.2 amperes.
Maximum Output Level/Impedance: 1.4 V rms/600 ohms.
Tone-Control Action: Bass, ± 12 dB at 100 Hz; treble, ± 12 dB at 10 kHz.
Dimensions, Main Unit: 7 in. W x 1 $\frac{5}{16}$ in. H x 6 $\frac{5}{16}$ in. D (17.8 cm x 4.9 cm x 16 cm).
Weight, Main Unit: 3 lbs., 12 oz. (1.7 kg).
Price: \$1,100.
Company Address: One Panasonic Way, Secaucus, N.J. 07094.
For literature, circle No. 92





The CQ-DC1 can automatically distinguish between digital and analog cassettes and, when playing an analog tape, between normal and high-bias tapes. Dolby B noise reduction can be switched in when needed.

When controlling CD changers, the CQ-DC1 offers bidirectional disc and track selection plus repeat and random play. Disc titles can be entered and displayed.

Among the tuner section's special features are an FM Optimizer (automatic high-blend on difficult signals) and Impulse Noise Quieting, which improve signal quality under adverse listening conditions. Eighteen FM and six AM station

**THE CQ-DC1 LETS YOU
EXTEND DCC'S TITLING
FEATURE TO CD's
AND RADIO STATIONS.**

frequencies can be preset, and a preset scan feature will pause at each one momentarily.

The wireless remote control can handle all CD changer functions mentioned earlier as well as such tape functions as fast forward, rewind, search, repeat, and side change. The remote can also tune the radio; select a band; adjust bass, treble, balance, and front/rear fader; increase or decrease volume, and trigger a clock display.

The CQ-DC1 has dual front and rear preamp outputs plus two analog inputs (CD changer and auxiliary), an attenuator/loudness switch, and a circuit that automatically mutes the sound when certain Panasonic mobile phones are in use. The faceplate can be removed, rendering the unit useless.

Control Layout

The controls you'll use most are two large rockers at the far left, one for volume (and for bass, treble, balance, and fader, depending on how many times the small

round "Select" button is pressed) and the other for moving forward and backward through the radio dial or through tape or CD tracks. Stacked at the far right are buttons for choosing the "AUX" or CD changer inputs as well as "Tape" and "Tuner." At the far right is the button that swings the front panel down for loading and ejecting tapes and to remove the faceplate. Set between these rockers is a button that attenuates the sound (or adds loudness compensation if you hold it down for a few seconds). The button next to it is for scanning or automatically programming the radio preset buttons, again depending on how long it's pressed; it's also used to change tape sides or, in CD mode, for disc selection. Three rocker switches along the lower edge take the place of the usual six pushbuttons for station presets and various tape or CD functions. To the right of the third rocker are a "Band" button (also used for switching between CD changers, if two are connected) and the power switch. Three FM band settings and one AM band allow a total of 24 FM and AM station frequencies to be entered in memory.

The three rockers are used in tape mode for track "Scan," Dolby NR selection (for analog tapes only), tape program search ("TPS"), blank "Skip," and repeat. With a CD changer, the rockers can actuate "Scan," select "Random" and repeat play, and recall the disc title to the display. A highly visible display occupies most of the front panel. The four round buttons just to its right are used to select display modes, reset the clock or actuate the FM Optimizer, recall the clock display, or store two bass/treble settings. If the display-mode button is held down for 2 seconds, the tuning rocker can be used to enter characters for names of radio stations and for CD titles. The CD title (and scan) features work only with some Panasonic CD changers.

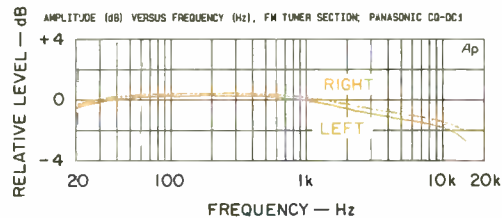


Fig. 1—FM frequency response.

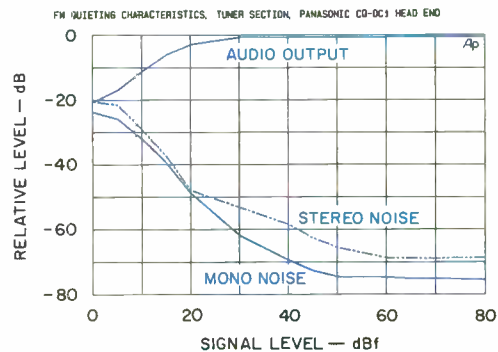


Fig. 2—FM quieting characteristics.

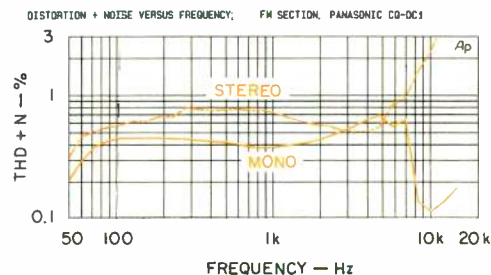


Fig. 3—THD + N vs. frequency, FM section.

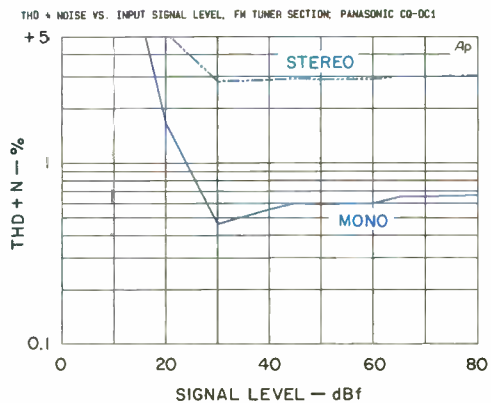


Fig. 4—THD + N vs. FM signal input level.

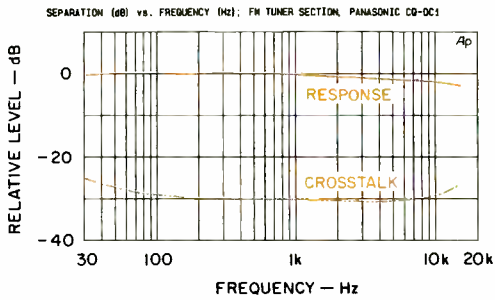


Fig. 5—FM frequency response and channel separation.

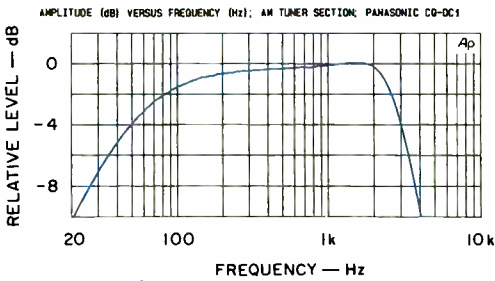


Fig. 6—AM frequency response.

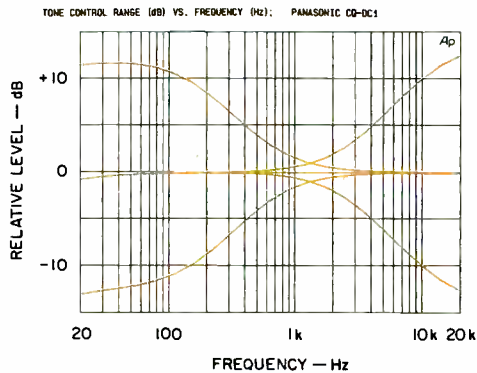


Fig. 7—Tone-control range.

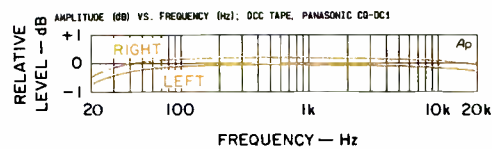


Fig. 8—DCC frequency response.

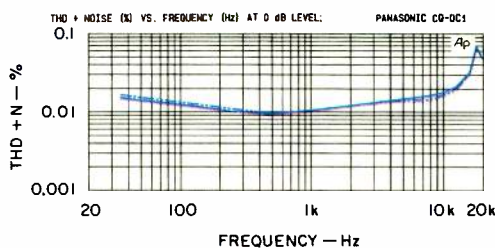


Fig. 9—THD + N vs. frequency, DCC section.

Measurements

The FM frequency response of the CQ-DC1 is shown in Fig. 1. Response is down about 2 dB at 15 kHz, which can easily be compensated for with the treble control. Attaining 50-dB quieting (Fig. 2) requires an input signal of a bit over 20 dBf, while maximum quieting measures 75 dB in mono and 68.5 dB in stereo.

For my sample unit, it was necessary to slightly retune my FM generator between mono and stereo measurements to obtain lowest distortion readings for each mode. This stems from slight misalignment of the i.f. or the ratio-detector stages of the FM section and will not necessarily be true of other samples. Figure 3 shows how THD + N varies as a function of modulating frequency for mono and stereo reception, with the generator slightly retuned between the mono and stereo plots. Under these conditions, THD + N at 1 kHz is 0.4% in mono and 0.75% in stereo.

You can also see, in Fig. 4, how THD + N varies with input signal strength when the generator is not retuned for each measurement. Mono usable sensitivity is 17.5 dBf, while stereo THD + N hovers around the 3% mark—even with strong signals—because of the improper alignment mentioned above. Channel separation is approximately 30 dB over much of the audio frequency range (Fig. 5).

Figure 6 shows the tuner's frequency response in AM mode. The -6 dB points are reached at 36 Hz and 3.4 kHz, which is a bit better than average compared to most AM tuner sections I have tested recently.

The total boost and cut range of the bass and treble controls is shown in Fig. 7. The results conform closely to the specifications.

When DCC was first announced, I prepared a DCC test tape from the CBS CD-1 test disc I normally use when checking out CD players. Using that tape, I mea-

sured playback frequency response of the digital tape section. It is virtually flat over the entire audio frequency range (Fig. 8).

Figure 9 shows how THD + N varies with frequency for playback of the same DCC test tape. At 1 kHz, THD + N is just over 0.01%, increasing slightly at the bass and treble extremes. These results correlate well with those shown in Fig. 10, a plot of THD + N versus signal amplitude. Referred to maximum level, THD + N over much of the recording-level range measures around -83 dB, corresponding to about 0.007%. Only at maximum record level does THD + N rise to slightly above -80 dB, roughly corresponding to the 0.01% mentioned in connection with Fig. 9.

**FREQUENCY RESPONSE
FOR DCC PLAYBACK
WAS VIRTUALLY FLAT
OVER THE AUDIO RANGE.**

Linearity of the DCC player section was excellent (Fig. 11). With undithered signals, deviation from perfect linearity did not exceed -0.6 dB even at a signal level of -90 dB.

The A-weighted S/N for DCC tapes was 86.6 dB for the left channel and 86.2 dB for the right channel. Figure 12A shows the distribution of residual noise as a function of frequency, using a third-octave bandpass filter to make the measurements. The EIAJ dynamic range for the DCC section was 88.4 dB for the left channel and 89.7 dB for the right.

To check the CQ-DC1's performance with analog tapes, I played back a "no-signal" Type I (normal-bias) tape on which only bias current had been recorded. Results with and without Dolby B noise reduction are shown in Fig. 12B. The A-weighted S/N with these analog tapes measured 52 and 49.3 dB for the left- and right-channel outputs, respectively, without noise reduction and 60.9 and 57.7 dB with Dolby B NR.

As expected, wow and flutter for DCC tapes was below the limits of my test equipment. With analog tapes, wow and flutter is approximately 0.067% wtd. rms, as shown in Fig. 13. The weighted peak

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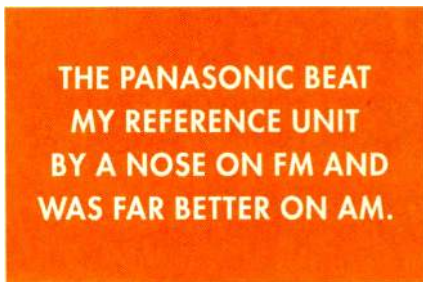
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wow and flutter for the same period ranges between 0.09% and 0.135%.

