

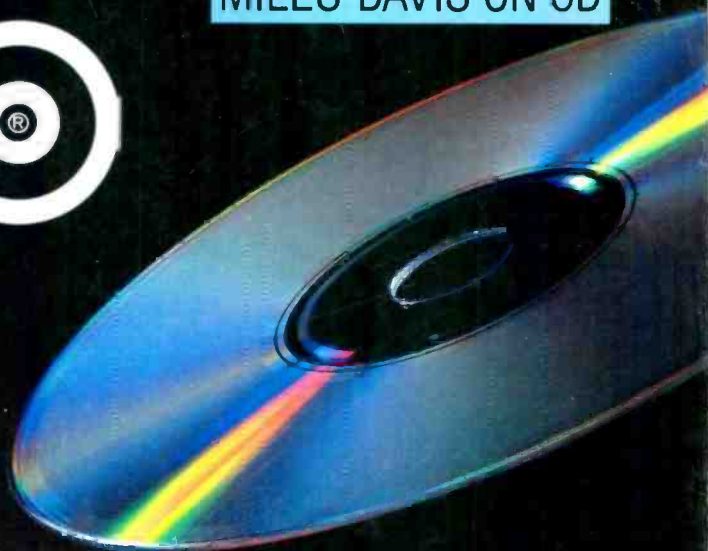
# Audio

APRIL 1988 • \$2.50

**INSCRIPTIONS**  
MILES DAVIS ON CD

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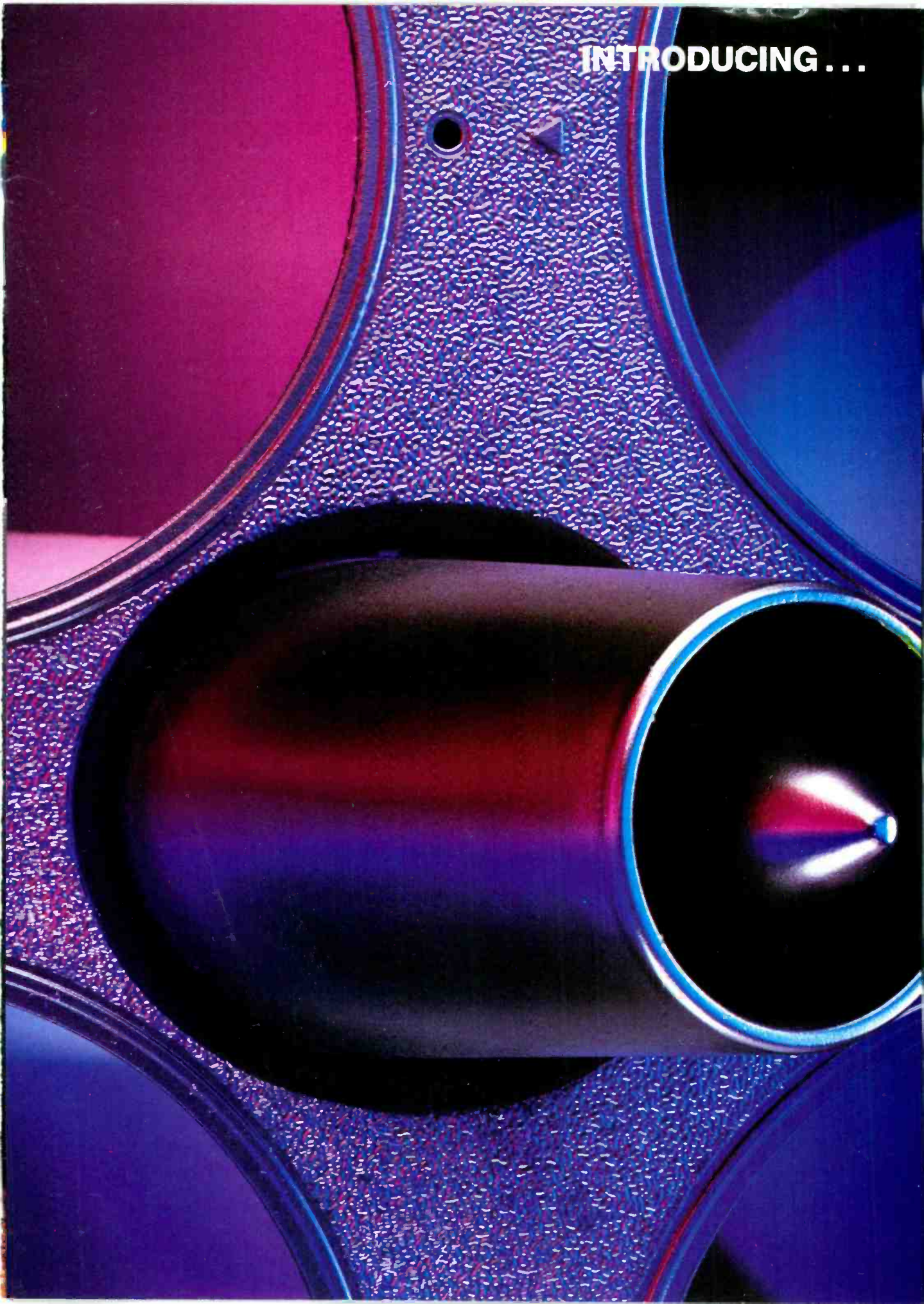
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## John Bowers

John Bowers, founder and chairman of B & W Loudspeakers Ltd., passed away on December 20th, 1987 at the age of 65. He faced the world with great gusto and good humor, and his final illness with great courage.

Mr. Bowers served with Britain's Royal Corps of Signals during World War II. In 1945, he opened a retail electronics store in Worthing, West Sussex, with Roy Wilkins. He began his experiments in loudspeaker

and also to pass on his thanks while he still could. "The 21 years I have worked both with and for the audio industry," he wrote, "have been the happiest of my life, due largely to all the good friends that I have made within the industry."

On December 11, Britain's *Hi-Fi News & Record Review* recognized Mr. Bowers' contributions at the annual presentation of their Lifetime Achievement Awards. The award was accepted for him by B & W's new chairman, Robert Trunz.



Photograph: Courtesy of Snowdon

design while at Bowers & Wilkins, then left the firm in 1966 to form B & W Loudspeakers Ltd. with Peter Hayward. The new company pioneered such milestones as linear-phase loudspeakers, the use of laser interferometry in audio technology, and the use of digital testing techniques for quality control.

A month to the day before he died, Mr. Bowers wrote to his many friends in the audio industry to tell them of his illness and retirement and of the arrangements he'd made to keep B & W flourishing after his death—

Said colleague and competitor Raymond Cooke of KEF (who received a Lifetime Achievement Award at the same time as Mr. Bowers). "John was one of nature's gentlemen, a true English gentleman, truly interested in music. It was no surprise that he built the firm up to the size he did, making it known and respected all over the world. His love and his family were his work. . . . He died about 4:00 a.m., listening to Mozart, with a smile on his face."

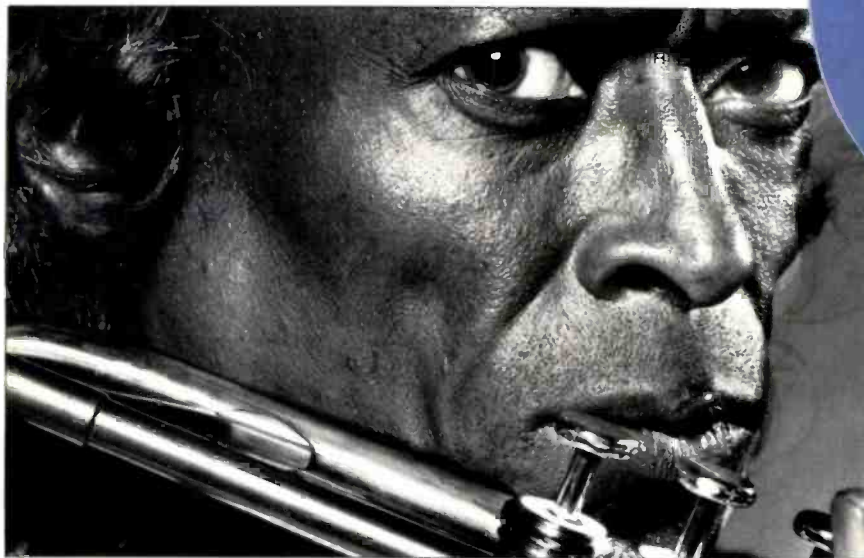
I hope he and Mozart meet.

Ivan Berger

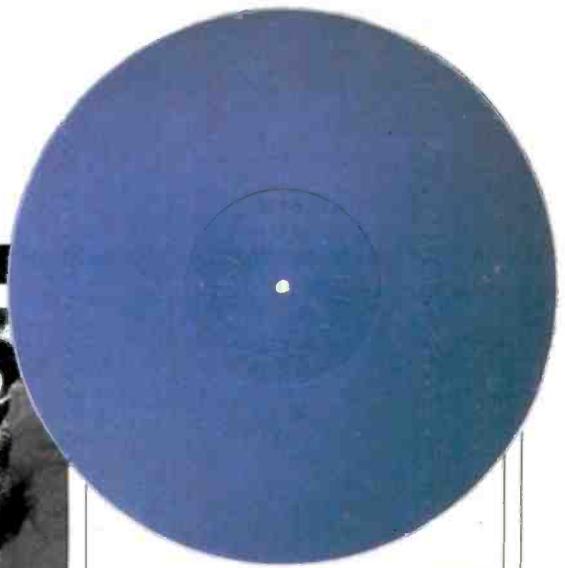
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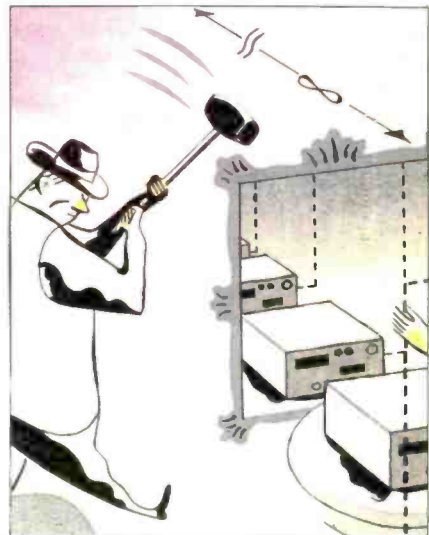
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339044. Mozart: Symphonies 40 & 41 (Jupiter)—Kubelik Bavarian Radio Or (Digital—CBS Masterworks)

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357939. Original Sound-track—"La Bamba". (Slash—Warner Bros)

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356501. Benson/Klugh—Collaboration. (Warner Bros)

356287. Suzanne Vega—Solitude Standing. (A&M)

355578. Hanson: Symphony No. 2 ("Romantic"), Barber: Violin Concerto. Oliveira, Slatkin St Louis Sym (Digital—Angel)

355164. Vladimir Horowitz Plays Favorite Encores. (CBS Masterworks)

355115-395111. Prince—Sign 'O' The Times (Paisley Park)

308049. Craeden Clearwater Revival Featuring John Fogerty—Chronicle. 20 greatest hits. (Fantasy)

354449 U2—The Joshua Tree (Island)

354951. Mozart: Flute Quartets—Rampal, Stern Accardo Rostropovich Digital—CBS Masterworks)

357616-397612 The Best Of The Doors. (Digitally Remastered—Elektra)

353771. Bolling/Rampal—Suite #2 for Flute & Jazz Piano Trio. (Digital—CBMA)

349985. Johnny Mathis/Henry Mancini—The Hollywood Musicals. (Columbia)

348987-398982 Linda Ronstadt—Round Midnight. (Asylum)

339226. Gershwin-Rhapsody In Blue; more Thomas Los Angeles Phil Digital—CBS Masterworks)

319996-399998. Motown's 25 #1 Hits From 25 Years (Motown)

219477. Simon & Garfunkel's Greatest Hits (Columbia)

352943. Wynton Marsalis—Carnaval. Hunsberger Eastman Wind Ensemble (Digital—CBS Masterworks)

361170. Yes—Big Generator. (A&O)

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## Defining Service

Dear Editor:

It is refreshing that some people are concerned with service. Service is something we have taken seriously for many years. Unfortunately, offering quality service often does not translate into more sales. Customers are rarely interested in hearing about service when they are deciding where to buy. Stores have found that if the question of service comes up, all they have to do is say, "Sure, we'll take care of you." When we say that, we mean that we have our own separate service department and calibration department whose quality of work is very high because it is controlled directly by us. But service, as defined by another "high-end" store in town, means it has a person that either takes the broken pieces to a "contract" service station or ships it back to the factory with too often dubious results because neither has to answer to that store.