The real test of the performance and sound quality of a unit like the Panasonic CQ-DC1 can only be made on the road. I leave that to our Technical Editor, Ivan Berger. I felt that the versatility and number of features in this combination DCC player/tuner, while admirable and certainly desirable, make the learning process a bit longer than would otherwise be the case. The English section of the bilingual owner's



manual (which includes 12 pages of installation instructions as well as operating instructions) runs to a total of 45 pages. At one point, the manual warns against trying to input titles while driving. I would extend that warning to several other control functions and would suggest you make as many adjustments as possible before setting out on a drive. *Leonard Feldman*

Behind the Wheel

Considering how few DCC tapes are available, I wouldn't counsel buying a CQ-DC1 unless you have a DCC recorder—but would definitely recommend its purchase if you do. The Panasonic's ergonomics are good, its tuner is good, its sound is good—and, as far as I know, there's only one other DCC unit (the Philips DCC-811, which I haven't seen) to compete with it.

The DCC section performed just as I'd expected. Whether parked or on the road, I could hear no difference between DCCs played on the CQ-DC1 and CDs of the same recordings played on my Alpine reference unit. Track-to-track access was as accurate as with other digital media and not quite as slow as with analog cassette. I'd have preferred to have the rocker default to forward and reverse track selection instead of fast forward and rewind. I liked having tapes load with their graphics facing me, not upside down like MiniDiscs.

Being able to read album, track, and artist info from the display was useful,

though I'd have preferred to see more than the first 12 characters of each. (I found nothing in the manual on how to scroll further.) I would have liked two-way cycling through display modes (you go directly from track title to artist name, but getting back to the next track title takes five button pushes), but it was nice being able to program the display with CD titles or names of radio stations.

The display was easy to read by night, less so by day. It is biased to be most readable from the driver's side, as it should be. (Are displays for Japan and Britain biased the other way?) When the CQ-DC1 is off, only the "Pwr" button glows, since there's no other way to turn the unit on. When it is on, all buttons are easy to find, and the names of all but the four small buttons next to the display are illuminated.

By varying size, shape, and placement of the controls and grouping them logically, Panasonic made it easy for me to tell which was which without looking. (My wife found it less easy.) The attenuator can be actuated from the panel, not just from the remote, and volume ramps up when the attenuator is released, instead of coming on with a bang. All in all, very good ergonomics.

You can't remove the faceplate unless the unit is turned on. That discourages theft of the faceplate if you leave it in place when you lock the car, but it may also discourage *you* from removing the panel when you should. In any case, I never quite got used to this. With the panel off, a red light blinks to warn off thieves.

The Panasonic's tuner noticeably outperformed my Alpine's in the lower third of the FM band, but the Alpine marginally outperformed it in the upper two-thirds—a tie, with the edge to the Panasonic. On AM, the Panasonic was the winner, hands down.

All in all, an excellent unit. If it played CDs or if I was into DCCs, I would want it. Badly. *Ivan Berger*

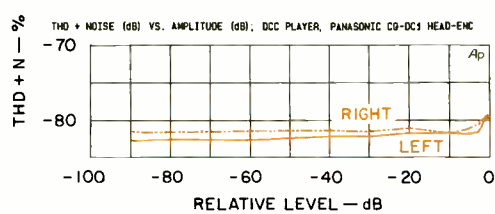


Fig. 10—THD + N vs. DCC signal level.

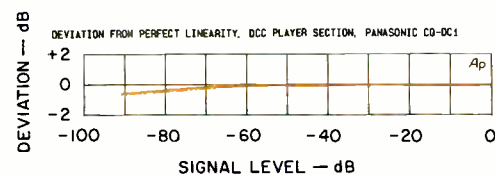
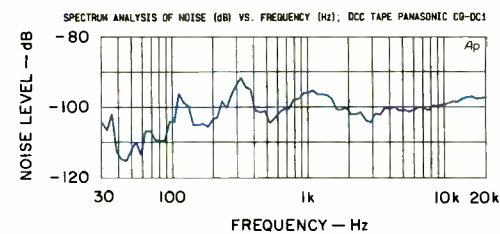
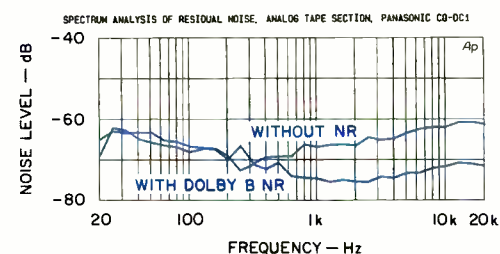


Fig. 11—Deviation from linearity, DCC section.



A



B

Fig. 12—Residual noise spectra for DCC (A) and Type I (normal-bias) analog cassette (B).

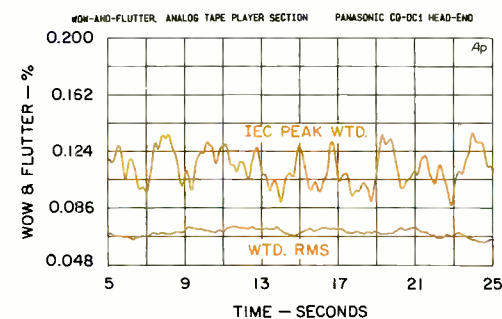
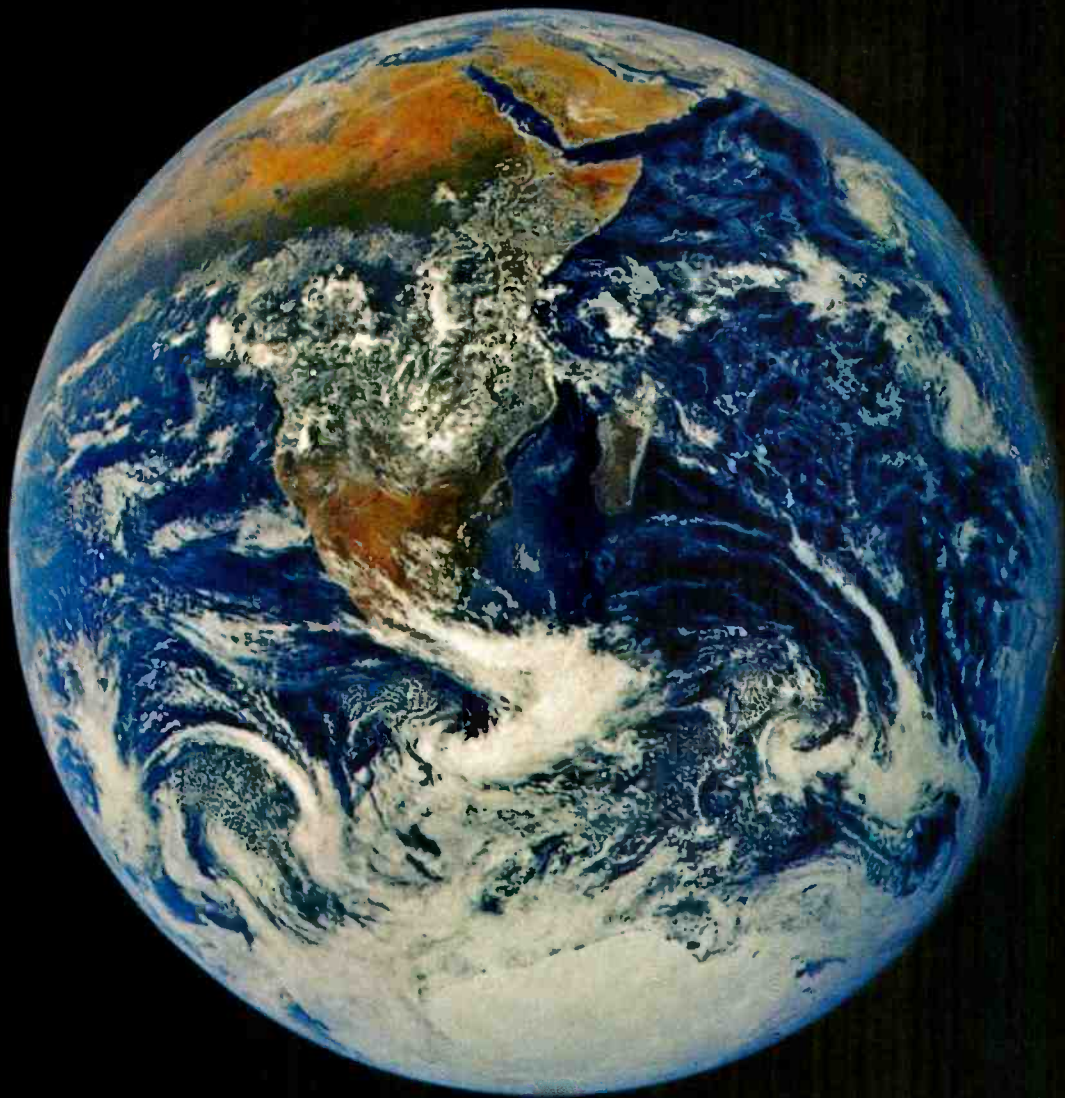


Fig. 13—Wow and flutter for analog cassettes.



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The Apogee Acoustics Studio Grands are the most successful combination of an electrostatic or ribbon wide-range driver with a cone subwoofer that I have yet encountered. They give you all the advantages of a full-range ribbon speaker (superior in many ways to the Divas that I have used as a refer-

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ence in the past), plus the large dynamic range of the best cone systems for bass that is as deep, powerful, quick, and detailed as I have yet been able to get in my home from any separate subwoofer systems. At \$12,600 to \$15,600, they can be considered either very expensive or a bargain in comparison to Apogee Acoustics' \$86,000 flagship Grands.

The Studio Grand is made up of two full-

range Studio Grand Ribbon Arrays (which act as line sources) placed on top of two matching subwoofers, plus a dedicated electronic crossover. You'll need two channels of high-power amplification for each side, which means two stereo or four mono amplifiers. I would suggest at least 100 watts per amplifier, and 200 or more will not go amiss if you really want full orchestral or rock music at performance levels.

The Studio Grand Ribbon Arrays weigh 95 pounds each, measure 55 inches high, 28½ inches wide, and 3 inches deep, and cost \$7,500 per pair separately. Mounting them on the

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AFTER MOMENT
OF SPECIAL CLARITY.**

subwoofers raises the total height to 6 feet. The arrays use separate midrange/tweeter and woofer ribbons whose response extends from below 30 Hz to 20 kHz; the ribbons cross over at 6 dB/octave, gradually increasing to 12 dB, and they can be bi-wired. Peak sound level is rated at 112 dB, and the nominal impedance is 3 ohms. A switch allows a small upward or downward adjustment in the relative levels of the midrange/treble and bass ribbons.

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follow "sine-wave" paths rather than straight paths, which stiffens the critical junctures between conductors and reduces the risk of hinging or bending that can alter the signal. The rear wave is free of mechanical intrusions, and the midrange ribbon uses a new foam suspension that keeps the ribbon in its magnetic field even at very high sound levels.

While I am not in a position to evaluate the technical merit of these changes, the Studio Grands do produce far better imaging and soundstage detail than any previous ribbon speakers I have had in my home and, indeed, better center fill and imaging depth than any planar or electrostatic speaker I have tried. They also have better dynamics than previous Apogeess. They can play louder than I care to hear; my sons inform me that they are capable of "rock-concert volumes."

The subwoofers use two custom, 10-inch, long-throw dynamic cone drivers. The slot-loaded enclosures measure 17 inches high, 28½ inches wide, and 25 inches deep. Their frequency response runs from below 20 Hz up to 70 Hz. The 85-pound enclosures are very heavily braced. They are remarkably vibration-free, even when producing ultra-low bass at levels that shake the room (or house).

The crossover frequency between the subwoofers and the ribbons, using the dedicated electronic crossover, is 70 Hz. This frequency is relatively low and, in my experience, extremely desirable. I have never heard a speaker system using a very low-frequency woofer or subwoofer with a crossover set above 80 Hz that did not present at least some audible problems in the crossover region. The slope is 6 dB, increasing to 12 dB. The crossover's rated S/N is 100 dB, and THD is rated at 0.003%. The crossover can be operated in balanced or unbalanced mode; nominal input level is 1 V. Two front-panel controls for each channel allow you to vary the level to the ribbons or subwoofers by ±3 dB each in 1-dB steps, yielding up to a 6-dB difference in relative input levels between the woofers and the Ribbon Arrays to compensate for different amplifier efficiencies and subwoofer room gain.

The Studio Grands do not have the simple visual elegance of full-range ribbons, but they are very well styled and their pan-

els are well integrated with the woofers. You also have a wide choice of regular or premium finishes. The ribbon drivers rest on top of the matching subwoofers without visible supporting braces, and the woofers are low and deep. This not only improves the look of the speakers but also improves the imaging and apparent soundstage at the listening position over a wide range of seating heights.

It definitely takes two people to set up the Studio Grands, but the instructions are good. About the only areas where you need to show some care are in putting the spike feet on the bottom of the woofer and in making sure not to tighten any of the

**THE STUDIO GRANDS
HAVE EVEN MORE
MIDRANGE DEFINITION
AND TRANSPARENCY
THAN PRIOR APOGEES.**

Allen-head screws that connect the ribbon panels to the subwoofers until all the screws are in place. I particularly appreciated that the tilt of the ribbon panel did not require special adjustment. With two people, it took 30 minutes from box to full assembly—but we did read the instructions before we began.

I was also surprised by how easy the subwoofers were to place. I have never brought home a speaker or subwoofer with output flat below 30 Hz that proved easier to locate in a way that minimized room interactions. It was easy to place the assembled systems in my listening room to get the best out of both the ribbon dipole unit and woofer—at least 3 feet from a side wall and 2 feet from a rear wall. Take care to avoid placing the subwoofer in a standing-wave area, and you are set. While I am always dubious about home-brew speaker measurements, it's worth noting that, using an Audio Control SA-3050A spectrum analyzer, I was able to get very flat power response from the subwoofer and in the crossover area.

The Studio Grands offer the top octave missing in many planar, electrostatic, and ribbon speakers, along with a relatively seamless crossover between the woofer and

midrange/treble ribbons and a remarkably smooth crossover to the subwoofer. Previous planar, electrostatic, and ribbon designs I've tried either lacked bass extension and dynamic range or obtained them at the cost of audible frequency changes in the subwoofer region and a clear shift in sound character as the woofer/subwoofer took over. This shift usually was heard as a lack of bass speed and definition and a similar coloration, caused by transient smear, that extended upwards in frequency until the woofer was so far down the crossover slope as to become inaudible. With these discontinuities reduced to such a surprisingly low level, you can truly enjoy the deep bass without being constantly reminded that something about the bass is not quite right—a very real pleasure that far too many audiophiles have to miss.

The Studio Grands give you the bottom octave that is so important in live performances but is missing in so many high-end systems. They provide the very deep bass energy you get from the very best subwoofers and do so with great speed and detail. They can easily reproduce the lowest organ notes with room-filling energy. At the same time, they have the transient speed and dynamic “slam” to avoid the kind of smeared or lingering deep bass that more than offsets inferior subwoofers' added low-end power.

The Apogeas can provide a natural picture of the deep bass in complex orchestral recordings or where moments of deep bass energy add a dramatic touch to piano, percussion, and lower woodwinds in solo or chamber music.

The mid and upper bass is remarkably neutral, once you have positioned the woofers properly and have set the crossover levels to get the best power response. I have rarely heard any speaker strike as good a balance between warmth and definition while avoiding colorations. The Studio Grands did an excellent job with percussion, adding realism and definition to old chestnuts like the Sheffield “Track” and “Drum” records (Sheffield CD-14/20) and to new jazz percussion records like Cody Moffett's *Evidence* (Telarc CD-83343).

String bass had excellent timbre, speed, and definition, even with difficult analog classics like Couperin's “Pièce de Violes avec la Basse Chifrée” (Das Alte Werk, Tele-

funken 6.42225AW) or the combination of bass and guitar on Ray Brown's *Moonlight Serenade* (Jeton CD-123). Grand piano was excellent, and the mid-bass to lower midrange differences in the character of a Steinway and Bösendorfer were very clearly defined.

If you have already heard the midrange of a top-of-the-line Apogee Acoustics speaker, you have a general idea of how good the midrange of the Studio Grands can be. The Studio Grands, however, add a bit more definition to the midrange than previous Apogeas, particularly in low-level passages. There is slightly more life and more transient detail and air. This came through clearly in comparing the Studio Grands to the Apogee Acoustics Divas, which have been one of my reference speaker systems for years.

I was impressed by the smooth midrange realism of widely varied male and female voices. The Studio Grand speakers also did an excellent job with the complicated mix of voices and chamber orchestra such as on Pomerium's recording of *In Hydraulicis* (Dorian Recordings DOR-90184). This midrange transparency and realism was also reflected in the sound of grand opera and really complex orchestral music like Mahler's Eighth Symphony. The Studio Grands do not add any merciful warmth or any euphonic coloration to operatic

voices, but they reveal great voices without hiding the power and complexity of the orchestra or the interplay between solo voice and supporting chorus.

There is a slight downward tilt in upper octave energy compared to such good reference speakers as the Thiel CS-5 and many Martin-Logans. And the upper octave sound of line-source dipoles like the Apogee is different from that of a unipolar speaker. At the same time, the upper octaves seem to have better horizontal dispersion than any previous Apogee Acoustics speaker and considerably less increase in directivity with rising frequency than most electrostatics. I preferred them in my listening room with the treble control on the

ribbon panel set to high, but I never felt I was missing any part of the top octave.

These speakers provide smooth upper midrange and treble response, and excellent detail, transparency, air, and transients. Prolonged listening to the Studio Grands reveals moment after moment when bells have special clarity or when brush sounds and cymbals reveal extra detail in the upper midrange and treble.

The soundstage presentation is exceptionally wide and deep, and center fill is very stable, without the sudden shifts in apparent soundstage during minor head movements that characterize some planar speakers. The apparent listening position is the one you expect from the recording, without exaggerated depth or any tendency towards a slightly forward sound. The Studio Grands do very well with both small ensembles and a full orchestra—as well as with the hardly natural soundstage effects in a recording like Dire Straits' *Money for Nothing* (Vertigo 836 4190-2). They reproduced recordings of solo instruments without altering instrument size and location.

I should also praise the Studio Grands' ability to handle midrange dynamics and transients. They handle dynamic peaks and also resolve low-level dynamics. This ability really helps with brass and piano, and the Studio Grands have tremendous life and bite. Try any good recording of Saint-Saëns'

Third Symphony (the first and second movements, not just the third). Better, listen to both the low- and high-level dynamics in the Dallas Wind Symphony recording of *Pomp & Pipes* (Reference Recordings RR-58CD).

The Studio Grands stand out as one of the finest speaker systems I have ever heard, and as one of the most revealing of musical nuances and differences in audio electronics. They deliver every octave with full power, excellent detail, and superb coherence. They not only provide great listening pleasure but are also the kind of speaker you should audition, rather than read about, simply to see what the state of the art can do. *Anthony H. Cordesman*



YOU SHOULD AUDITION
THE STUDIO GRANDS,
IF ONLY TO APPRECIATE
THE STATE OF THE ART.

SENTEC DiANA D/A CONVERTER



This interesting new D/A converter, made in Sweden by Antemi and marketed by Sentec, features an unusual analog output amplifier topology that is said to help give it superior sound. The DiAna consists of a nicely made enclosure containing the D/A itself and an external wall-plug transformer and power cord. Digital inputs include two coaxial and one EIAJ optical (Toslink); audio output is via two phono jacks. On the front panel are an LED pilot light and two three-

position toggle switches. One switch selects among the three digital inputs; the other controls absolute output polarity, with output muting as the center position—simple, but functional.

The designer Svante Osterberg's philosophy is to use the highest quality components where they relate to sound quality

and reliability, but not to invest in cosmetic and gimmicky features like custom-machined cases or indicators for sampling frequency and de-emphasis. The unit sells for \$1,150, including delivery via Federal Express.

Company Address: c/o Phototronics, Box 977, Manotick, Ont., Canada K2A 1A8.
For literature, circle No. 94

A very well done p.c. board takes up the DiAna's interior space. The selected digital input is routed to a Crystal CS8412 receiver, which is increasingly being used in D/A designs. Output of the receiver is passed on to a Burr-Brown DF1700 digital upsampling low-pass filter. Filtered digital data is next passed to two Burr-Brown PCM63P-K 20-bit D/A converter chips.

It is in the analog output circuitry that the DiAna's unique nature emerges. The unit uses a new integrated circuit, the PA630, designed for professional audio applications and made under contract by AT&T for Phototronics, which is also Sentec's distributor in the United States and Canada. This IC consists of three sections: A current-conveyor circuit and two unity-gain, complementary emitter-follower, buffer amplifiers. All of the devices in this IC are bipolar. The operation of a current conveyor is similar to a current-input operational-amplifier circuit. Like the op-amp, the current conveyor has two input ports (signal and reference) and an output port. If the reference port is held to a specific voltage level and a current signal is fed to the input port, then roughly equal currents are sourced from the reference and output ports.

Of particular interest is the fact that the signal port will be driven to the same voltage as the reference port. Now if that port is referenced to ground, then the signal port becomes a virtual ground, or low-impedance input, and the impedance of the output port becomes high. That the signal port is a virtu-

al ground makes it perfect for connecting to the current output of typical multibit D/A converters. The actual implementation of the current conveyor on the chip is quite complex.

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Useful conversion from input current to output voltage is achieved by loading the output of the conveyer with an appropriate resistance. In the DiAna, this conversion is accomplished without any negative feedback. (Commonly used, inverting, op-amp current-to-voltage converters are said to be vulnerable to slew-induced distortions caused by out-of-band energy from the transition steps between audio samples. Being free of negative feedback, the current-conveyer circuitry would be free of this effect.)

The output load resistor of the current conveyer is paralleled by an appropriate value of capacitance to form one pole of a three-pole Sallen and Key low-pass filter with Bessel characteristics. The first of the two buffer amplifiers within the PA630 isolates this RC network and drives the two-pole portion of the output filter. Active implementation of this part of the filter and final output buffering to the outside world are the job of the second unity-gain buffer.

Measured performance of DiAna was pretty good. Full-scale total harmonic

distortion was about 0.013%, essentially pure second harmonic, and decreased quickly with signal level to better than 0.003% for levels from -10 dB referred to digital full scale (dB_{FS}) on down into the noise. Total harmonic distortion as a function of frequency stayed relatively flat as the signal frequency increased. Input/output linearity was spot on at signal levels down to -100 dB_{FS} and was only up about 1 dB when the signal fell to -110 dB_{FS} . Frequency response was quite flat and was down about 0.25 dB at 20 kHz. Noise levels were low enough to easily resolve a -90 dB, undithered, 1-kHz sine wave into its three states.