Craig J. Rutten  
Owner/Manager  
C & S Audio  
Colorado Springs, Colo.

## In Defense of CDs

Dear Editor:

I'm writing to thank Anthony Cordesman for his fine review of the Tandberg 3015A CD player ("Auricle," November 1987) and to share with you some of my observations on CD sound. I purchased a Tandberg CD player a few days ago, after listening extensively to it and other current models. I think it was the hardest purchase decision of my life, though now that I have a player, I think it was worth the effort.

One of your readers wrote to you recently, complaining of having just bought "another" excessively bright CD in spite of a favorable review. I don't recall which CD it was, but I suspect the problem was with the CD player and/or its cables, rather than with the disc. I've played a couple dozen widely different CDs on my Tandberg, and so far I have found none to be "unlistenable"—as some people think many CDs are. My main complaint with CDs has to do with obnoxious remastering, as on The Beatles' *Sgt. Pepper*, which I found to have exaggerated bass and too-subdued vocals. Also, some classical piano re-

cordings sound as if they were made underwater. I had a Denon LP that sounded the same way, so I don't think this problem is with the discs themselves but rather is due to the digital mixing and/or digital recording. Has anyone else noticed this "underwater" effect? If so, does anyone have an explanation as to why it occurs? Some CDs are noticeably more clear and dynamic than others, but, as I've said, I haven't found any "unlistenable" ones.

I think it's amazing how little critical listening is apparently going on in audio stores. And ignore the so-called "audiophile" cables; using garden-variety interconnects will produce a much more musical sound (unless you're willing to spend \$350 per meter). Most CD players are too bright-sounding to my ears, while CDs sound good to me, with a few reservations.

Paul C. Welz  
San Francisco, Cal.

## The Power of Silence

Dear Editor:

Edward Tatnall Canby's entreaty to listeners to seek the cleansing effect of silence ("Audio ETC.," November 1987) demands a response. As one of those born, as he puts it, a few decades ago in the age of occasional silence, I find myself increasingly assaulted by society's noise. I ask myself, is everything else "unnatural," or is it I that am not right? We can gain some insight if we realize that what is perceived as "natural" has changed constantly over the generations. Perhaps now the natural state is one of constant visual and aural bombardment. If we agree that each generation perceives normality differently, then the overriding question becomes: Will the existing environment equip the current generation in a better or worse way than their predecessors to deal with the problems that they will inevitably confront? I do not know. I suspect that, if people are preoccupied with increasingly sophisticated mass stimuli, they may have less time for creative and analytical thinking—a dangerous condition, as history has shown. If this is the underlying process (dare I say design?), then the problem is much more than one of simple annoyance with noise.

But societal concerns aside, Mr.

Canby's argument for silence has much merit. Masters in the use of sound have always known the value of silence. In music class, we were taught about quarter, eighth, and sixteenth notes (the sound) while the corresponding rests (the silence) were always an afterthought: "Oh, by the way, this whole note also has a rest, and its symbol is like a hat turned up, so that it can catch all the silence. . . ."

Beethoven knew how to use silence. In his music, pianissimo follows sforzando—the rhythm is tortured by scattered, unpredictable silences. Affectation never enters into his use of the materials. All is for but one ultimate goal: To let the listener know what is in his soul. In the fourth movement of his Ninth Symphony, choir and orchestra reach a shattering climax with the words, ". . . Und der Cherub steht vor Gott! Vor Gott! Vor Gott!" There is then absolute, utter silence. He knew exactly where to write it in. This is truly inspired mastery in a method of organizing sounds and silences that we know as music.

In his later years, Beethoven came to know silence quite intimately. It is an ultimate irony that fate was to draw a curtain across the most precious sense of a most gifted man. Yet out of his isolation and despair came sounds the likes of which the world had never before heard. Beethoven's impending deafness, and the desperation and resolve that it brought, were of course the impetus for his Fifth Symphony. In this, we hear what a mighty work silence has wrought! If the Creator does indeed have designs upon each of us, then His reason for walling up Beethoven in silence must have been to bring forth all that was inside this man.

But I have digressed in making a point. Mr. Canby's plea for silence is really a plea for a balance in things. Ecclesiastes tells us, "For everything there is a season, and a time for every matter under heaven." At its heart, this is a call for balance.

I fear that our society's preoccupation with experiences and stimulation will lead to our ultimate downfall. I fervently hope that we will have the wisdom to step back from the noise and learn something from the silence.

Bill Werner, Jr.  
Minneapolis, Minn.



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# TAPE GUIDE

HERMAN BURSTEIN

## Wow Woes

*Q. I do a lot of taping of phono records using a moderate-price cassette deck and moderate-price cassettes. At times I have encountered wow. Sometimes it disappears after I put the tape through fast wind and rewind; at other times the cassette mechanism will begin to click, and occasionally the auto-stop mechanism will bring the tape to a halt. What's the problem?—Stephen A. Leslie, Philadelphia, Pa.*

*A.* For all its seeming simplicity, a cassette is a very sophisticated mechanism, requiring excellent design, top-quality internal components (such as high-grade slip sheets to permit smooth travel of the tape), and very accurate alignment (such as that of the guide pins, which must be almost perfectly vertical) in order to achieve high-quality performance. And the tape itself, of course, must have all of the appropriate physical as well as magnetic properties.

Perhaps by running the cassette at fast speed you are loosening up the tape and the moving parts in the shell, thus improving performance with respect to wow; there may be similar improvement in the deck itself. I suggest that you try several well-known cassette brands whose reputations are excellent in order to determine which ones give better physical performance. If this doesn't help, the problem lies in your deck, and you will need to visit a competent service shop.

## Print-Through Protection

*Q. If I record a cassette tape in just one direction, in order to avoid print-through, is it still necessary to leave the tape in the "tail out" position when storing it? If so, why?—Monte Kim, Reedley, Cal.*

*A.* Print-through occurs between adjacent layers of tape on a reel, not between adjacent tracks. Therefore, recording a cassette in only one direction will not prevent print-through.

Leaving a tape in the tail-out position—that is, not rewound after recording—tends to produce post-echo, which is a faint repetition of the original sound. Leaving the tape "head out," in ready-to-play position, tends to produce pre-echo, which is a faint forerunner of the original signal. Post-echo tends to be less annoying than pre-

echo. Therefore, in the case of a tape recorded in one direction, it is usually advisable to store the tape tail out. Moreover, when it comes time to play the tape, the act of rewinding prior to playback tends to reduce the print-through somewhat.

## Give It a Smack

*Q. Over the past year, I have been experiencing intermittent problems with left-channel dropout. Sometimes the left channel will be as much as 10 to 20 dB below the right channel; at other times it will drop out altogether. My temporary, although occasionally long-lasting, solution is to forcefully strike the right side of the deck with my hand. This lowers my frustration level and raises the left channel's level. What is the cause?—Stuart Zimmerman, Solana Beach, Cal.*

*A.* There is probably a poor connection, perhaps due to improper soldering, in the left-channel circuitry. There may also be a defective part, such as a resistor, or perhaps there is dirt in the wiper of a level control. You need the help of a qualified service technician.

## Recording Music at 3¾ Ips

*Q. I have a problem with my open-reel deck, although it is only two years old. At the 3¾-ips speed, it is totally unsuitable for music reproduction. At 7½ ips, music reproduction is fine, but this offers practically no advantage in recording time over cassette when using 1-mil tape on 7-inch reels.—Saverio Giordano, Hoffman Estates, Ill.*

*A.* A good modern open-reel tape deck should be able to provide very good reproduction at 3¾ ips, with frequency response about as good as that of a cassette deck and with somewhat better performance in such respects as distortion, headroom (freedom from tape saturation), modulation noise, etc. It appears that your deck isn't performing up to specifications and should be brought to a service shop. It may have such problems as incorrect bias, improper azimuth alignment, a widened gap in the playback head, or faulty equalization.

At 7½ ips, recording quality should be far superior to that of a cassette tape. You are right, however, in saying there's no advantage in recording time at that speed. At 7½ ips, a 7-inch reel

of 1½-mil tape will play for 32 minutes per side, versus 30 minutes per side for a C-60 cassette; a reel of 1-mil tape will play for 48 minutes per side as opposed to the 45 minutes per side of a C-90. In practice, a few seconds' worth of tape will be used as leader, making the reel's recording-time advantage over cassette even smaller. At 3¾ ips, of course, recording times would be doubled.

## Connections

*Q. I want to connect my FM/long/medium/shortwave receiver, which includes output jacks for a tape deck, to my tape recorder, which has microphone input jacks. How can I connect these to record from radio?—Jonathan Taylor, Tulsa, Okla.*

*A.* Chances are that if you connect the tape output of your receiver directly to the mike input of your tape deck, the deck will be overloaded, resulting in severe distortion and possibly in serious aberrations in frequency response. The solution is to interpose in-line attenuators between your receiver outputs and tape deck inputs. Check with your local audio shop as to what they have in the way of such an item. Radio Shack has what it calls a "signal reducer," selling for just a few dollars each, that might solve your problem. It is Model 274-300. Of course, you will need two, one for each channel. This item provides about 40 dB of signal attenuation, which might be too much. If so, you'll have to look for devices with less attenuation.

## Distortion S.O.S.

*Q. I am getting a lot of distortion when taping. Please advise.—W. H. Martina, Emmastad, Curaçao.*

*A.* There are a number of possible causes: Insufficient bias current fed to the record head, excessively high record level, faulty heads, defective parts in the record or playback amplifier of the deck, or a fault in the component to which the deck is connected. You will need the help of a service technician to root out the cause. **A**

**If you have a problem or question on tape recording, write to Mr. Herman Burstein at AUDIO, 1515 Broadway, New York, N.Y. 10036. All letters are answered. Please enclose a stamped, self-addressed envelope.**

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**DX4200 Preamplifier/Equalizer**, with Compact Disc Player and Video/Audio inputs. Phono preamp has Variable Cartridge Loading (50-800 pF, 100/47,000 ohm); phono level controls for adjustable  $\pm 20$  dB gain; MC variable reluctance or MM cartridge inputs; 3-way Tape Dubbing; 2 external Signal-Processor Loops; conventional line outputs plus separate Autobridge Line Outputs for Mono Bridging of Most Amps; EQ S/N 114 dB; Passive-Coil filters with 15 dB boost or cut for each octave, max 22 dB; Differential Comparator circuitry for True 0.1 dB Unity-Gain EO balancing; includes Frequency Spectrum Analyzer test record and Instant reset Computone Charts. 19" W x 5 1/4" H x 11" D, 20 lbs. .... \$699

**DX4000 Preamplifier**. Same as DX4200 without phono cartridge matching controls and Equalizer, but with 3 external loops. 19" W x 3 1/2" H x 11" D, 15 lbs. .... \$439



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**PCR800 Power Amplifier**, MOSFET stereo, 205 watts per channel continuous RMS 20-20,000 Hz into 8 ohms  $< 0.05\%$  THD; TIM unmeasurable; S/N 105dB. 8 1/2" W x 5" H x 12" D, 22 lbs. .... \$499



**PRO-REFERENCE TWO**, Studio Monitor quality MOSFET Stereo Amplifier. LED Meters monitor output of each channel in dB from  $-40$ dB to  $+3$ dB (200 Watts per channel into 8 ohms). True Clipping Indicators, switching for two pairs of speakers. **Power Output:** 100 W/ch into 8 ohms, 190 W/ch into 4 ohms continuous RMS, 20-20kHz at  $< 0.05\%$  THD. S/N  $> 105$ dB. 19" W x 5 1/4" H x 10 1/2" D, 30 lbs. .... \$699

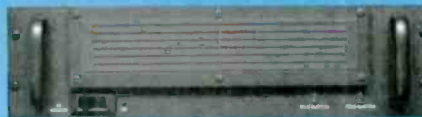
**PRO-REFERENCE ONE**, Same as above except no meters and no speaker switching, 28 lbs. .... \$599