In setting out to evaluate the sonic attributes of DiAna, I used my PS Audio Lambda CD transport to drive one of her digital coaxial inputs. I then fed DiAna's

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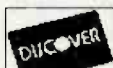
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analog audio outputs either directly into a Crown Macro Reference power amplifier or into an AR Limited Preamp 2 and then into either the Crown Macro Reference or the Quicksilver Audio M135 tube amps. Loudspeakers were the excellent B & W 801 Matrix Series 3s that I have been using as my main reference systems for about a year now.

I would characterize the sound of DiAna as smooth and musical, with reasonable detail and relatively little irritation. Imaging and spatial resolution are good. Compared to my current reference standard of CD reproduction, the Sonic Frontiers' SFD-2 D/A converter, DiAna does not reveal as much of the excitement and reality of music. Bass detail and slam are not as good. However, compared to some of the other similarly and lower priced converters I have auditioned, DiAna does a pretty good job of conveying music (must be that current conveyer), and I generally enjoyed listening to music with her.

Bascom H. King

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B & W THX HOME CINEMA SYSTEM



This seven-piece B & W THX speaker system, and the electronics I used to audition it, represent a radical shift—the adoption of high-end audio equipment to an audio/video system. There is no question that the B & W THX system can produce both very impressive home theater sound and good reproduction of

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music. However, any effort to evaluate it raises serious questions as to what kind of sound quality can really be achieved in the home theater field today, and as to whether a high-end audio/video system can be compatible with a high-end audio system. The answers are more ambiguous, and most users of these speakers may not care about

such details. Movies, after all, rely far more on pure illusion than realism, and their goal is to entertain.

The B & W THX Home Cinema System carries a price tag of \$7,000. Three of its speakers are FCM8 Front Cinema Monitors, for the left, center, and right channels. Like most high-performance home theater speakers, the FCM8s are relatively large, measuring 23 $\frac{5}{8}$ inches high, 10 $\frac{1}{4}$ inches wide, and 9 inches deep. They are magnetically shielded, two-way loudspeakers, each using two 6 $\frac{1}{2}$ -inch bass/midrange drivers crossed over at 3 kHz to three 1-inch tweeters with ceramic/metal domes. These are very similar to the drivers in the B & W 801 Matrix Series 3, widely acknowledged as one of the world's top reference monitors. The FCM8s are superbly built, and have specifications similar to those of small reference monitors.

Frequency response is 3 dB down at 80 Hz and 22 kHz. The roll-off at 80 Hz is mandated by the THX specifications, which call for the side and center speakers to cross over to a subwoofer at that frequency. (The Lucasfilm team that designed THX argues that listening tests show a properly designed 80-Hz crossover to be inaudible.) The THX specification also dictates a standardized crossover that uses a 24-dB/octave low-pass filter and a 12-dB/octave high-pass. Used with main speakers that roll off at 12 dB/octave below 80 Hz, this yields matching 24-dB slopes with minimal phase problems—but it also means that the system will only perform at its best

with a THX crossover or decoder.

The FCM8 speakers also comply with THX requirements for a wide horizon-

tal dispersion with a response that does not vary by more than +1 dB in a 60° arc, mated to a restricted vertical response that is flat from 1 to

**HOME THEATER
CREATES EXCITEMENT
I HAVE NOT SEEN SINCE
THE DAWN OF STEREO.**

16 kHz in a 30° arc, and then rolls off relatively quickly. This controlled dispersion is intended to integrate the sound from left to right while minimizing the impact of ceiling and floor reflections.

Ideally, all three front speakers in a THX setup should be at the same height and on the same plane. However, moving the center FCM8 a bit, to clear a monitor screen, had only limited effect. I also found that removing the grilles helped integrate the speakers in video applications and improved response with music.

The FCM8s were not shielded well enough to avoid creating some spots at the edge of the picture on my TV monitor.

**THE FCM8S COMPLY WITH
THX REQUIREMENTS
FOR WIDE HORIZONTAL
AND LIMITED VERTICAL
DISPERSION.**

This should not be a problem with most smaller picture tubes, which I find less hypersensitive than 35-inch monitors, or with projection sets.

The 12-inch PCS8 subwoofers are also magnetically shielded. Each has a separate, 80-liter, vented enclosure, 23 $\frac{5}{8}$ inches tall. These enclosures measure 22 $\frac{7}{8}$ inches wide and 23 $\frac{1}{2}$ inches deep at the base, tapering to top surfaces just large enough to serve as stands for the left- and right-channel FCM8s. (However, mounting the FCM8s on the PCS8s limits your flexibility in speaker placement: The PCS8s should be given several feet of clearance from a corner and about a foot of clearance from a rear wall, and they require some attention to standing waves.) The subwoofers' nominal impedance is 8 ohms, and the manual suggests that they be wired in parallel to achieve an effective 4-ohm load to the amplifier, thus gaining 3 dB from most amps' higher output at 4 ohms.

The THX Standards permit stereo subwoofer outputs, provided that the bass for the center channel is summed and split between left and right—but most THX preamps or decoders have only a single subwoofer output. The designers of THX state that using separate subwoofers allows

proper placement to minimize room-interaction effects. While they do not deny that playing subwoofers in stereo can have advantages when listening to music, they state that wiring the two subwoofers in mono reduces room interaction while allowing you to take maximum advantage of room reinforcement in the low bass.

The subwoofers' rated *anechoic* response is 3 dB down at 35 Hz, but this is misleading. In normal listening rooms, a subwoofer that is anechoically flat will produce far too much bass because of room reinforcement. In actual use, the PCS8s can produce prodigious amounts of deep bass, down to 28 Hz, and can easily reproduce the most demanding transients in movie soundtracks—transients far more demanding than those in most music. With a really good power amplifier delivering at least 200 watts into 4 ohms, they can even handle *The Terminator*. More important, their combination of taut, crisp, bass transients; excellent dynamics, and detailed frequency resolution gives new life to deep bass sound effects at low and medium levels.

The SCM8 Surround Cinema Monitors for the left and right side channels, like the FCM8s, use 6 $\frac{1}{2}$ -inch woofers and 1-inch tweeters. However, the SCM8s are dipoles, with drivers on opposite faces of a triangular-profile enclosure. Two identical sets of drivers, facing in opposite directions, radiate upwards at an angle to reflect off the ceiling. The SCM8s are designed for wall mounting; users whose rooms are not pure rectangles, with no major openings, may find they work best on stands. The SCM8's frequency response is 6 dB down at 105 Hz and 25 kHz, and its mean power response is ± 3 dB from 120 Hz to 20 kHz.

Dolby Surround and THX Standards emphasize that surround speakers should produce ambient rather than directional information. So dipole surrounds like the SCM8s should be placed to the left and right of the listener, who will then be in the null of each speaker's direct radiation pattern. Listeners will then hear only diffused, reflected sound. The SCM8s should also be placed just a bit above the listener's ears. Speaker quality and placement are critical in reproducing the ambience of the better Dolby Surround and THX soundtracks. I would not suggest the use of smaller surround speakers with rougher response,

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because with the best soundtracks, you need all the good performance you can get. If anything, I sometimes wanted more bass response from the SCM8s, since many soundtracks contain considerable bass information in the rear.

It became obvious during my first few days with the B & W system that the difference between mid-fi and high-end home theater impresses a far wider range of people than the difference between mid-fi and high-end audio. My sons started bringing in their friends, my non-audiophile friends showed an amazing new willingness to pay attention to equipment, I had problems in getting some workers doing repairs on my home to go back to work, and even my mail-carrier suddenly invited himself to a listening session. The interest that absolutely everyone showed in the B & W system made it clear that home theater is far more of a social and family experience than stereo is. I have not seen this kind of excitement since the hi-fi craze of the 1950s or the early days of stereo.

What most buyers of the system are going to want is drama, and the B & Ws do a magnificent job of delivering this in the home with more of a "Wow!" factor than any piece of audio equipment I have had for review in years. Almost all listeners agreed that this setup sounded much more dramatic and detailed than any system they had ever heard in a movie theater.

Auditioning the B & W THX Home Cinema System shows that using high-quality monitor speakers in a home theater system makes a tremendous difference. And furthermore, it takes exceptional speakers to handle the dynamic range required and to resolve low-level ambient information, such as the forest sounds in the hunting scene in *Last of the Mohicans*. Thus, in home theater the difference between high-end and mid-fi systems can be brutally apparent. This is particularly true with the mid-priced "subwoofer" systems that simply cannot provide true deep bass and crisp accurate transients.

The B & Ws made it painfully clear that the soundtracks of most Hollywood musicals, and many LaserDiscs of musical performances, need remastering—if they can be salvaged at all. Time and time again, the B & Ws revealed side-channel ambient information with little relation to the image

on the screen, voices with no spatial existence, and exaggerated left and right effects with sudden skips to the center channel. You do not always notice these problems unless you listen for them or blank the screen to remove the visual cues. A really accurate home theater system does, however, show that movie sound engineers must tighten up their act.

The B & W THX Home Cinema System is obviously designed to make maximum use of THX Standards and THX sound processing. The most important aspect of THX is probably that it sets fixed and reasonably demanding standards that produce a much greater probability that what you hear in a movie house or home is actually what the director and sound engineer of the film intended you to hear. However, THX also requires high levels and a low noise floor, high-frequency equalization to produce the same frequency balance at home as in the theater, timbre matching so front and surround sounds will match despite the ear's different spectral sensitivities to front and side, and decorrelation of the summed rear channel so home listeners won't find it shifting with their head movements.

The four THX-certified Lucasfilm LaserDiscs I used for this review (*Rising Sun*, *Star Wars*, *The Abyss*, and *Terminator II*) sometimes made me feel I was attempting to judge THX using the kind of listening material I had in the first days of stereo—the sounds of ping-pong balls, trains, cannons, and hyped-up musical potboilers. However, THX is designed to work with all Dolby Surround soundtracks, and I did have the use of the new Proceed PAV audio/video preamp, one of the best THX units currently available. I also had the opportunity of comparing the sound of an excellent non-THX surround unit, the new Adcom GTP-600 audio/video tuner/preamp.

In broad terms, I was very impressed with the sound of the soundtracks I auditioned using the THX setting of the PAV, whether or not the movie had THX certification. Regardless of whether THX is the

ideal standard, it immediately becomes apparent that there is a great deal to be said for standardizing the software and the playback system. There is also a great deal to be said for dynamic range. These B & Ws are far more lifelike in handling both the dynamic peaks of movie tracks and music than most high-quality speakers, and this superiority has a major subjective impact.

Even with THX-certified discs, I had to make minor adjustments in level from disc to disc for maximum effect, particularly in subwoofer level. But such level adjustments were needed more often with standard Dolby Surround recordings, which had almost random variations in bass and levels. I quickly found that easy on-screen setting of each channel and using a subwoofer test tone were absolutely critical to getting

**THE PCS8 SUBWOOFERS
CAN PRODUCE DEEP
BASS IN PRODIGIOUS
QUANTITIES.**

true high-end performance; THX equipment provides better test tones for all channels (including the subwoofer) than does most other audio/video electronics.

I also found that an optimum setup really requires the use of THX and Dolby Surround test discs and a sound-level meter, not just the preamp's test tones and your ears.

I did not find that THX addressed the critical problems of directionality and ambience that I hear in today's surround soundtracks. Try turning off the picture and listening to the sound alone: Unless you have never heard such sounds as real gunfire or a car turning at high speeds, you will hear serious compromises in realism. Speakers as good as the B & Ws, and electronics as good as the PAV and Adcom GTP-600, cry out for discrete side channels, more realistic directionality, and more precise ambience.

I found it hard to reach any solid conclusions about how important it is to have a THX preamp or decoder rather than another good home theater unit. I did prefer the sound of the PAV, on its THX setting, to the sound of any other home cinema surround processor I have yet heard. At the same time, I had the impression that most of the subjective differences between THX/Dolby Surround and Dolby Pro-Logic

without THX were differences in level and equalization.