## Power Amplifiers



**PRO-POWER FOUR**, MOSFET stereo power amp 300 Continuous RMS Watts per channel @ 4 ohms, 205 Continuous RMS Watts per channel @ 8 ohms, 20-20kHz, 450 Watts RMS @ 2 ohms, 900 Watts RMS @ 4 ohms Bridged. THD  $< 0.05\%$ , Hum and Noise:  $-105$  dB, Front Panel switching for 2 pair of speaker systems. 40-LED 0-1600 Watt Power Meters. 19" W x 5 1/4" H x 11" D, 30 lbs. .... \$799

**PRO-POWER THREE MOSFET** stereo power amplifier, same as Pro-Power Four, except no 40-LED power meters. 30 lbs. .... \$699



**PRO-POWER EIGHT MOSFET** stereo power amp 600 watts per channel continuous RMS power into 4 ohms; 375 watts per channel continuous RMS power into 8 ohms, 20-20,000 Hz with no more than 0.05% THD; 900 watts per channel RMS into 2 ohms; Freq. resp. 20-20,000 Hz  $\pm 0.1$ dB; S/N  $-105$ dB; slew rate 50V/msec; TIM unmeasurable; IM 0.05%. 19" W x 5 1/4" H x 16 1/2" D, 87 lbs. .... \$1,499

**PM840 Power Amplifier**, MOSFET stereo, features no-current-limiting power supply, 300 w/p/c RMS into 4 ohms; 450 w/p/c RMS into 2 ohms; 205 w/p/c into 8 ohms  $< 0.05\%$  THD; Freq. resp. 20 to 20,000 Hz  $\pm 0.1$ dB; S/N  $> 105$ dB; slew rate 50 V/microsec; TIM unmeasurable; damping factor 200. 8 1/2" W x 5" H x 12" D, 22 lbs. .... \$549



**A5002 Power Amplifier, Class-H** Vari-Proportional circuitry and Autobuffer for continuous operation into 2 ohms. Features auto crowbar protection circuit for output protection without current limiting; 40-LED 0-1,000 Watt power output Meters; Front-Panel switching for 2 pairs of speakers; True Clipping Indicators; Input Level controls. Output power 250 W/ch into 8 ohms, 375 W into 4 ohms continuous RMS, 20-20,000 Hz at  $< 0.09\%$  THD; S/N  $> 105$ dB; slew rate  $> 50$  V/microsec; TIM  $< 0.02\%$ . 19" W x 7" H x 12" D, 50 lbs. .... \$949

**A5001 Power Amplifier**, Same as A5002 except no Meters and no Input Level controls. 50 lbs. .... \$799

## Tuners



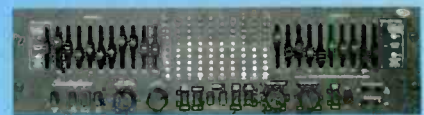
**T6200 AM/FM Stereo Digital Tuner** Digital quartz PLL tuner with 16 Station presets, 5-digit Station Readout, Auto-Scan tuning, active High Blend filter. Broad-Band AM switch, 19" rack-mount front panel, IHF sens 1.6  $\mu$ V; S/N 75 dB; distortion 0.08%. 19" W x 2 3/8" H x 12" D, 10 lbs. .... \$349

## COMPACT DJSC Player

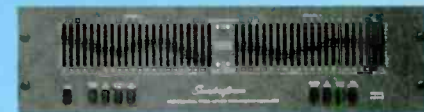


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**DC2214 Differential Comparator Equalizer**. Same as DC 2215 except equalizer filter circuits have op-amp synthesized inductors. THD and IMD  $< 0.01\%$  at 2 V; S/N ratio 106 dB at 10 V; boost/cut range  $\pm 12$  19" W x 3 1/2" H x 9" D, 13 lbs. .... \$299

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## Current and Work

*Q. Is there less amperage in the negative side of a speaker wire? I wonder about this because it seems to me that the voice-coil has to use amperage to do work in the form of moving the speaker cone.—Lee Engelman, Oradell, N.J.*

A. An electrical circuit is complete only when all of the electrons which start by entering one terminal (of a loudspeaker, in this instance) return to the other terminal. Thus, the amperage, which is the measurement of the number of electrons passing a given point in a second, must be the same for all points in the circuit.

## Equalizer Center Frequencies

*Q. The frequency response of my amplifier is 40 Hz to 20 kHz. My equalizer has a number of frequency controls, the lowest being for 60 Hz and the highest for 14 kHz. When I boost those two outer bands, what happens to the frequencies below 60 Hz and above 14 kHz? Are they boosted along with the filters' center frequencies? What about everything between those outer extremes? Are they affected, or do they change only in accordance with their individual controls?—Name withheld, Brooklyn, N.Y.*

A. How an equalizer affects frequencies other than its specified center frequencies depends to some extent on its design. Your equalizer can probably help maintain bass below 40 Hz, but this depends on the width of the frequency range affected by its 60-Hz control. If this control affects a broad frequency range, it will likely boost frequencies down to perhaps 30 Hz.

The same can be said for the highest control on your equalizer; it will probably still be somewhat active at 20 kHz. Of course, it likely won't have the effect at 20 kHz that it will have at 14 kHz, its center frequency.

As to frequencies between the extremes, well, each of the frequencies shown on your equalizer panel is the center of a band of frequencies affected by that control. Chances are that the width of each band is such that there will be at least a small amount of overlap between one control and its neighbor. Thus, boosting the lowest frequency fully will cause some boosting in the range immediately above it.

Therefore, with your unit, if you boost the 60-Hz control substantially, you will probably find it desirable to cut the frequency band immediately above it just slightly. By doing so, you will keep that portion of the spectrum more or less where it would have been had you not boosted the 60-Hz band. The same can be said for the effect of boosting the upper frequency: You will probably need to cut the band just below the 14-kHz control if you add substantial boost at 14 kHz.

You will find that most adjustments will not be of the coarse nature we have just discussed. Moving any one of the controls just 2 to 3 dB will usually produce dramatic audible results. Changes of this small size will have such a minimal effect on neighboring bands that no compensation need be made. As far as I am concerned, one should use an equalizer only sparingly.

## Pilot Frequencies

*Q. What are the 19- and 38-kHz products associated with FM equipment? Why is there a need to suppress them if the frequency range of FM stereo broadcasts does not extend beyond 15 kHz?—Robert Beiswinger, Townbank, N.J.*

A. In order to explain in any detail the matter of these frequencies, it would be necessary to fill more space than this column allows. Suffice it to say that, in order to transmit a stereophonic signal, it is necessary to generate a 19-kHz "pilot" signal. This is sent via the same transmitter which supplies the desired program. The tuner requires this signal so that the stereo decoding circuit can lock onto the stereo information. The tuner uses the 19-kHz signal to create a 38-kHz carrier which is used to reconstruct stereo information.

If these two frequencies were allowed to appear at the output of the tuner, serious problems would occur. The higher audio frequencies would combine with the 19-kHz pilot signal to produce a kind of background swish which is often referred to as hash. It is at least conceivable that harmonics of the 19-kHz signal would "beat" with any SCA signals that might be present, again producing very annoying hash. An attempt to record from a tuner which does not suppress these fre-

quencies would very likely result in even more hash, because harmonics of the 19- and 38-kHz signals could beat against the recorder's bias oscillator frequency.

Tape decks with Dolby noise reduction commonly have multiplex filter switches which can be set to limit the highest recordable frequency to 15 kHz and to suppress all higher frequencies. This ensures that the Dolby circuits, whose actions are controlled by the high-frequency content of the signal, will respond only to upper audio frequencies and not to any 19- or 38-kHz tones which may escape the filters in the tuner. Otherwise, the Dolby decoding process might not work properly, and highs would be rolled off in playback.

## Cartridge Coil Cracks

*I am writing this in response to your answer to Mr. Cornell Coco about the expected life of his moving-magnet phono cartridge (July 1987).*

*Thermal expansion and contraction can (and often does) cause microscopic cracks on the varnish used to insulate the coils of a moving-magnet cartridge. Moisture can then penetrate right to the surface of the copper. After sufficient buildup, electrolytic action can result, which will ultimately result in shorted windings. This, in turn, leads to weakening of the audio signal produced by the cartridge, lowering its impedance and introducing nonlinearities in frequency response.*

*I have handled thousands of cartridges and have seen many suffering from this problem. The remedy, of course, is to replace the cartridge when either channel is discovered to be weak or after eight to ten years of satisfactory service. This is just what one would do with a broken stylus or any other nonrepairable item.*

*Incidentally, the same type of coil failure is often found in microphones, tape recorder heads, speaker voice-coils, and electromagnetic pickups used on guitars.—George Winter, Tuscaloosa, Ala.*

If you have a problem or question about audio, write to Mr. Joseph Giovanelli at AUDIO Magazine, 1515 Broadway, New York, N.Y. 10036. All letters are answered. Please enclose a stamped, self-addressed envelope.

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Vol 9 No 7

November 1986

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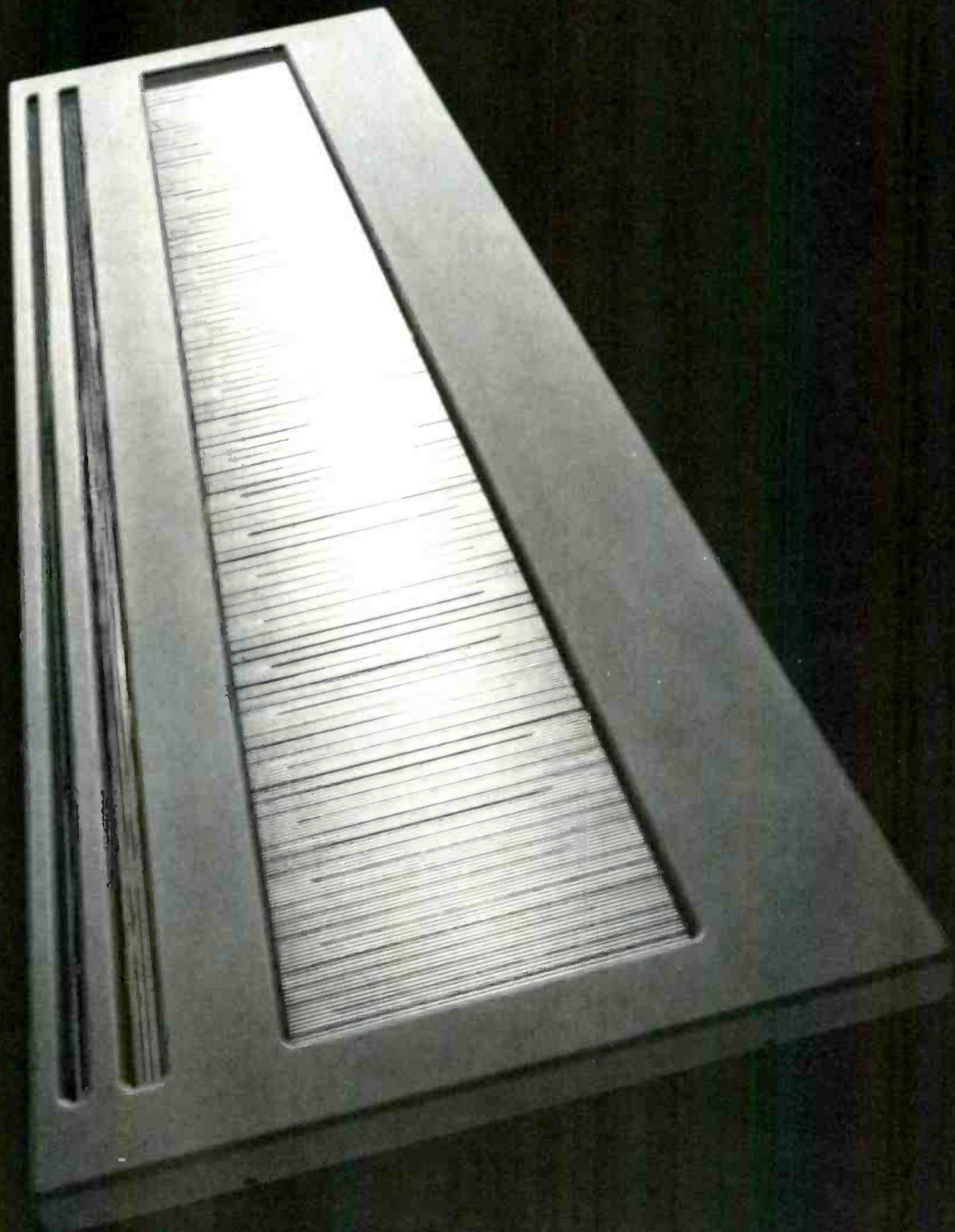
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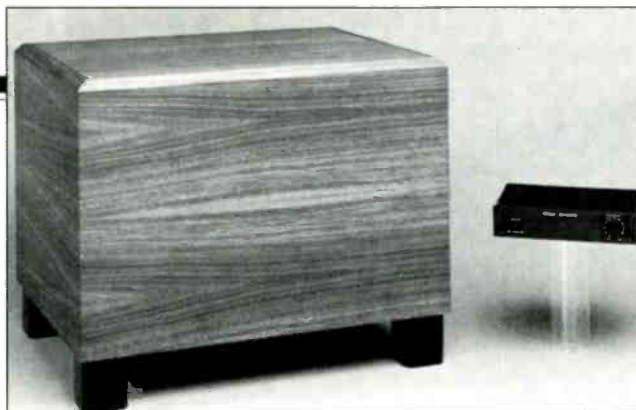
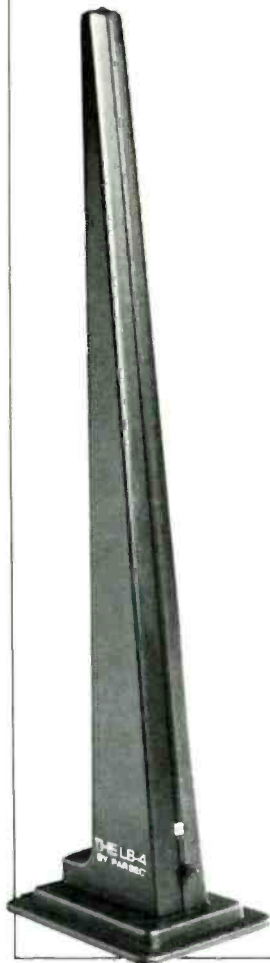
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## Parsec FM Antenna

The LS-4 indoor FM antenna uses a new gallium arsenide FET low-noise amplifier, designed by Larry Schotz, with gain that averages 36 dB over the FM band. The antenna element is oriented vertically to avoid multipath reflections, but the unit can be tilted to one side and aimed at a station when high overall signal gain is needed. To minimize clutter, a single cable carries d.c. power to the LS-4 and returns FM signals to the tuner. The antenna is 17¼ inches tall. Price: \$59.95. For literature, circle No. 100



## Velodyne Powered Subwoofer

Like the larger Velodyne subwoofers, the ULD-12 has a built-in servo amplifier which uses feedback from an accelerometer on the driver. In this model, that driver is a 12-inch cone

with a 56-ounce magnet and a resin-impregnated cone; the amplifier is rated at 100 watts rms, 400 watts peak. A control and adaptor box contains both speaker- and line-level inputs, plus woofer-level and subwoofer-bypass controls. Connection to the speaker is made via a 25-foot shielded cable which can be extended. The crossover is at 85 Hz, with a high-pass slope of 6 dB/octave and a low-pass slope of 12 dB/octave. The speaker cabinet, available in walnut or oak veneer, measures 21 inches wide x 17 inches high x 16 inches deep. Price: \$850. For literature, circle No. 102

## Tannoy Speaker

The RHR system is built around a dual-concentric drive unit whose woofer cone doubles as the horn for the coaxially mounted tweeter. Low-frequency loading is via a rear folded horn. The cabinet is made of selected walnut, with solid walnut moldings and a burr walnut veneer panel on the front. Price: \$8,995 per pair. For literature, circle No. 101

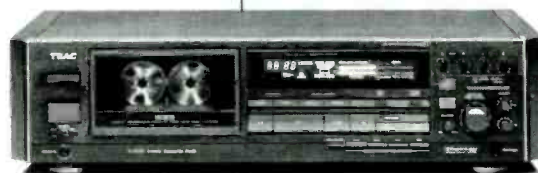


## Teac Cassette Deck

A new three-head system with discrete record and play heads allows each head of the V-970X to be individually factory-aligned

for azimuth. This minimizes phase errors and extends frequency response. The deck also features a full set of noise-reduction systems, including dbx and Dolby B

and C, together with Dolby HX Pro headroom-extension circuits. The transport features dual capstans and a hysteresis servo system to maintain tape tension. Other features include several music-search functions, a CD level check, intro check, and repeat. A wireless remote control is included. Price: \$729. For literature, circle No. 103





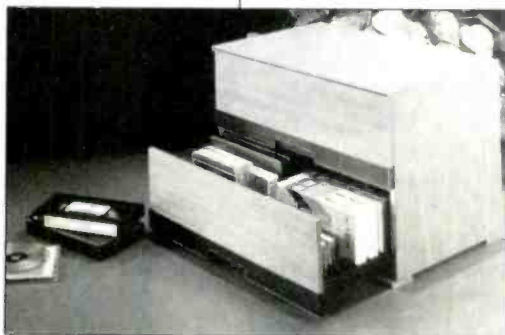


**Revox Controller**

The B203 Timer Controller is an intelligent control-integration device for selected B200-series Revox audio components. The B203 gives the system one-touch control of complex functions—to start CD play, for instance, a single command would turn on both the CD player and the amplifier and switch the amp to its CD input. That command can be entered either on a component's front panel or via the optional B205 infrared remote controller. Using the remote, up to five timed events can be programmed. Alternatively, an RS-232 port enables the B203 to be operated via a computer. Relay contacts on the B203 can be used to program lights on and off and to perform other functions. Price: \$600; infrared remote, \$160. For literature, circle No. 104

**Soundesign Media Cabinet**

Adaptable drawers help Soundesign's TM32K storage cabinet hold any combination of audio tapes, videocassettes, and CDs. Maximum drawer capacity is 72 single Compact Discs plus four double CDs, or 48 audio tapes, or 32 videocassettes. Measuring



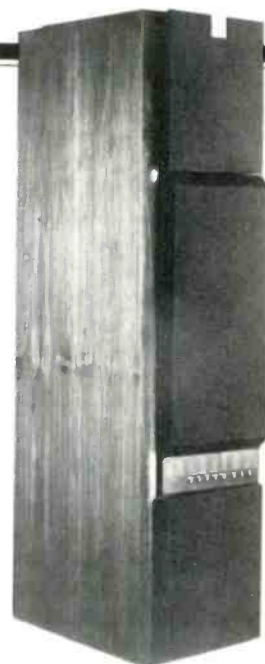
18 1/8 in. W x 13 in. H x 12 3/8 in. D, the TM32K can fit on a bookshelf. It is finished in oak-grain vinyl. Price: \$19.95.

For literature, circle No. 105

**Panasonic CD Changer**

Holding six CDs, the SL-P3900C features 36-step random-access programming, direct selection entry via a 10-key pad, and random play of all

tracks in the magazine or all tracks entered in a program. The player uses digital filtering and comes with a 23-key wireless remote. Price: \$399.95. For literature, circle No. 106



**Altec Lansing Speaker**

Five amplifiers with individually (and remotely) adjustable level drive each speaker in the Model BIAS 550 five-way speaker system. The two 10-inch subwoofers near the top and bottom of each cabinet get 250 watts of the 700-watt-per-channel total and are mounted in sub-enclosures that are isolated from the main cabinet to prevent vibration transfer. At 80 Hz these drivers cross over to the center section, which contains the other drivers and the control panel. This section can be turned 15° to either side, to fine-tune imaging without moving the 490-lb. cabinet. The drivers it contains include an 8-inch woofer and 6 1/2-inch mid-bass with woven carbon fiber cones, and a 2-inch midrange and 1-inch tweeter with Polyimide domes and a diamond coating to increase rigidity. Rated frequency response is 20 Hz to 20 kHz, ±2 dB. Price: \$12,000 per pair. For literature, circle No. 107

## DATS AND DASHES

It looks as if Americans will be able to play DAT in their cars long before they get the official go-ahead to record on it at home. Late last year, Ford announced that DAT players would be available as an option on the Lincoln Continental, starting this summer. The players will be made by Sony and will be plug-compatible with the Sony-built CD player now available on the Continental. At the January CES, Clarion and Kenwood announced DAT players for delivery in February, at prices of \$1,750 and \$2,000, respectively. (Technics showed a unit too, but they have no plans yet for its marketing in the U.S.) Right after CES, GM announced that it would have a DAT option available later this year. As Ford pointed out, there's no prohibition against DAT players, only the possibility of roadblocks for DAT recorders.

The significance of these announcements depends on who's making them. For Ford and GM, announcing DAT is more a matter of market positioning than market share. The number of DAT players either company can expect to sell this year is minuscule when compared to the vast numbers of radio and tape units they install in their cars' dashboards; Ford, in fact, expects to move no more than 1,000 DAT units. But by announcing DAT now, the car makers show that they are, at last, in the vanguard of car stereo technology. That's quite a contrast to the days when Detroit had to be forcibly pried away from 8-track cartridge tape when the public began to prefer cassette.

To Clarion and Kenwood, on the other hand, sales are probably more important than audio image-polishing. So the fact they're finally offering these players for sale means that they think there is a U.S. market for them. And since very little commercial DAT software is yet available, even in Japan, they must think there's a fairly sizable number of home DAT decks here, even though none have yet been officially imported. (I used to think I knew a lot of DAT owners only because so many of my friends are in the audio industry. Now I wonder if DAT might already have arrived, before we've had a chance to realize it.)

Clarion's Audia DAC 2000 is a tape-only unit, presumably designed to be used in conjunction with in-dash tuner/



*Kenwood KDT-99R car DAT player*



*Technics DT1 car DAT player*



*Clarion Audia DAC 2000 car DAT player*

cassette decks or tuner/CD players. For this year, that approach seems logical; with software still in short supply, there's not much sense in making DAT a car's sole playback medium. The Technics DT1 and Kenwood KDT-99R, on the other hand, have built-in FM/AM tuners.

The Technics has more room for a tuner because of its small (15-mm) head drum. That drum is also used in the portable DAT recorder prototype which Technics showed at CES. Casio too showed a portable DAT recorder, which it planned to have on the market this month for \$1,099. Considering the high cost of DAT tapes and equipment and the limited software available, one might be better off, for now, buying one portable for both home recording and car playback, instead of buying separate machines for each purpose. And the car owner is more likely to take his DAT unit with him when he parks if it can also be used as a portable once it's removed.

Patching in a portable is still the cheapest way to add CD to a car, and it need not involve tinkering with the sound system. That's undoubtedly why

Sony, last year, introduced their D-160, a portable unit designed primarily for car use. This year, Citizen showed a full kit of mobile accessories for their CBM-2000 and new CBM-3000 CD portables, and Sanyo showed the CP12, an ultra-thin player which may be powered by a battery pack or a 12-V adaptor, and for which a gadget to feed its output through an in-dash cassette slot is available.

Not that there was any shortage of in-dash CD players at CES. Most of these, like Kenwood's new KDC-90R, also have tuner sections, and several have amplifiers as well. The KDC-90R is a pull-out unit, but if you don't always want to take it with you, the optional CK-50 electronic lock system (which also fits other Kenwood pull-outs) will automatically lock the player into its dashboard slide 10 S after ignition switch-off. The player's transport can be tilted up 30° for use in cars that have no level mounting positions. (If a CD player is tilted too far back it may not fully eject a disc, and it will retract the disc as soon as it's ejected. When that happens, snapping a disc out takes the speed and dexterity of a frog catching flies with its tongue.) The same tilt feature is found in Kenwood's player-only version, the KDC-80; it will probably be even more useful in that unit, since add-on players are often mounted under the dash, where it's hard to level them.

Denon, with the DCC-8920 tuner/CD unit, is now into its second generation of pull-out CD players. Features include presets for 18 FM and 6 AM stations, illumination which dims with the dashboard lights and which can be made to match the dash's lighting color, and a front-panel input for a portable tape unit.

Both Clarion and Blaupunkt showed tuner/CD units which use the single-disc cartridge system introduced by Yamaha a few years back. Clarion's unit, the Audia 5000, has an accessory input which the maker suggests is for "a CD changer or DAT player" rather than for a plain-vanilla cassette unit. Blaupunkt's tuner/CD player is the Chicago SCD 08.

Both Sony and Pioneer showed new trunk-mounted changer systems. Pioneer's six-disc CDX-M100, actually introduced a few months before CES,

can be controlled from the KEX-M700 in-dash tuner/cassette player, for those who want to have radio, tape, and CD. The system can also be operated via a wireless remote control supplied with the KEX-M700 or via the remote control provided with Pioneer's new home CD changer. The home remote stores programming information in its memory, and those programs can be downloaded into the car unit's memory at the touch of a button.