The B & W system's sound quality will be far superior to your TV picture's quality, almost regardless of what you do. Today's video technology still lacks the contrast range of film and leaves you with noise, blurs, and color artifacts. Superior sound quality helps me forget the problems in video quality, but this is so subjective that it may not work for you.

This brings me to the issue of music and the compatibility of a high-end THX audio/video system with high-end reproduction of music. I auditioned some music through the B & W THX speakers, using the Proceed PAV and Adcom GTP-600, Krell and Theta Digital CD players, and Adcom and Classé Audio electronics. I set up the system both in my home theater room and as an audio system in a separate listening room. I also had the opportunity to make direct comparisons between the B & W Home Cinema System and the B & W 801 Matrix Series 3 monitors.

In broad terms, you can get quite good reproduction of music through a system optimized for home theater use. This requires a good preamp whose five-channel stereo mode passes undamaged stereo signals to the left and right channels, which fills in the center channel and provides a touch of ambience without excessive processing. With settings that fulfilled these requirements, the Proceed PAV and Adcom GTP-600 both did very well.

You can get good standard two-channel reproduction simply by passing through the stereo signal and listening to just the left and right speakers—provided you have high-quality speakers and electronics. (THX requires that any preamp circuitry pass through a pure stereo signal, and the Adcom GTP-600 also has this feature.) However, you probably will need to choose between spacing of your speakers to produce the best possible music reproduction and spacing them for home theater. Spacing to match your screen width generally spaces speakers too widely or too narrowly for music. Unless you are willing to put

your speakers on wheels, high-quality stereo and home theater are going to be at least slightly incompatible.

I often shut off the side channels when using the PAV's or Adcom's five-channel stereo settings, particularly when I listened to recordings of small jazz groups and chamber music. Really good stereo recordings already have ambience, and adding even a minimum of processed ambience does not always help. On the other hand, at times center-channel information helped lock in images and opened up the soundstage, as well as eliminating some of the problems of speaker placement for both video and audio.

I also developed mixed feelings about the use of a summed subwoofer channel. However, the THX Standard permits the use of either stereo subwoofers or full-range front and rear

speakers. I also recognize that many audio experts believe that summing the bass (using a properly executed 80-Hz crossover) is inaudible, that moving the subwoofer to the best location in the room may offer better bass than integrating it into a full-range speaker, and that the THX Standards for dispersion should enhance musical as well as home theater listening.

I had the option of substituting the full-range B & W 801 Series 3 monitors for the FCM8s. For music in stereo, I very much preferred listening to full-range left and right channels, and shutting off the subwoofers. The integration of deep bass, mid-bass, and midrange/treble was slightly better with the 801s than when I used the separate subwoofers in the B & W THX Home Cinema System. The 801s were more open and lifelike in the midrange and upper octaves, and more musical with today's stereo recordings. They had significantly better imaging and reproduction of the nuances of a stereo soundstage.

The THX Home Cinema System, however, was superior in power handling and dynamics. If you like orchestral spectacles, power rock, or hearing full organ crescendos, B & W's THX system will outperform their 801s in handling truly loud dynamics and sustained musical peaks. At

normal volumes, the 801s' superior musicality came through clearly with organ, full orchestra, bass strings, and percussion. While the B & W THX Home Cinema System did very well with stereo music, the 801s provided a notably more realistic mix of musically natural changes and transients, and a consistently more detailed and accurate soundstage.

My listening experiences taught me that I would want any system designed to provide the best of both stereo music and home theater to have full-range left and right channels optimized for stereo musical listening rather than for home cinema. The sacrifices you make in home cinema sound quality if you optimize for stereo music are limited, and the advantages for stereo can be very real. THX electronics allow you to defeat the crossover or high-pass filter, and use full-range front speakers. If you do, however, it will be necessary for you to experiment to decide whether to use a subwoofer or the center and side channels when listening to music. You will also have to experiment with the speakers' relative levels—particularly the subwoofers—as you switch from the THX cinema mode to stereo.

I have consistently rejected use of the side channels for serious music listening, but many audiophiles like a small increase in ambience. I like just enough signal from the center channel to create a stable center fill, but some purists reject any center-channel information when listening to stereo.

My experience with the B & W THX Home Cinema System, Proceed PAV, and Adcom GTP-600 have shown me that top-quality home theater systems can do a very good job of reproducing stereo music—even a superior job in terms of sheer dynamics and power handling. At the same time, they show that even the best home theater systems are still likely to involve some compromises and trade-offs. If you want the very best in both audio/video and in music, I suspect you are going to find that you will need separate audio and audio/video systems. Failing that, try an audio/video system with full-range left and right speakers, an excellent center-channel speaker, full-range side-channel speakers, and a separate subwoofer.

Anthony H. Cordesman

**B & W 801s ARE MORE
MUSICAL THAN B & W'S
HOME CINEMA SYSTEM,
BUT THE LATTER HAS
BETTER DYNAMICS.**

CLASSICAL RECORDINGS

kissin

Schumann: Piano Concerto in A Minor, Op. 54; Arabeske, Op 18; Schubert (arr. Liszt): "The Trout"; "The Erl-King"; Grieg: "Carnival Scene"; "I Love You"; Liszt: Soirées de Vienne, Valse-Caprice No. 6 (first version)

Yevgeni Kissin, piano; Vienna Philharmonic, Carlo Maria Giulini
SONY CLASSICAL SK 52567, CD; 59:56

Rachmaninoff: Piano Concerto No. 3 in D Minor, Op. 30; Vocalise (arr. Richardson), Op. 34, No. 14; Prelude in B Flat, Op. 23, No. 2

Kissin, piano; Boston Symphony, Seiji Ozawa
RCA VICTOR RED SEAL 09026-61548-2
CD; DDD; 54:16

These CDs provide two disparate, glittering facets of Yevgeni Kissin, the extraordinarily talented stripling who may, if he continues as he has begun, develop into a latter-day combination of Sviatoslav Richter and Vladimir Horowitz.

The dear old Schumann has long since become such a routine staple of the concerto repertoire that many, perhaps even most, repetitions of it sound routine as well. Not with Kissin, who made his first big splash in this country at his Carnegie Hall debut in September 1990, when, at the age of 16, he created a sensation with the Rachmaninoff Second.

In the first movement, Kissin makes the piano sing its melodies, while the underlying quintuple 16th notes ripple with striking clarity. Especially in the slow movement, Carlo Maria Giulini's fetching mannerism of lingering barely an instant on passages' top notes enhances their expression more than one would believe. The third movement of the Schumann contains

a pitfall that cracks up most pianists who fail to overcome it by putting themselves in the place of the listener with no score before him; if played with inadequate attention to accents, Schumann seems suddenly

almost to have shifted meter. Kissin navigates those rapids with meticulous skill, exemplary of his attention to detail throughout the entire work.

If the Schumann impresses, this Rachmaninoff almost stuns. Van Cliburn, at 23, for me set the all-time musical standard for this satanically difficult showpiece, but Kissin comes close indeed to matching it. Like Cliburn, he takes a broadly expansive view of this quintessentially Romantic work. He keeps his transcendental technique subsidiary to the music and, as such, ignites the pyrotechnics only when artistically justified—which, of course, is all the more electrifying to the dazzled ear. In the concluding minutes, Rachmaninoff quickly piled three successive climaxes on top of one another; with the second, Kissin and Seiji Ozawa attain what seems the ultimate imaginable peroration, only to top that mere seconds later in an access of musical ecstasy that brings the listener close to levitation.

Producer David Saks' recording team, for whatever reasons, has recorded the Rachmaninoff at a lower level than any recording to come my way in a long time, possibly ever. Watch it at the end: Both of these CDs perpetuate live performances, and the shouting ovation proper Bostonians gave the Rachmaninoff might well blast both your eardrums and your speakers beyond repair.

Paul Moor

Mozart: Sinfonia Concertante in E Flat, K. 364; Concertone in C; Symphonia Concertante in A

Soloists; Amsterdam Mozart Players, Jurgen Kussmaul

CHANNEL CLASSICS CCS 3992, CD; 67:20

An audio note concerning one of the works on this CD—welcome back, Concertone! You may be too young to remember, as I do vividly, one of the first "high-end" consumer-type tape recorders put on the market, way back, promoted in high style by a brilliant entrepreneur from California named Bert Berlant, accent on the last syllable. A big, fat machine.

Illustration: Rick Tulka



Home tape was at its very beginning, full-track mono machines barely portable by a muscular youth. But easier than an Ampex! That counted. The Berlant machine had its problems, a new breed and unsettled. I had one for a while. It did not remain very long in a fast-changing market, as I remember. The name of this machine was the Concertone.

Named after Mozart? (See above.) I doubt it! Berlant was not the Mozart sort but a flamboyant Californian in all his glory. More likely, the thought was along conventional hi-fi public relations lines, like "Best seat in the concert hall." Get it? *Concert Tone*. Com-



pressed handily to Concertone. I suppose I am one of the few who knew *both* Concertones, Berlant's and Mozart's, at the time.

Mozart's Concertone, closing this CD, is actually an early example of a format that became celebrated for a few years in European music centers, the Sinfonia (or Symphonie) Concertante. Its top popularity came just as young Mozart set forth on his first solo job-hunting trip, more than a year, to Paris via that hotbed of new music, Mannheim. The concertante, as it is usually called, was a long,

relatively relaxed piece, usually cast in the wind-y, horn-y, trumpety key of E flat, with a large orchestra and lots of those winds; the special feature was a group of concerto-like soloists, two or more. Straight out of the baroque concerto, but Mozart would not have known that. In those times, music history was anything older than a year or so.

At Mannheim the concertante hit Mozart right at his creative core. He wrote concertantes for the Mannheim players and then went on to Paris, where his music was ignored, then tragically lost. The spate of these continued, ever more profoundly when Mozart returned jobless to Salzburg. And that was it. Other music took over his expanding powers.

The landmark recording of the finest of all these, the Concertante for Violin and Viola, K. 364, was an early 78 from the 1930s, Albert Sammons and Lionel Tertis with the London Philharmonic under Sir Hamilton Harty (Columbia CM 188). Much too big, a modern full symphony orchestra, but wonderfully played, my favorite album for years. (It took eight 12-inch sides to cover the whole work!) The present Dutch ensemble, a correctly sized group for the music, is made up of Dutch symphony professionals playing "modern" instruments;

Haydn: Symphonies Nos. 82 ("L'Ours"), 83 ("La Poule"), and 85 ("La Reine")

Orchestra de Chambre de Lausanne,
Jesús López-Cobos
DENON CO 75356, CD; 64:30

Have you followed old "Papa" Haydn from the earlier 20th century to today? Big changes. And who knows what "Papa" had in mind? This combination of an excellent Swiss "chamber" orchestra, right sized for Haydn's symphonies, and a Spanish director (from Spain) is odd but does bring the old master up to date in a number of ways, which should be a satisfaction to plenty of ears.

No "period" instruments here; it is one of those orchestras that simply ignores that invasive movement towards authenticity. Doesn't really matter. What counts is a drive and intensity that is very much of today and not at all of the 1930s, when Haydn was first recorded by the likes of Henry J. Wood, Thomas Beecham, and on to Bruno Walter. This is a small, accurate group of seasoned players, driven (by their conductor, I sup-

pose) to an almost stressful portrayal that might perhaps startle the easygoing and humorous composer. For us it is quite okay—

and it remains *musical*, which is what matters. I like the brisk speeds, and no eccentricities; at first I was not so happy with the stress, the loudness of every loud contrast, which was much more than merely a volume contrast. But I soon came around. Recording: On the dead side—a chamber orchestra, but not far removed from the presumable original sound, as heard in elegant 18th-century music rooms.

The rather silly subtitles are strictly 19th century, post-Haydn. His sense of humor was boundless, but not at all on this silly side. In "La Poule" he actually had in mind the model of the tragic G minor key, as of Mozart in his "Little G Minor" and the big one, No. 40; chickens had nothing to do with it. If you think not, listen to the chicken's neck being wrung in the first movement.

Edward Tatnall Canby



Maxwell Davies: Black Pentecost; Stone Litany; Runes from a House of the Dead

Della Jones, mezzo-soprano;
David Wilson-Johnson, baritone;
BBC Philharmonic, Peter Maxwell Davies
COLLINS 13662, CD; DDD; 78:38

Britain's traditionally rich eccentricity takes infinite forms. Take the case of Peter Maxwell Davies, who has long preferred to shun the metropolis and spend most of his time on one of the harsh, remote Orkney Isles, about as close as Great Britain extends towards the North Pole. The austere history, pre-history, and atmosphere of that wild region color both these works, as it has most of Sir Peter's entire output.

Somber works, both of these: The first lamenting the rapacious despoliation of the Orkneys after the discovery of uranium there, the second setting to music stone inscriptions left by the island's earliest Norse settlers. (Stephen Pruslin's scholarly notes, printed in fonts designed to put your eyes out, provide not only those original runes but also their transliteration, pronunciation, and translation of the text Della Jones sings.) Also, the prose texts (from George Mackay Brown's novel *Greenvoe*), sung by both soloists in "Black Pentecost," include such unpromising passages as "It is a pity that the whole life and economy of the island should be so abruptly and radically altered."

Nonetheless, both of these uncompromising and challenging works etch themselves into the memory, thanks in good measure to superlative performances by all forces and skillfully differentiated recording.

Paul Moor

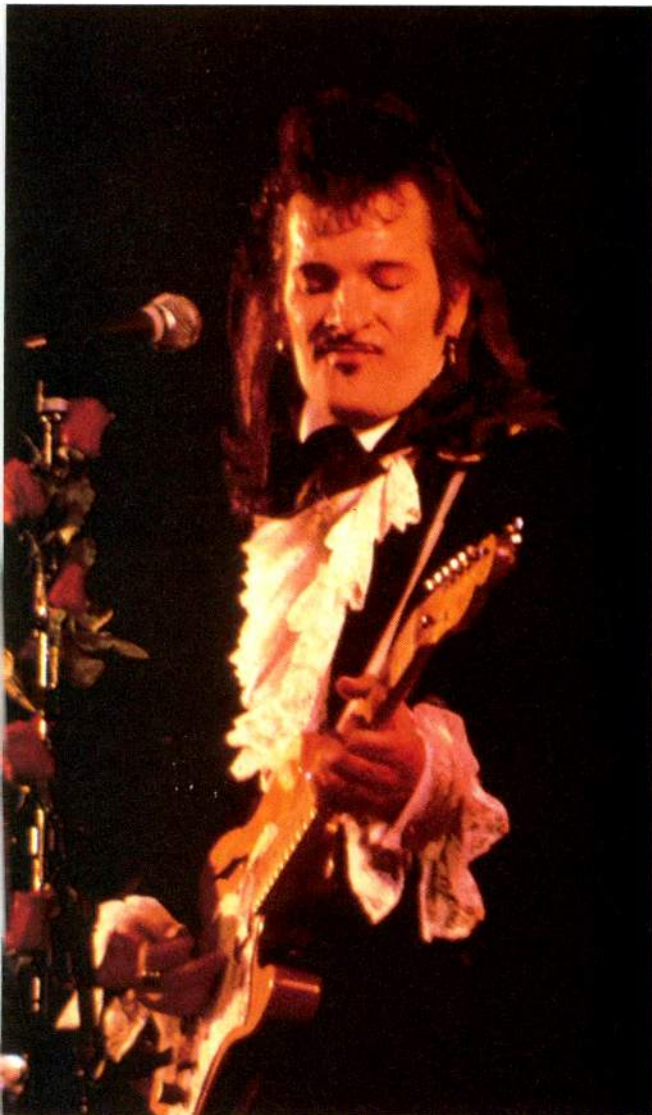


their sound is contemporary, fast and peppy, well-shaped but not too profound. The winds seem very loud and the strings a bit weak for our string-fed ears but actually not far from Mozart's own balance, I suspect.

One minor audio criticism: The miking is almost too pure. Minus live sight lines, the soloists need a bit more accent to create the needed contrast. And why do the cover, the notes, and the actual record have the music in different order? Confusing, especially while reading the notes. Edward Tatnall Canby

ROCK ~ POP RECORDINGS

DeVille



Willy DeVille keeps plugging away, despite the mainstream indifference in this country.

Backstreets of Desire

Willy DeVille

FORWARD/RHINO 71686-2

CD; 57:30

Sound: B+, Performance: A-

Willy DeVille first garnered attention when his band of the late '70s, Mink DeVille, was a mainstay of the New York/C.B.G.B. punk scene. Even then, his was a sultry and personal style that told stories from the street, often with a Spanish Harlem attitude to the music, and this remains true here.

Backstreets of Desire, originally recorded in 1992, contains 10 originals (one of them in two different arrangements) and covers of "Come to Poppa" and "Hey Joe" in a wonderful mariachi version. Two songs

with New Orleans (DeVille's current home) storylines, "Voodoo Charm" and "Jump City," are produced by Dr. John, and each has characteristic Crescent City sounds. "Voodoo Charm" contains a spooky gris-gris feel, and "Jump City" has percolating second-line rhythms with Willy doing a vocal that's a ringer for Dr. John. The bulk of the album, co-produced with keyboardist John Philip Shenale, opts for a leaner band approach with occasional flourishes of strings or accordion (the latter played by Zachary Richard or David Hidalgo).

Willy has dedicated the album to the late Doc Pomus, the great songwriter who clearly is a massive influence. This is manifest both in the fine detailing of Willy's lyrics on "Bamboo Road," about a poor sugar-cane cutter, and in DeVille's excellent sense of atmosphere. Pomus' inspiration is also evident in the desolation of "Empty Heart" and "All in the Name of Love," the aching urgency of "Lonely Hunter" (with a tip of the hat to Carson McCullers), the hunger of "Even While I Sleep," and the swaying stateliness of "I Call Your Name."

There's always been a lot of heart in Willy DeVille's songs and music, and when he puts together an album, it's always a classy effort. Despite mainstream indifference in his native U.S. turf, he's kept plugging away at his art. That's probably why he spent years living in Paris, where he's pretty popular. *Backstreets of Desire* is more than just another chapter; it could be Willy's best. Rhi-

no deserves credit for having the sense to finally release it stateside, even a full two years after it first came out in Europe. It's just much too good to let slip away unnoticed.

Michael Tearson

Backbeat: Music from the Motion Picture

Various Artists

VIRGIN 7243 8 39386 2, 27:05

Backbeat: Original Motion Picture Soundtrack

Don Was

VIRGIN 7243 8 39413 2, 59:44

Sound: B+, Performance: B+

As I write this, Paul McCartney, George Harrison, and Ringo Starr are in a studio recording tracks to a demo tape left by John Lennon. Does anyone think that this is going to be anything but anticlimactic, if not a little embarrassing, to our memories of the Fab Four?

For a sense of the thrill The Beatles provided, just turn to the music from *Backbeat*, the movie about The Beatles' early years in Hamburg with original bassist Stu Sutcliffe. Producer Don Was enlisted some of the cutting-edge musicians of the '90s to play and sing the cover tunes that were The Beatles' oeuvre at that time. If it's not a direct recreation (God forgive Beatlemania),



if the guitar solos from Sonic Youth's Thurston Moore are a bit too edgy and the drumming from Nirvana's Dave Grohl too crisp for Pete Best, all the better. This album doesn't maintain the sound of The Beatles as much as it does their spirit. Afghan Whigs' singer Greg Dulli in particular captures the raw shout Lennon had before it was polished by George Martin. It sounds more like the early days of punk, which in a way it was.

For an alternate approach to *Backbeat's* rock 'n' roll, there's Don Was' underscore. Was, who also plays bass here, has created big beat instrumentals, turning Bo Diddley rhythms into jazz vehicles and evoking the sound of *Kind of Blue*-era Miles Davis. With a frontline of Terence Blanchard on trumpet, David McMurray on saxophone, and Eric Reed on piano, that's not too difficult, but like the rockers on the other disc, these musicians bring an original verve to this music with some wild blowing and smokey atmospheres. If this quintet tried to make it as a real jazz band, they'd be monsters. *John Diliberto*

A Date with The Smithereens

The Smithereens

RCA 07863-66391, 48:18

The bastard sons of Pete Townshend and Elvis Costello have come through with a truly rocking record, reuniting with original producer Don Dixon for a consistent album that doesn't wimp out. "Miles from Nowhere" is the instant classic, although some wishful thinkers may adopt "Sick of Seattle" or "Gotti" (subject matter is self-explanatory) as their personal anthems. Frontman Pat Dinizio's singing great, the band's playing hard, and if *A Date* brings to mind The Smithereens' 1986 breakthrough, *Especially for You*, it's no surprise and probably intentional. But that certainly makes this album no less enjoyable. New Jersey's premier rock band hits you where it helps. *Jon & Sally Tiven*



Mine

The Glee Club

4AD/WARNER BROS. 9 45496, 44:31

Following in the wake of Irish ethereal girls like The Cranberries' singer Dolores O'Riordan, The Glee Club hones a similar folk-based sound, tinged with 4AD atmospherics and a New Wave dance drive. Hugh O'Carroll's violin gives them a Celtic/country flavor, but his guitars head



Pub

Denzil

PLAY/GIANT 9 24530-2, 44:31

Sound: B, Performance: A-

Denzil Thomas, who leads the self-named band, cites his influences as "everything bloody ever." "Bloody" yields a clue that he's from jolly old England, while "everything ever" yields chiming, acoustic-based guitar pop that's so overripe with melody and pop smarts, it's a musical analog to that fruit & booze that sits over-fermenting in a glass tank in an increasing number of N.Y.C. watering holes, on the bar and next to the really thin bread sticks. And this, by the way, is meant as a compliment.

On an album that casually mixes minute-long vignettes (like the acoustic rave-up "Bastard Son of Elvis," replete with sounds of the King calling in from beyond) with songs that are either brashly revelatory or frustratingly oblique, Denzil and his U.K. warble conjures XTC's Andy Partridge fronting a band of folky, three-chord, major-key guitar strummers.

Only on several songs, like the schmaltzy but heartwrenching "Running This Family," is Denzil a forthright storyteller. Here he chronicles young lust, an ensuing mistake ("We made a baby from a bottle of rum"), the bittersweetness of premature parenthood supplanting youth ("I'm sad/When this beautiful girl calls me Dad"), and the concerned father envisioning his daughter as a promiscuous teenager.

Then there's "Useless," driven by a rousing electric 12-string and almost destined to stake its place among the



current alterna-pop anthems of being worthless-and-twentysomething (you know the ones, any Nirvana song, Beck's "Loser," Radiohead's "Creep"). On "Useless," Denzil defends his ineptitude in the sack by proclaiming "I'm so damn boring" and "I'm not self-indulgent by choice" and finally "You can't say you weren't told." Hey, Kurt Cobain probably wasn't much of a stud-muffin either.

Such is life in Denzil's U.K. universe, where (like anywhere else) pubs serve to numb the refractory routine of a gray existence. But as if to say "it's not worth understanding my environment," Denzil more often than not writes lyrics

that read like indecipherable stream-of-consciousness, creative-writing exercises. Like "Sunday service hengistbury head down the one-stop when you're usually in bed desolate bus like machine

room spray abandons us thelma walks the dog." Uh, like, whaddaya mean you don't get it?