Sony's second-generation DiscJockey, the 10-disc CDX-A20, can be controlled from in-dash tuner/tape units (the XR-7300, with built-in amplifier, and the XR-7200, without) or from the RM-X2 remote commander. The RM-X2, which can be installed in the dash, mounted on an optional goose-



Harman/Kardon CR151  
cassette player/receiver

neck stalk, or left loose for hand-held use, can also control the DiscJockey's optional tuner pack and can be used with auxiliary sources such as Sony's XK-8D half-height cassette player. A second remote commander can be added. The CDX-A20 is smaller than its predecessor and can be mounted upright as well as on its side.

The security advantage of trunk mounting is that what a thief can't see, he usually can't get. Aiwa has long used that principle in its self-concealing head units. In the company's Series 5000 models, the control panel flips up over the display and tape slot when not in use; in the less expensive Series 3000, the controls are part of the main panel, but a security cover swings up to cover them when you park. The top model in each series also slides out of the dash for added security.

Flipping panels can be used for sheer convenience too. Sharp's RG-F882 has a two-sided flip-down panel, with major operating controls on the normally exposed side and equalizer controls on the part that's exposed

when the panel is flipped down. In Europe, Alpine has shown two "Man Machine Interface" models whose controls and displays are normally vertical; the front panels can be flipped down, however, to expose the tape or CD slot and to aim the controls up at the user.

Getting back to security, Sharp's RG-F816, with non-flipping controls, can be disabled by removing a pocket-sized module; removing the module also exposes a bright-colored panel that bears the message "THEFT DETERRENT SYSTEM."

The most interesting approach to slide-out security is being used by Technics and Panasonic. Both companies offer two models whose control, tape, and tuner sections are removable while their amplifier sections stay with the mounting brackets in the car. The removable sections are lighter and more compact than those with built-in amps, and therefore are more likely to be carried away by the owner when he parks. Panasonic's CQ-E430 and CQ-E410 both come with amplifiers that deliver a nominal 25 watts into each of four channels (at unspecified distortion levels), and both have front-panel input jacks for portable CD players. Technics also offers two slide-out head units with front-panel CD inputs, the CQ-H9320 and the CQ-H9310. These can be used with bracket sections in three power ranges: 4 x 25 watts, like the Panasonics; 2 x 25 watts (convertible to 4 x 8 watts), and no watts at all (for feeding preamp-level signals to external amps).

Blaupunkt's UniFit mounting system, announced shortly before the show, is designed to simplify installation in both the DIN slots found in European and some American cars and ISO slots common in Japanese autos; it also provides for optional slide-out mounting on many models.

There seems to be more interest in tuner design lately. The "Hi Q" circuit used in Harman/Kardon's Citation Twenty-Three, to reduce interference from strong nearby stations, is now available on an H/K car stereo too, the CR151. Proton announced a new tuner design from Larry Schotz, incorporated in its new CR-360 cassette deck/receiver. However, Proton would not yet disclose details about the design, beyond stating that the Schotz II Tuner

would have 3 dB better sensitivity, enhanced selectivity, and improved overload resistance.

Philips showed an interesting antenna diversity system called PSM, for "Phase Shift and Mix." The PSM system adds and subtracts the signals from two antennas to get four r.f. signals, then selects the best of these four signals rather than just the better of the two unmixed antenna inputs. The system measures not only r.f. signal level but the detected audio signal from the FM station and the noise level. Philips says the system is small enough to be built into a standard DIN-sized head unit, or it can be placed outside the head unit.

It looks like FMX is coming closer. Both Sanyo and Sprague have produced chips with FMX reception circuitry, which makes building the system into car stereos more practical. At CES, Sanyo showed FMX-equipped car-stereo prototypes from Alpine, Clarion, and Concord, as well as an FMX model of its own. Prototype home units from Denon, Fisher, Lux, Magnum Dynalab, NAD, and Sony were also on display.

Speaking of displays, Targa's R-780 head unit can be programmed by the



Targa R-780 head unit

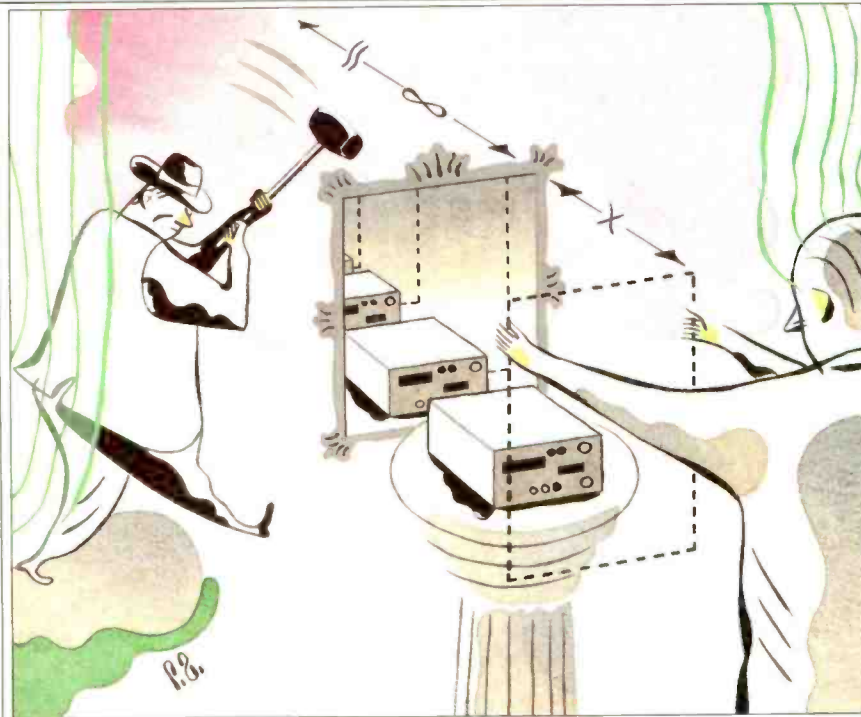
user to show various stations' call letters or program formats instead of just their frequencies. Targa calls the system SETR (Symbolic Electronically Tuned Radio). This is not to be confused with the system being introduced in Europe, wherein stations broadcast such information to receivers, which then display it automatically.

I note, belatedly, that two head units, Kenwood's KRC-999II and Blaupunkt's Berlin, both have automatic volume controls which adjust volume to match changes in ambient noise.

I also note belatedly that I've run over my allotted space, so amplifiers, speakers, and the like must await another column.



## PHILIPS' FOLLY



**M**uch has been written about the record industry's efforts to inhibit DAT recorders from making "perfect clones" of prerecorded music. But while the CBS Copy-Code "notch" system was getting most of the ink, I had been hearing rumors about an anti-copying system for DAT that, unlike the Copy-Code system, would *not* alter or affect the audio content of recordings. The giant Philips organization of Europe, which has an interest in both the hardware and the software side of audio (it is the parent organization of Magnavox and Polygram Records), was said to have developed a system known as Solo. I have since learned from reliable sources based in Japan that there are two Philips anti-copying schemes, dubbed Solo and Solo Plus. Both were developed as alternatives to the Copy-Code proposal that, as of this writing, is still being evaluated by the National Bureau of Standards.

Various speculations as to what Solo and Solo Plus would do to inhibit the copying of program material have appeared in print over the last several months. Until recently, however, Philips has refused to confirm or deny anything. Here are the facts, as told to me by industry sources.

Solo, if implemented, would permit users to make only *one* DAT copy of a CD. During the making of that copy, the DAT recorder would add a copy-inhibit digital bit flag to the subcode of the tape recording. While this bit flag would in no way affect audio quality, it would prevent one from making subsequent direct digital copies from that DAT recording. Additionally, since every CD has an identifying digital code (and, presumably, every prerecorded digital tape will as well), each DAT recorder could be programmed to "memorize" the IDs of those CDs or digital tapes that had been copied on it once. Any attempt to make additional copies from the same source on the same DAT machine could thus be thwarted.

The RIAA and the major record companies that it represents immediately rejected this proposal because it would still permit users to make multiple *analog* copies of copyrighted material—something that the Copy-Code system would prevent. Furthermore, additional digital copies of the CD (or of a prerecorded DAT) could indeed be made, if the player's digital output were connected to the digital input of a second DAT recorder—and a third, and a fourth, etc.

Solo Plus, the other Philips proposal, was instantly deemed acceptable by the RIAA and its major record-company members. Unfortunately, it is *totally unacceptable* to the hardware manufacturers (and ought to be equally unacceptable to audio enthusiasts). Like Solo, Solo Plus would permit users to make one digital copy of a CD or a prerecorded DAT. However, machines complying with Solo Plus would have *no* analog inputs! This would mean that a DAT recorder could not be used to record FM radio programs, LP records, prerecorded analog audio cassettes, or any other analog program source. (Editor's Note: Unless, that is, you used a preamp with its own A/D converter—and such preamps are now appearing.—I.B.)

Perhaps in an attempt to justify this incredible scheme, Philips points out that the dedicated audiophile who would be interested in DAT probably owns a CD player that has a digital output jack. Further, in Japan and other parts of the world, digital audio broadcasting is already a reality, so a whole new crop of tuners with digital outputs is likely to be available soon.

Many DAT hardware manufacturers think Philips is offering these two extreme solutions simply to stall the proliferation of DAT machines in Europe and the U.S. Three possible reasons have been suggested for this maneuver: First, delaying DAT will permit CD to gain an even stronger foothold before DAT becomes a major format. Second, further delay of DAT will permit Philips' DAT research and development to catch up with the Japanese. Finally, delaying DAT might provide Philips with the time needed to come up with an acceptable standard for recordable CDs. Philips has been dedicated to optical/digital formats ever since the laser videodisc was developed, and if practical recordable CDs become a reality, DAT may never see the light of day here at all.


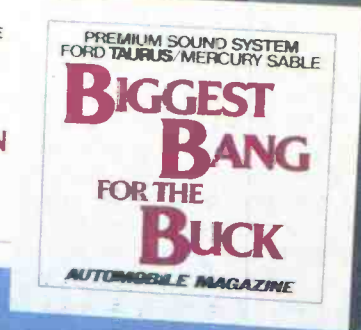
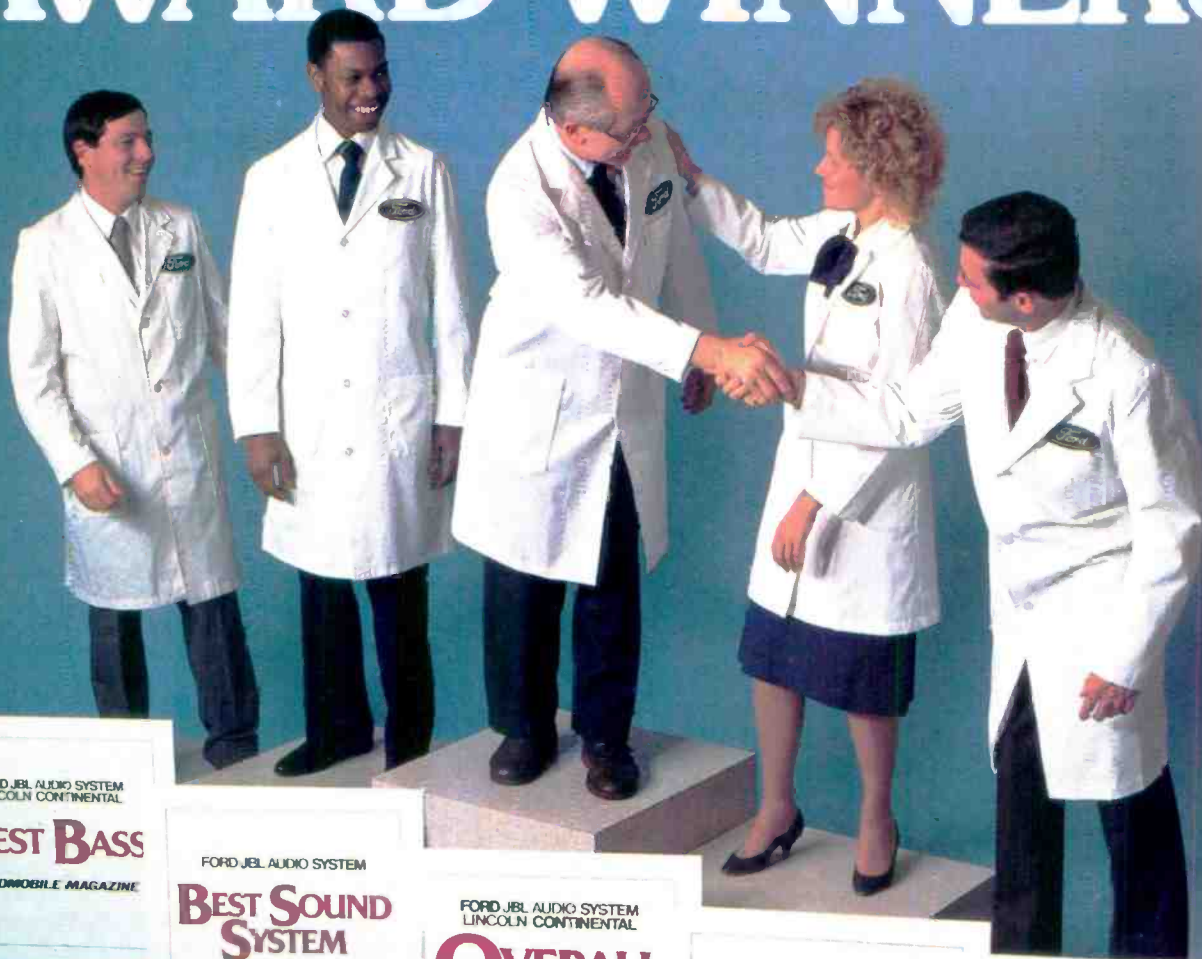
Given no compromise solutions between Solo and Solo Plus, the hardware and software groups have made little or no progress during joint meetings they have held in Europe. Despite the impasse, the feeling in Japan is that, by the time you read this, DAT will have broken loose in major markets, including the U.S. Let's see if this crystal-ball gazing proves to be correct! 