The fact is, you won't know what the hell he's rambling on about half of the time. But Denzil consistently bludgeons you with his English pop charm, and words won't matter when you're smarting from his uncompromising melodicism. *Mike Bieber*



into the modalities of U2 with a dollop of Velvet Underground textures. Joanne Loughman wraps her voice around the gorgeous harmonies of "Need" and the raucous refrains of "Bad Child's Dolly." Her pure folk tones are rasped by an occasional imperious-

ness that recalls Siouxsie & The Banshees. It's a strange brew, but The Glee Club's mix of moody meditations and triumphant anthems makes me come back for more, which is more than I can say for the last glee club I encountered. *John Diliberto*

The 35th Anniversary Collection

Smokey Robinson and
The Miracles

MOTOWN 37463-6334-2, 4:51:58

In its earliest years, Motown's backbone was Smokey Robinson and The Miracles. They were Motown's first signing, its first big act, and with an incredibly long string of hits—mostly penned by Smokey—they became the company's first "heritage" act. Listening anew, I find that what stands out is Smokey's natural sense with words and lyrics and the emotional wallop these songs still pack—even the lesser known ones. With this four-CD re-

lease, these songs finally receive the technical care they deserve for CD. Do not miss subtle touches like the oboe in "Tears of a Clown." The annotation is superb, and discographical data is as complete as it can be. At nearly five hours, this is an exhaustive set, maybe a bit too much so in the later stages. I could have done without the post-Smokey-era Miracles, but I can justify their inclusion. A truly great release.

Michael Tearson



Eponymous

The Brain Surgeons

CELLSUM BS 00001, 40:32

Perhaps someday in the future we will be able to enjoy music simply by logging onto a mainframe computer and accessing recordings from *everyone*—superstar acts as well as ordinary folk—while bypassing record companies, retailers, distributors, and everything else that stands between an indie, homemade recording and its potential audience. The Brain Surgeons' debut CD is one recording that could certainly benefit from the "mastersystem."

Homemade and without distribution, *Eponymous* is the work of a husband/wife team, Albert Bouchard (ex-Blue Oyster Cult) and Deborah Frost (rock critic and proud of it), and their album covers a wide spectrum of rock music—none of it typical and most of it just plain enjoyable. There are traces of the Blue Oyster Cult sound, both the "(Don't Fear) The Reaper" and "Godzilla" varieties, but Bouchard's experiments with post-funk rhythms and Frost's rock "gurl" appeal take the place of Cult's guitar mania and heavy metal posturing; it's a better than even trade. Although one hopes the follow-up album will be a bit better produced so that the sounds of the guitars and drums are a bit bigger, The Brain Surgeons' post-AOR progressive/alternative fusion is full of verve and character. (Cellsum, P.O. Box 1070, Fort George Station, New York, N.Y. 10040.)

Jon & Sally Tiven



Day Dreaming at Midnight

Sir Douglas Quintet

ELEKTRA 61474-2, 41:31

In his notes, Doug Sahm (a.k.a. Sir Douglas) says he "set out on a rock 'n' roll journey to make a record for people of all ages." Remarkably, he's succeeded admirably. From gentle cautionary songs like "Too Little Too Late" and "Twisted World" to the pure and joyous rock of "Darling Dolores" (about a cat) and the hot sizzle of the title track, the songwriting throughout is smart and funny. Ace musicianship is courtesy of stalwarts like Creedence Clearwater Revival drummer Doug "Cosmo" Clifford, Desert Rose Band's John Jorgenson, Doug Sahm's sons Shawn and Shandon, and Sir Douglas Quintet vets Augie Meyers (master of the Vox organ) and guitarist Louie Ortega. *Day Dreaming at Midnight* throbs with fun!



Michael Tearson

FAST TRACKS

From Monday to Sunday: Nick Heyward (Epic EK-57755, 46:02). Heyward was the frontman for a wretched, fad-gadget synth-pop outfit 10 years ago. These days he's making cogently tuneful guitar pop with lots of electric 12-strings, mandolins, Hammond organ, and almost too much British charm. The riveting "Kite"—with its military march drum beat combined, oddly, with mandolins and trumpets—is pop song perfection. **M.B.**

Shipbuilding: Tasmín Archer (SBK/ERG 28707-2, 34:44). Archer's *Great Expectations* was one of last year's choice pleasures. The EP *Shipbuilding* is a lovely way to mark time. It includes fine, faithful covers of four Elvis Costello tunes, live takes of three of the highlights from *Expectations*, and an acoustic version of that album's hit, "Sleeping Satellite." Archer's cool voice shows a good sense of style. Recommended. **M.T.**

Moonlight Becomes You: Willie Nelson (Justice JR 1601-2, 44:58). An album of 15 Tin Pan Alley standards à la Willie's *Stardust*. A class job from end to end, played with a lightly swinging combo that features Willie's guitar and Paul Schmitt's piano. *Moonlight* is an easy album to like if you appreciate songs like "Sentimental Journey" and "You Always Hurt the One You Love." **M.T.**

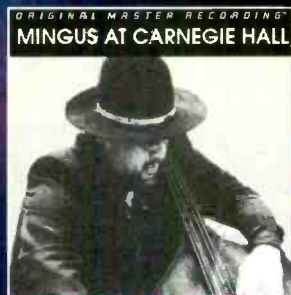
Walk the Line: Kennedy Rose (Pangaea/I.R.S. 13202-2, 49:04). Mary Ann Kennedy and Pam Rose are not your typical Nashvillians. They've sung on many country albums and their songs have been covered, but they're not really country artists. *Walk the Line*, their second album, is an excellent set of very adult songs about love and living, presented with style and taste. Sting and David Lanz make significant cameo appearances. **M.T.**

Brace Yourself! A Tribute to Otis Blackwell: Various Artists (Shanachie 5702, 42:19). You may not know Otis Blackwell's name, but you sure know his songs: "Don't Be Cruel," "Fever," "All Shook Up," "Return to Sender," and "Breathless," to name a few. Coordinated and produced by Tony Visconti and Jon Tiven, this benefit album to assist Blackwell (a recent stroke victim) with his medical bills is an absolute gas. Participants include Graham Parker, The Smithereens, Tom Verlaine, Dave Edmunds, and many more. The Joe Ely/Sue Foley cover of "Great Balls of Fire" deserves special mention. **M.T.**

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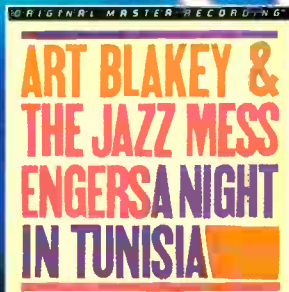
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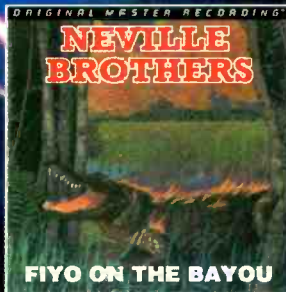
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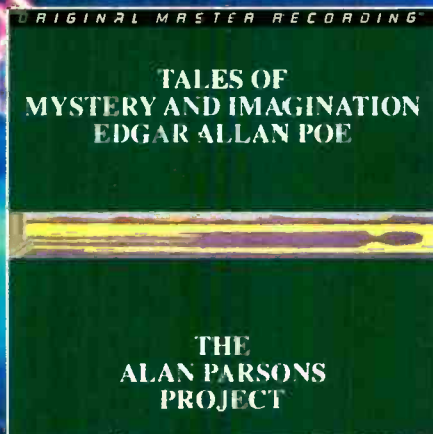


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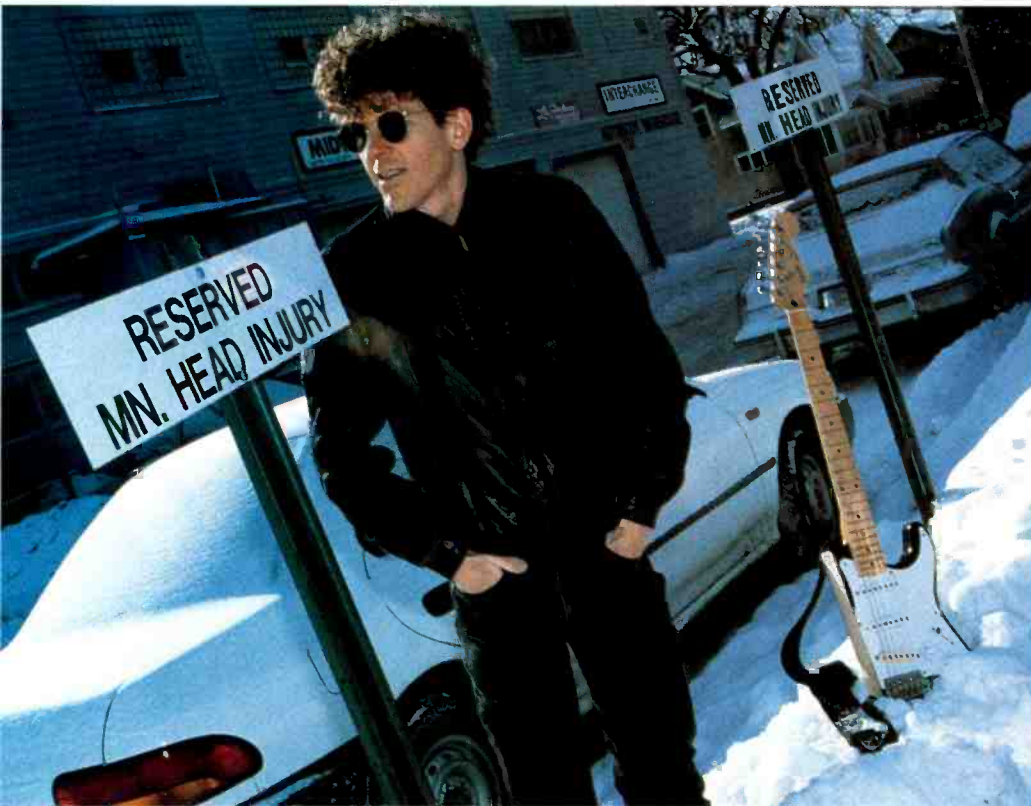
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R E C O R D I N G S



The Fall of Us All

Steve Tibbetts

ECM 78118-21527-2, CD; 70:25

Sound: A, Performance: B+

Guitarist Steve Tibbetts comes by his fascination with noise quite honestly. He's been a sonic renegade on ECM for more than a decade; his 1980 debut for the label, the recently reissued *YR*, is a thrash classic. Through a series of highly provocative projects for ECM, the enigmatic Mr. Tibbetts has skillfully juggled his roles of sensitive New Age guy with an acoustic guitar and crazed Strat strangler with a distortion pedal set on "stun." And he's arrived at his most satisfying blend yet on *The Fall of Us All*.



With longtime cohort Marc Anderson on percussion and Marcus Wise on tabla, this one grooves like

no other Tibbetts album. The conga and tabla tones are deep, the intensity of their driving jams mesmerizing. Claudia Schmidt and Rhea Valentine add an ethereal layer to that earthy base with their wordless vocals, while Tibbetts keeps switching hats back and forth within the same song, from conciliator to killer.

Pieces like "Dzogchen Punks," "Full Moon Dogs," "Roam and Spy," and the aptly named "Hellbound Train" build to furious metalloid peaks, with Tibbetts drawing more from Hendrix's "EXP" and Sonny Sharrock's free-jazz approach to guitar than anything else. But when the mood swings, as on the Zen-like "Formless" and "Drinking Lesson," he submits to an entirely different muse and settles into sublime acoustic guitar passages that soothe and linger with haunting beauty.