Illustration: Philip Anderson

# AWARD WINNERS



The critics have spoken. They've praised Ford Audio Systems for superb performance and exacting quality. And they've honored them with impressive awards.

Here's what the experts said about the Ford JBL Audio System in the 1987 Lincoln Continental:

*"...transcends the normal car stereo experience and begins to enter the realm of good home equipment... the sound is exemplary... This is the first factory system we've heard that could deliver real sock 'em bass response... the Ford JBL system is simply spectacular."*

*Automobile Magazine*

*"...more expensive than concert tickets and probably better."*

*Playboy*

*"...the Ford JBL system gives the best value of the three." [in a comparison with Delco/Bose and Chrysler/Infinity systems]*

*Popular Mechanics*

Also earning recognition was the Ford Premium Sound System in the Ford Taurus and Mercury Sable:

*"Its purely technical performance is among the best... The premium sound system's modest price buys a tremendous jump in performance."*

*Automobile Magazine*

There's good reason for the high marks given to Ford Audio Systems. Each system is designed and engineered for the specific acoustic requirements of Ford, Mercury and Lincoln vehicles, giving you true custom-tailored performance.



**AUDIO SYSTEMS**

## LOSING IT IN VEGAS



**T**he EIA states that 103,000 people attended the 1988 Winter Consumer Electronics Show during its January 7-10 run in Las Vegas, but most observers consider this figure grossly inflated. In the opinion of a similarly large number of Show watchers, this CES was rather dull, what with the scarcity of new product introductions and the dollar/yen situation hanging like an omnipresent dark cloud and affecting all buying and marketing decisions.

The third edition of the "R-DAT Follies" played to a less than packed house. Once again, a few companies boldly proclaimed they would accept orders and soon be shipping R-DAT units. And once again, by the end of the show they had to concede that their marketing plans were premature. Although such factors as the foreign trade bill and a shortage of critical DAT parts from vendors in Japan were cited as reasons for the hold-up, most felt it was still the uncertain outcome of the National Bureau of Standards' Copy-Code tests that was the real culprit. But now all of this may be academic, because word has come from the Bureau that they were able to accelerate the tests and that results would soon be in. Thus, by the time you read this, per-

haps sweet reason will have prevailed and the whole absurd Copy-Code issue will be nothing but a bad memory.

The demise of the Copy-Code will open the R-DAT hardware floodgates, and while initial prices will be fairly high, consumers will have quite a wide choice of machines in the home component, automotive, and portable categories. To me, the most fascinating R-DATs will be the fantastic little portable recorders. Their potential for "fun-type" applications—parades, outdoor concerts, and the like—all with the ultra-fidelity of digital recording, is virtually unlimited.

Casio claims to have the smallest and most lightweight of the R-DAT portables. Their DA-1 measures just 4.7 inches wide, 1.7 inches high, and 5.7 inches deep and weighs only 1.6 pounds. Technics also has an R-DAT portable, the SV-MD1. It measures 8.3 inches wide, 1.6 inches high, and 4.8 inches deep and weighs 3.2 pounds with its rechargeable Ni-Cad battery which provides 2½ hours of recording time. The unit can also be powered from a car battery and a.c. The small size of the SV-MD1 is partially due to the use of a 15-mm recording head drum instead of the standard 30-mm R-DAT drum. Also, eleven LSI chips

were developed for the Technics. The SV-MD1 uses two A/D converters with digital filtering on special LSIs incorporating a new multi-stage noise-shaping system with 64-times oversampling. The system is said to avoid zero-crossing distortion and maintain phase linearity. Many of the features of standard R-DAT units are also provided on these portable R-DAT recorders. Pricing of the Casio is about \$1,000 in Japan, while the Technics is about \$2,300 over there.

This year marks the fifth anniversary of the Compact Disc's introduction in the U.S. The CD was appropriately celebrated at the WCES with many new players in all price categories and, more importantly, by significant advances in CD technology.

The current buzzword in CD players is 18-bit quantization. Companies showing new 18-bit players included Sony, Technics, Stax, Pioneer, and Onkyo. Sony also introduced eight-times oversampling (352.8 kHz/S) on its CDP-507ESD and top-of-the-line CDP-707ESD players. Pioneer and Stax also use eight-times oversampling, via an arrangement with Sony.

There have been several quasi-18-bit CD players on the market; these have 18-bit digital filters, but their output goes into 16-bit D/A converters. With high-level signals, these systems act like conventional 16-bit converters. With low-level signals, the extra two bits are shifted or switched in order to use the more linear portion of the D/A converter. This gives rise to measurable—if not necessarily audible—switching noise.

The new Sony linear 18-bit D/A converter, in combination with the newly developed CXD-1144 18-bit/eight-times oversampling digital filter, provides complete utilization of all 16-bit signals at both high and low levels. Sampling at 352.8 kHz results in an extremely dense data stream as the filter outputs seven "calculated" values for every "real" value. Among the benefits of this increased density is better waveform linearity. The CXD-1144 filter also allows calculating to the 293rd order, as compared to the 96th-order calculations of current quadruple-oversampling technology. These higher order calculations greatly increase filter accuracy, with virtually rip-

# Prism Effect

What has prism effect, a refractive phenomenon, to do with audio equipment?

Nothing, except that it is the simplest analogy to describe what our sophisticated XM-3\* Mobile Electronic Crossover does to audio signals.

When an ordinary ray of white light passes through a prism, it is systematically separated into the primary colors of the spectrum—optically much more aesthetic than the original light.

Similarly, when an audio signal enters the XM-3, the original signal is then separated, via various controls, to the front and/or rear tweeters, mid-ranges and sub-woofers, creating distinctive bands of the audio frequency spectrum that are space and user-specific.

Specially engineered features such as Front and Rear Pre-Amp Inputs and Front and Rear Outputs as well as a constant Sub-Woofer Output, Asymmetrical Electronic Crossover which has two high-pass (32-400 Hz variable)

crossover points for the front and rear outputs and a low-pass (32-400 Hz variable) crossover point for the sub-woofer output, Woofer/Enclosure Equalization engineered for optimizing bass response, Phase Inverter allowing the sub-woofer output to be shifted 180 degrees out-of-phase to compensate for in-vehicle acoustical abnormalities and Frequency Multiplier Switch which, by multiplying crossover points for the front channel, transforms the XM-3 from a **BI-AMP SYSTEM** to a **TRI-AMP SYSTEM**, etc., all contributed to create the **PRISM EFFECT** and make the XM-3 the most versatile electronic crossover ever manufactured for automotive use.

Cooustic...a sound investment.



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03-719-8086

\*Patent pending  
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# **“In its price category, the Adcom GFA-535 is not only an excellent choice; it’s the only choice.”**

Sam Tellig, The Audio Cheapskate

**stereophile**

Vol. 10 No. 7 November 1987



Adcom GFA-535 power amplifier.

## The complete report:

Sometimes products are too cheap for their own good, and people don't take them seriously: the Superphon Revelation Basic Dual Mono preamp, Rega RB300 arm, AR ES-1 turntable, Shure V15-V MR cartridge, and the B&K ST-140 power amp. They can't be any good because they cost so little, right?

Wrong, of course.

Adcom appears to be having the same problem with their \$299.95 GFA-535 amp. Credibility.

Now if this amplifier were imported from England and sold for \$599.95, then maybe it would be taken seriously. And highly praised, no doubt.

For the baby Adcom is one of the finest solid-state amps I have heard. No, not the best; I'm not sure what *is* the best. But it's an amplifier that is so good for so little money as to be practically a gift.

Actually, when Rob Ain from Adcom called, I was about as enthusiastic about the GFA-535 as you were before you finish reading this piece. But Rob insisted, "You've gotta hear this amp."

He brought it over the next day, along with the GFP-555 preamp (\$499.95), and we put both pieces into the rest of the system: a Shure Ultra 500 in a Rega RB300 arm on an AR ES-1 table, with Quad ESL-63 speakers on Arcici stands. Then we chatted for a half hour or so while the electronics warmed up.

And then, simultaneously, the two of us decided to shut up and listen.

"I've never heard the Quad ESL-63 sound better," Rob said. Of course, he was hardly an impartial observer, but the sound was extraor-

dinarily clean, detailed, and musical. If it wasn't the best sound I have ever heard from Quads, it was pretty close.

**“Now if this amplifier were imported from England and sold for \$599.95, then maybe it would be taken seriously. And highly praised, no doubt.”**

This humble \$300 amplifier was driving a pair of very revealing \$3000 speakers and giving a very good account of itself. (We listened first to some Goran Sollscher classical guitar.)

"So how come this product isn't flying off the dealers' shelves?" I asked Rob.

"I don't know. Everyone wants the GFA-555 with 200 watts per channel. Including people who don't need it."

"Does the GFA-555 sound any better?" I asked.

"It's our aim to have all our amps sound pretty much the same. You pay more money, you get more power."

Rob pointed out that while the GFA-535 is rated at 60Wpc, it puts out more like 80. And while I did not do any measurements, my experience with other amps tells me Rob's right. I suppose Adcom doesn't want to steal sales from its GFA-545, rated at 100Wpc and selling for \$200 more.

After a couple of hours, Rob left, grinning from ear to ear, and I later sat down to listen alone. True, when I tried certain Telarc and pushed hard I could get the amplifier to clip—

**“... the baby Adcom is one of the finest solid-state amps I have heard... so good for so little money as to be practically a gift.”**

two LEDs quickly light up (very useful). But the Quads were running out of the ability to use the power anyway. My first impressions were confirmed: the GFA-535 is one of the best amplifiers around for driving Quads. Spendor SP-1s, too.

Suddenly, it hit me what this meant. Conventional wisdom had been dealt a severe blow. You know, the old saw that you should never power a good pair of speakers with a cheap amplifier. Here was a cheap amp—one of the cheapest on the market—that sounded good with Quads, Spendors, later Vandersteens. Probably Thiels, too—at least the CS1. What it means is you can stretch your speaker budget a bit and get the speakers you really want, then economize by buying an Adcom GFA-535 for \$299.95. True, you may be a little power shy, but probably not much. And to say the least, the GFA-535 would make a decent interim amp.

What does the GFA-535 sound like? (You thought I'd forget that part, right?) Well, this is one of the most neutral amps I've heard. While it doesn't sound particularly tubelike, it avoids the typical transistor nasties through the midrange and into the treble. I wouldn't call it sweet—there's no euphonic coloring—but it isn't cold or sterile. What it is, is smooth. And detailed. Far more detailed than I would



ever imagine a \$300 amplifier could be. The GFA-535 reminds me of the Eagle 2A and PS Audio 200C, amplifiers that sell, respectively, for about three and five times the price. Of course, they have more power. And they are more detailed. The point is, the Adcom comes close. Very close.

### **"The GFA-535 reminds me of... amplifiers that sell... for about three and five times the price."**

The bass, like everything else, is neutral, certainly not fat and overdone. But it's here where you notice that this amp is not a powerhouse. You just don't get the solidity and extension you get with a very powerful (and expensive) solid-state amp. Nor do you get the breadth and depth of soundstage that you often find with a very powerful amp. The Adcom GFA-535 sounds a wee bit small, which it is.

My only criticism, and it's more of a quibble, is that the speaker connectors are non-standard and unique (so far as I know). You insert bared speaker wire into a hole and twist the connector tight a quarter turn. Most speaker cables will fit, but some will not. Certainly MIT won't. Neither will the best Kimber, the kind with eight clumps of strands. The less costly four-clump Kimber will, and proved an excellent choice. My sample amp was quiet—no hum—and ran cool. There are selectors for two sets of speakers. And the 535 looks nice.

### **"This amplifier is so good and so cheap that I think any CD owner who buys an integrated amp is nuts."**

And talk about economy: If you're not into LPs anymore, you could buy a Mod Squad, dbx, or Old Colony line-level switching box—or possibly a B&K Pro 5 preamp, with its switchable line amp section (only \$350), or the Adcom SLC-505 passive preamp (\$150)—and run it with a CD player. In fact, if you are into CD only (no tape, no tuner, no phono), you could buy a CD player with a variable volume output and run it directly into the Adcom. This amplifier is so good and so cheap that I think any CD owner who buys an integrated amp is nuts.

In its price category, the Adcom GFA-535 is not only an excellent choice; it's the only choice. The real question is whether you should buy one even if \$299.95 is much less than you planned to spend for an amp—*ie*, whether you should put the money into a better CD player or pair of speakers instead.

## **ADCOM**

11 Elkins Road, East Brunswick, NJ 08816 201-390-1130  
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Pointe Claire, Quebec H9R 4X5

ple-free output. In fact, on this new filter, audio band ripple is on the order of 0.00001 dB! Another bonus of this technology is that it allows the use of a fairly simple third-order analog output filter which has improved group delay and phase characteristics and whose slope is so gentle that high-frequency spurs are dramatically reduced. The result is better high-frequency performance and a smoother, more musical output. This development should finally still the shrill discords of the digiphobes and their talk about that more-imagined-than-real "digital glare"!

The CDP-707ESD, the subject of an "Equipment Profile" in this issue, has a host of other new features. For instance, in common with all new Sony units, it can play the new 3-inch CD singles without an adaptor. Still more sophisticated anti-vibration measures have been incorporated in the chassis and other areas. In addition to its coaxial digital output, the CDP-707ESD has an optical digital output. If you have wondered what the advantage is in using the fiber-optic connection, it lies in the fact that there is no common ground through the cable; digital and analog stages are completely isolated from each other, thereby avoiding the possibility of converter glitches and hum and noise spikes affecting the analog signal. The price of the CDP-707ESD is \$1,800.

Pioneer's 18-bit introduction was the PD-91, the top unit in their Elite line. It too uses Sony's eight-times oversampling system, and it sells for \$1,300.

Technics entered the 18-bit sweepstakes with four new CD players. Their top model, the SL-P990, has an 18-bit digital filter and uses quadruple oversampling. The unit is equipped with two D/A converters per channel—one for the positive half of the waveform and one for the negative half—and is said to eliminate digital crossover distortion at the zero-crossing point. The SL-P990 has a multitude of convenience features including one that is quite unique, called Auto Peak Level Search. Using a signal output meter, the system can search through an entire CD or a set of programmed tracks for the highest peak signal. Then it will repeatedly play the 3 S of music just before the peak and the 3 S just after it, to facilitate the setting of recording lev-

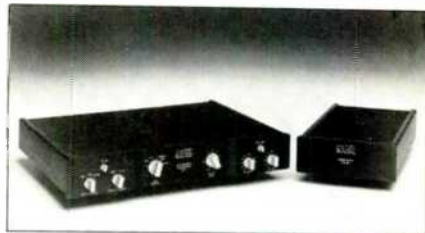
**Several quasi-18-bit CD players are already out; now Sony, Technics, Stax, Pioneer, and Onkyo have true 18-bit conversion.**

els on transfer to another format. A 1-hour program can be searched in 3 minutes. Obviously, this is quite a boon for those who record "customized cassettes." The price of the SL-P990 is \$825, and the unit will be available as you read this.

On the CD software front, there is encouraging news. So many CD processing plants are now in operation that price competition on CD mastering is a reality at last. As a consequence, it is now possible to manufacture CDs for \$1.50 to \$2 each, instead of the \$3 to \$3.50 that had prevailed for some time. Many hardware people expect that we will soon see CDs priced between \$10.99 and \$11.99—and that includes premium recordings.

Most of the major loudspeaker manufacturers had introduced new models at the 1987 Summer CES, so there wasn't much at Las Vegas in the way of new models that would send audiophiles scurrying to their dealers. However, for the audiophile in search of high-end exotica, there were quite a few interesting new preamplifiers and power amplifiers.

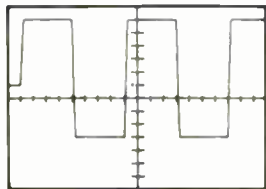
Madrigal introduced the Mark Levinson No. 26 dual monaural preamplifier. It is said to combine the superb sonic qualities of their previous "minimalist" designs with the input and switching flexibility needed to cope with today's



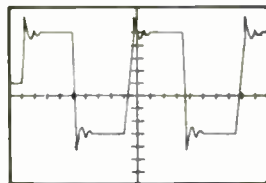
*Mark Levinson No. 26 preamplifier*

multiple audio sources. The No. 26 mates with a separate PLS-226 power supply. Precision-crafted in the Mark Levinson tradition, the No. 26 features new sophisticated circuit topology and design innovations for improved performance. All switching is by remotely powered sealed relays with solid silver, gold-plated contacts. The power supply feeds unregulated d.c. to the No. 26, where four discrete internal regulators—one each for the positive and negative d.c. rails in each channel—operate at all times in Class-A mode.

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The YBA<sub>1</sub> amp operates in "Class Alpha," said to have the advantages of Class A without the output-stage dissipation.

In recognition of the fact that many people use CDs as their main music source, a phono input is optional on the No. 26; if desired, it can be either for moving-magnet or moving-coil cartridges. There are five high-level inputs: CD, tuner, AUX 1, tape 1, and tape 2. If no phono input is desired, one can instead have a sixth high-level input (AUX 2). Another option is a balanced line input, and the outputs offer a choice of unbalanced Camac or balanced Neutrik XLR connections. Among other niceties, the No. 26 has an absolute-polarity switch. The No. 26 is obviously meant to be a companion unit for the Mark Levinson No. 20 and No. 23 power amplifiers. It is currently available at a price of \$3,990 for the line-only unit, \$4,750 with an MC phono input, and \$4,650 with an MM phono input.

Dave Fletcher, whose Sumiko company has imported Supex and Grace phono cartridges for many years, has diversified; he is now importing high-end YBA preamplifiers and power amplifiers from France. The products are designed by Yves Bernard André, an electrical engineer and laser expert who worked on turntables for several years with Goldmund before designing his own quite radical and expensive Vecteur turntable.


The YBA<sub>1</sub> preamplifier and power amplifier are quite meticulously constructed, even to the extent of using André-designed, custom-built capacitors, resistors, and transistors. The amplifier operates in what André calls Class Alpha, which is claimed to have the advantages of Class A without the disadvantage of dissipation in the output stages. Features include the use of quadruple switches to limit contact resistance, and triple potentiometers without hysteresis. The unit has very little or no negative feedback. Transistors are mounted with mica, copper, and silver on the heat-sinks to avoid capacitive effects. A common star-ground system is employed. The amplifier delivers 85 watts per channel into 8 ohms, 170 watts into 4 ohms, and 1,500 watts into 0.7 ohm. THD at 20 watts is rated at less than 0.09% from 20 Hz to 20 kHz. Rise-time is 3 μs at 10 kHz. Current output is rated at 35 to 40 amperes. The YBA<sub>1</sub> preamplifier and YBA<sub>1</sub> power amplifier are priced at

\$7,000 each. Also available are the YBA<sub>2</sub> preamplifier and the 70-watt/channel YBA<sub>2</sub> power amplifier. With design and construction similar to that of the YBA<sub>1</sub> units, they are priced at \$3,500 each.

Lexicon Inc. of Waltham, Mass. is preeminent in professional audio for its digital delay lines, digital reverberation and effects processors, and other sophisticated digital signal-processing equipment. Several months before the



Lexicon CP-1  
Digital Audio  
Environment Processor

WCES, Lexicon was kind enough to demonstrate in my video room a "breadboard" prototype of their new consumer audio product, which debuted at the CES as the CP-1 Digital Audio Environment Processor. Lexicon is licensed to use Dolby Pro Logic circuitry for decoding Dolby Surround programs, and the CP-1 Pro Logic unit is entirely digital. In addition, Lexicon has used their expertise in digital signal processing to incorporate 12 derived software programs in the CP-1: Three for "Panorama" mode, three for "Reverb," three for "Ambience," and three for "Surround Sound," including Dolby Pro Logic. What I heard was very impressive—not only the decoding of Dolby Surround movies, but also such things as the reproduction of dummy-head binaural recordings through loudspeakers (uncanny phantom images appeared to the left and right of the listening position). Unlike other processors, this all-digital unit operates in true stereo mode. In its ultimate embodiment, it would feed left, center, and right front speakers; left and right side speakers; left and right rear speakers, and a subwoofer. All processing is controlled via wireless remote. The CP-1 will be available this month at a price of \$1,200. 

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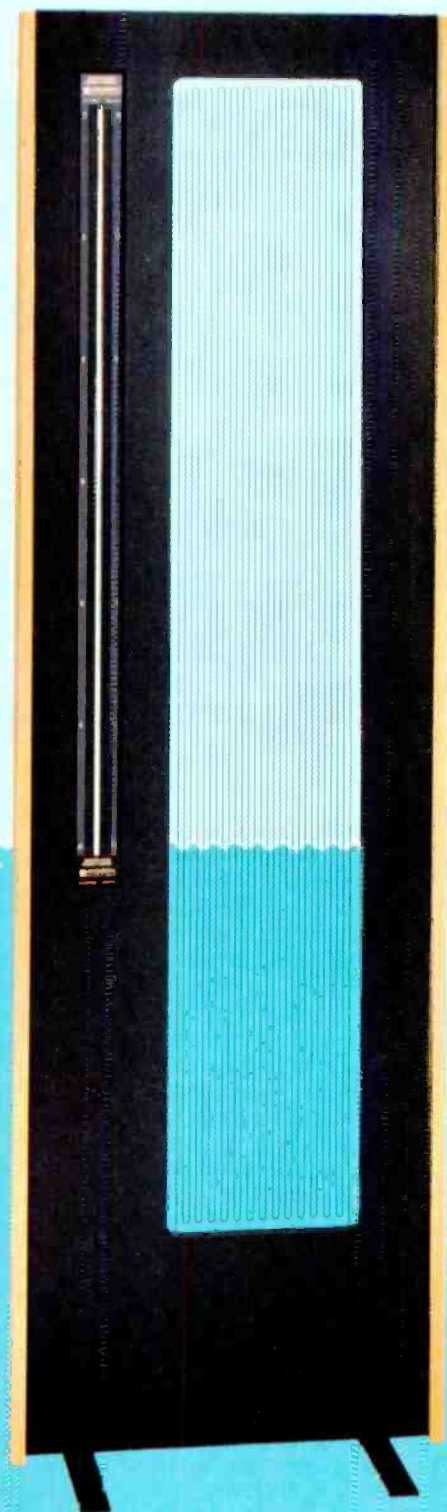
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September, 1987*

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*Hi-Fi News &  
Record Review  
December, 1987*

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December, 1987*



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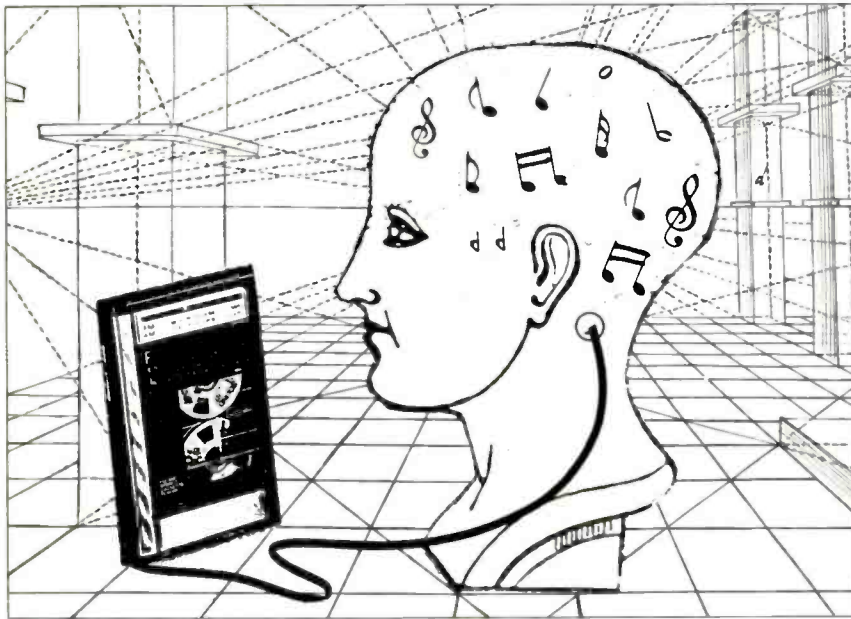
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\* Speaker photographed with magnetic structure removed.