Tibbetts' chemistry with Anderson is especially evident on this CD's

title track, an uncommonly gentle number that makes dramatic use of space while highlighting the duo's telepathy. They also attain a dynamic accord on the berimbau-acoustic guitar throwdown "Burnt Offering," which brings to mind Egberto Gismonti's duets with Nana Vasconcelos.

There are distinct traces of World Music here, along with heavy doses of both grunge-noise psychedelia and gentle New Age. An odd mix, but Tibbetts manages to blend it all organically in this strikingly original offering.

Bill Milkowski

Only in New York

Bob Mintzer Big Band

dmp CD-501, 67:35

Only in New York could an ensemble that's this much fun be so often overlooked. Bob Mintzer's command of big band vernacular allows him to cover a wide diversity of influences; he makes reference to Steely



Dan as easily as to Thad Jones. And because his approach focuses so heavily on the richness of color and on ensemble sound, it is well served by producer Tom Jung's meticulous approach in the studio, where Mintzer obviously enjoys himself. On "Modern Day Tuba," his own fuzzy bass clarinet messes the "clean room" acoustics of dmp's studio. On "TV Blues," he sings a lyric that would make Dave Frishberg smile. Throughout, Mintzer displays the confidence that comes from writing for a band with no weak links. Originals range from the user-friendly ("Brotherhood") to the deeply swinging ("Good Morning, Good Day, Good Night"). Perhaps most impressive of all, though, is how Mintzer transforms the silly rhythmic device of "I Want To Be Happy" into a clever, syncopated bop.

Larry Blumenfeld

The Journey

Danilo Perez
NOVUS 63166-2, 59:24

The Departure

David Sanchez
COLUMBIA CK 57848-2, 73:10

Dizzy Gillespie's legacy will no doubt endure. In fact, like any multifaceted treasure, his brilliance can be viewed from many angles. Trumpeter Jon Faddis may well have inherited Dizzy's horn, so to speak, but other riches have been more widely bequeathed.

Danilo Perez's *The Journey* is imbued with the spirit of musical adventure with which



Gillespie threaded together African, Latin, and American elements into a singular music. Positioned as a series of dreams, Perez's record is more an expression of Dizzy's vision (of pan-cultural African-American music), via a confident, original voice that belies the Panamanian piano man's age (he's 27). *The*

Journey's suite-like program opens with a solo piano section and slowly extends to embrace African percussion, Latin rhythms, and small group arrangements. The common thread lies in virtuosic improvisation, most notably here by Perez and tenor/soprano saxophonist David Sanchez.

Perez and Sanchez (former bandmates in Dizzy's United Nation Orchestra) join forces as well on Sanchez's solo debut, *The Departure*. The recording bristles with the same energy as producer Bobby Watson's own work, but the voice—all Sanchez's—is distinct. It's a serious blowing date, with trumpeter Tom Harrell urging Sanchez on. And with the presence of bassist Andy Gonzalez, percussionist Milton Cardona, and Perez, Afro-Cuban rhythms are never far from mind.

Sanchez's departure and Perez's journey both succeed not so much by what they fuse, but by what they reveal. From above, Dizzy is smiling. *Larry Blumenfeld*



Spiders on the Keys

James Booker
ROUNDER 2119, 57:53

While James Booker's work fits soundly into New Orleans rhythm & blues, the tremendously influential pianist's discography is severely lacking. To date, Booker can lay claim to a scant two domestic albums and some singles—very disappointing for someone who, while influencing talents from Fats Domino to Marcus Roberts, so greatly helped define what we identify as the Crescent City sound. Arriving, better late than never, are two new Booker discs from Rounder, *Spiders on the Keys* and *Resurrection of the Bayou Maharajah*. Of the two, *Spiders on the Keys* is the more recommended. Both present Booker unaccompanied on an upright at New Orleans' Maple Leaf club, but *Spiders* is more accessible and presents a more cohesive program, (although selections like "Eleanor Rigby" and "Besame Mucho" probably seem stylistically incompatible). Still, the aptly titled *Spiders* should be on everyone's must-buy list. *Jon W. Poses*

The Pursuer

Carl Allen
ATLANTIC JAZZ 82572-2, 55:33

Carl Allen is a journeyman drummer who spent most of the 1980s working with trumpeter Freddie Hubbard. Not surprisingly, his sound comes straight out of the Art Blakey school of hard bop, and while Allen doesn't really add much to the Blakey *oeuvre*, here on *The Pursuer* he puts some nice spins and precise playing on these bop-derived tunes.

Like Blakey, Allen is a drummer who doesn't just work polyrhythmically, he works antiphonally as well, and all the while he's creating a gestural music that bounces left and right as if he's running a gauntlet of rhythm.

On *The Pursuer*, he brings this same sensibility to his sextet (which is composed



of alto saxophonist Vincent Herring, tenor saxophonist Teodross Avery, trumpeter Marcus Printup, pianist Ed Simon, and bassist Ben Wolfe) with taut, pointed solos that build off the rhythm, parrying left and right

whether it's moody ballads or power-charged grooves. *John Diliberto*

Roots

Tronzo Trio
KNITTING FACTORY WORKS
KFW 154, 49:15

Dave Tronzo has finally found an accessible context for his singular slide-guitar voice. He's dealing more with song forms and familiar territory, giving listeners something to grab onto while digesting his mind-boggling technique. There's a bit of holdover from his avant-bop phase, but what really connects here is the simpler numbers and the soulful way that Tronzo delivers them, practically breathing the notes through his instrument.

Particularly riveting on this CD are a funky Delta version of Duke Ellington's "Rockin' in Rhythm," a straightforward reading of Irma Thomas' "Ruler of My Heart," and "Son House," Tronzo's tribute to that legendary bluesman. (Available from Knitting Factory Works, 47 East Houston St., New York, N.Y. 10012.) *Bill Milkowski*



FAST TRACKS

Bluesiana Hot Sauce (Shanachie 5009, 53:12). Recorded live in the studio, this is one tasty heap of gumbo. The band includes Allen Toussaint on piano, Toots Thielemans and his signature harmonica sound, Michael Brecker on tenor sax, Living Colour's Will Calhoun on drums, Ray Anderson on trombone, Paul Griffin on piano and organ, Eddie Gomez on bass, Joe Bonadio on percussion, and Phil Hamilton on guitar. Toussaint's vocals on his "Brickyard Blues" and the Eddy Arnold gem "You Don't Know Me" are worth the price of admission alone, but there are other delights aplenty, including Harlan Howard's "Busted" featuring Anderson. Mutual respect and fun are the watchwords. **M.T.**

The Strongman: *Reginald R. Robinson* (Delmark DE-662, 67:22). Possibly the only ghetto kid in America to teach himself the ragtime piano idiom of 1893 to 1917, Robinson's pride is not that he did it at all but that he's done it so well. Born in 1973, he wrote these 20 original rags and plays them solo, convinced and persuasive of the form's lasting pleasures and values. **H.M.**

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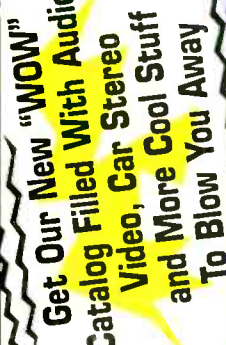
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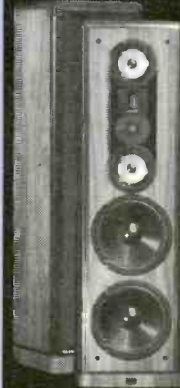
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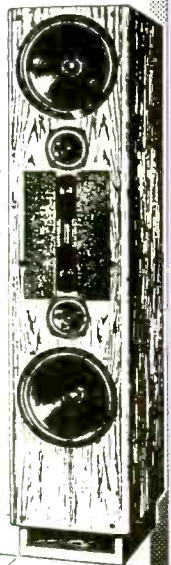
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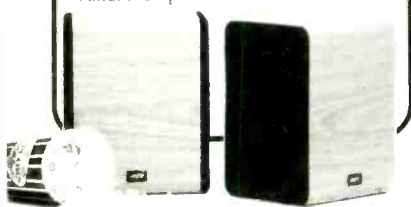
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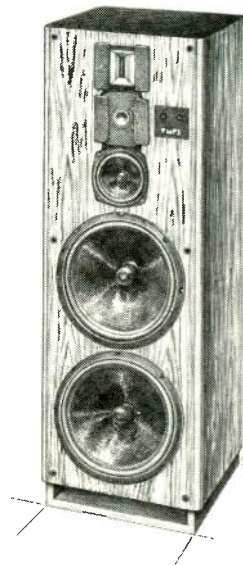
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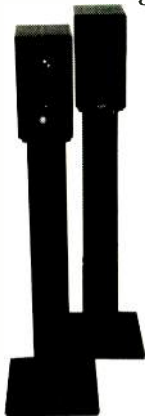
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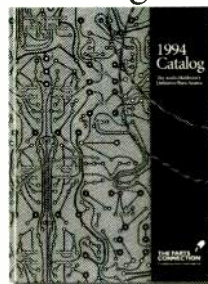
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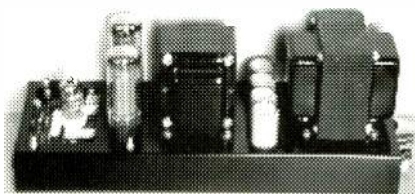
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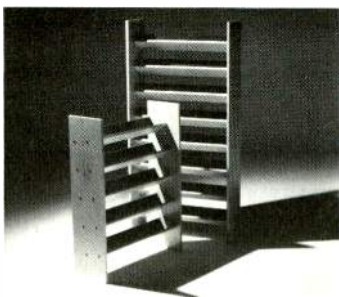
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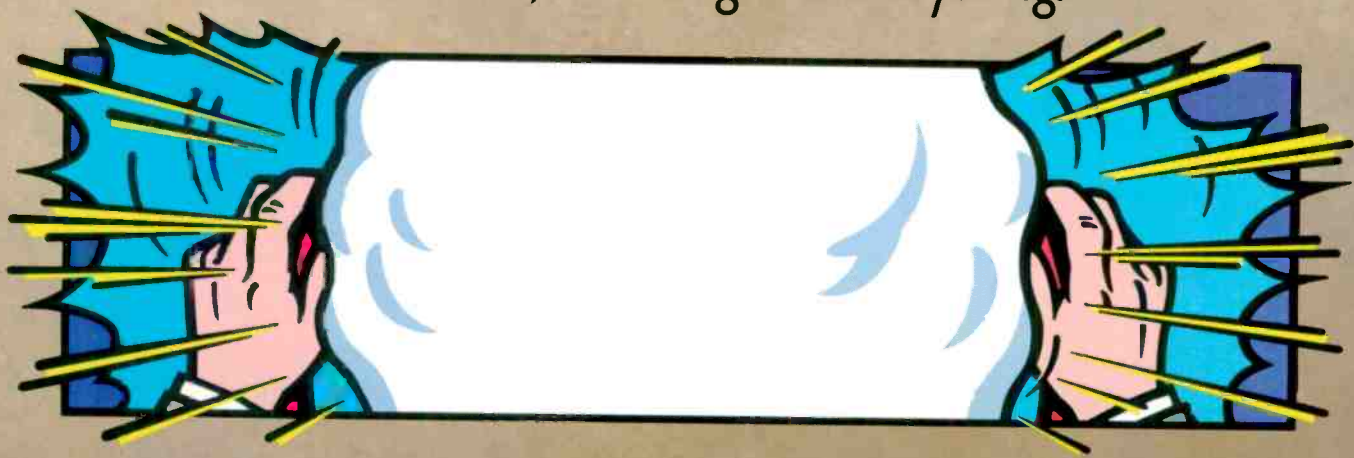
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