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## AUDITORY BYPASS



In these pages exactly two years ago, in a column entitled "Music Ex Machina," I described the concept of pure-performance music reproduction. Pointing out the limitations inherent in recording, storing, and reproducing music via conventional microphones, digital media, and loudspeakers, I argued for the development of new music machines in which music would be re-created directly from the score through computer-controlled musical instruments. Utilizing the principles of artificial intelligence, such expert systems would actually be robot musicians, able to learn technique and develop proficiency much as a human player does. A listener's system would be composed of a literal orchestra of robots, placed in the seating arrangement called for in the score, playing independent parts under system control. Music would thus be re-created directly, freed of the frailties and distortions of human musicians and the intervention of audio reproduction systems.

This revolutionary idea was greeted with basically two kinds of reaction: Indifference and ridicule. This is very encouraging, because any new and revolutionary idea is always greeted by contempt. They laughed at Aristotle, they laughed at Orville and Wilbur Wright, they laughed at Marx (both Karl and Groucho). In fact, the greater the contempt, the better the idea. Judging

by the reaction to it, one might estimate that the idea of pure-performance machines will be an overwhelming success one day.

Another good sign that human musicians are on the way out recently came at two of the world's most prestigious audio fairs. At the Berlin Funkausstellung (I believe that's German for "Audio: A Great Excuse to Party"), a curious opera recording/playback system was demonstrated. A CD-I disc with four channels independently reproduced a stereo mix of the singers on stage and a stereo mix of the pit orchestra, played back over two sets of loudspeakers. The pit-orchestra speakers were placed slightly forward of those for the stage performers, exactly the way things would be in the opera house. The message is clear: Even with surround-sound ambience, the best way to re-create a front image with depth is to literally place the reproducing sources at the appropriate distances from the listener.

Another, more serious challenge to conventional audio reproduction came last fall at the Japan Audio Fair in Harumi. On an open-air stage, performances were given by Carmen McRae, the Count Basie Orchestra, and other groups. However, these performers weren't really there—they were on tape. The reproduction source was a Mitsubishi 32-track digital recorder,

used to create 40 feeds sent through 20 stereo amplifiers to 40 loudspeakers of various types. The loudspeakers were placed on stage in exactly the same locations as the Count Basie musicians would be seated. To the left were piano, bass, and guitar speakers, to the right were a front row of sax speakers, a middle row of speakers for the trombones, and a back row of trumpet speakers. In the rear were drum speakers complete with ride cymbals perched on top; in the front were vocal speakers.

Now, as impressive and forward-looking as these experiments are, they are primitive compared to the proposal I made two years ago. Although the spatial problems of reproduction have been overcome in these experiments, the problems caused by human performers (in recording) and loudspeakers (in playback) have not. Clearly, the next step is the development of robot players to simultaneously replace both.

Encouraged by these public demonstrations, I have conducted further study of this concept. Unfortunately, my latest thinking on the subject is not encouraging. While few technical details stand in the way of the pure-performance system, numerous economic ones do. The bottom line is that a pure-performance machine could be built, but it would cost more than the gross national product of Bulgaria, or one hour's worth of the U.S. trade deficit, whichever is greater.

This will certainly be disappointing for the many music lovers who have bulldozed their homes and built concert halls in expectation of the availability of pure-performance machines. There has been widespread speculation in the yellow audio press that some audiophiles may now hire live musicians to perform in their listening halls—a serious blow to hi-fi.

Fortunately, the Lirpa Foundation has intervened, as it has so often in the past when a crackpot idea has been in jeopardy. Bolstered by the profits from speculation in the South Florida real estate market, the Foundation commissioned the late Millard Fillmore, 13th President of the U.S. and rock 'n' roll nut, to study the problem. His solution, communicated from beyond the grave via a picture of Elvis, is truly revolution-

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If we establish a direct connection between the storage medium and the brain, we can bypass those troublesome ears of ours.

ary. It is, in fact, a Walkman-style pure-performance system.


The problem with any audio phenomenon is the acoustic nature of the event. Whether it be a musician and his saxophone or an amplifier and its loudspeaker, the necessity to convey an acoustic signal to the ear is a most

severe deficiency, because the ear is a largely prehistoric design that does not take recent technological advances into account. President Fillmore's solution is ingenious, unnatural, and certain to cause a deep rift in the ranks of the Democratic Party: Bypass the ear altogether.

The idea is to establish a direct digital connection from the composing or storage medium (e.g., synthesizer or CD player) to the brain itself. The brain, as demonstrated conclusively in numerous Vincent Price movies, is a pulsating mass of Jello-like stuff with wrinkles. Moreover, it is digital, with synapses and other peculiarities which have something to do with electricity. By inserting a connector in the correct part of the brain, audio data is fed to the auditory processing system and is perceived as sound. The need for any additional audio reproduction equipment is entirely eliminated.

With those troublesome ears out of the way, anyone, of any age, with any caliber hearing, can enjoy the highest fidelity that perception can possibly permit. Frequency response, distortion, localization, spatiality—everything is resolved in packets of digital information delivered right where they are needed. To this end, chassis-mount RCA connectors with hypo-allergenic gold connectors have been designed to be placed at the base of the skull behind the left ear, approximately 3 feet north of the gluteus maximus. The skull itself can be drilled at any hi-fi store in a simple operation involving a 1/4-inch bit and a Q-Tip. Cabling, of course, remains a concern. While ordinary zip cord is acceptable for certain listening applications, surely audiophiles will want to invest in heavy-gauge wire to plug into their heads. Strain relief will be important.

Recent tests on laboratory animals and on small children who refuse to eat their vegetables have proved promising. Their grim facial spasms, bodily contortions, and heavy breathing definitely show that they are enjoying their rock 'n' roll. Although approvals are still pending from the Food and Drug Administration, the Federal Communications Commission, the American Medical Association, and *Good Housekeeping*, units are expected for sale in time for Flag Day.

Manufacturers and other purveyors will soon begin demonstrating their prototypes. Next time you're hanging around the Funkausstellung and you hear the sound of a Black & Decker approaching from behind, you'll know what to expect. Don't worry—you'll hardly feel a thing, I am told. 

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Stereo Review confirmed the unqualified sonic superiority of Matthew Polk's revolutionary SDA Technology when they wrote, “These speakers *always* sounded different from conventional speakers — and in our view better — as a result of their SDA design.

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basic concept of mono is that you have one signal (and speaker) meant to be heard by both ears at once. However, the fundamental and basic concept of stereo is that a much more lifelike three-dimensional sound is achieved by having 2 different signals, each played back through a separate speaker and each meant to be heard by only one ear apiece (L or R). So quite simply, a mono loudspeaker is designed to be heard by two ears at once while true stereo loudspeakers should each be heard by only one ear apiece (like headphones). The revolutionary Polk SDAs are the first TRUE STEREO speakers engineered to accomplish this and fully realize the astonishingly lifelike three-dimensional imaging capabilities of the stereophonic sound medium.

**“A stunning achievement”**

Australian HIFI

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**“Literally a New Dimension in the Sound**

Stereo Review Magazine

The Polk SDA systems eliminate interaural crosstalk distortion and maintain full, True Stereo separation, by incorporating two completely separate sets of drivers (stereo and dimensional) into each speaker cabinet. The stereo drivers radiate the normal stereo signal, while the dimensional drivers radiate a difference signal that acoustically and effectively cancels the interaural crosstalk distortion and thereby restores the stereo separation, imaging and detail lost when you listen to normal “mono” speakers. The dramatic sonic benefits are immediately audible and remarkable.

**“Mindboggling, astounding, flabbergasting”**

High Fidelity Magazine

Words alone cannot fully describe how much more lifelike SDA TRUE STEREO reproduction is. Reviewers, critical listeners and novices alike are overwhelmed by the magnitude of the sonic improvement achieved by Polk's TRUE STEREO technology. You will hear a huge sound stage which extends not only beyond the speakers, but beyond the walls of your listening room itself. The lifelike ambience revealed by the SDAs makes it sound as though you have been transported to the acoustic environment of the original sonic event. Every instrument, vocalist and sound becomes tangible, distinct, alive and firmly placed in its own natural spatial position. You will hear instruments, ambience and subtle musical nuances (normally masked by conventional speakers), revealed for your enjoyment by the SDAs. This benefit is accurately described by Julian Hirsch in Stereo Review, “...the sense of discovery experienced when playing an old favorite stereo record and hearing, quite literally, a new dimension in the sound is a most attractive bonus...” Records, CDs, tapes, video and FM all benefit equally as dramatically.

**“You owe it to yourself to audition them.”**

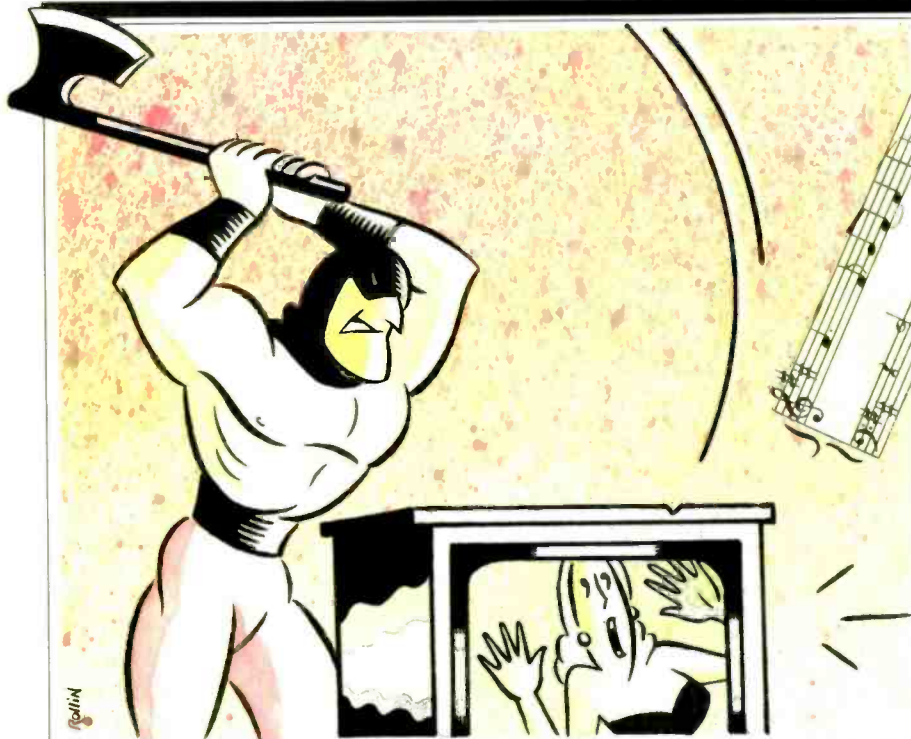
High Fidelity Magazine

SDAs allow you to experience the spine tingling excitement, majesty and pleasure of live music in your home. You must hear the remarkable sonic benefits of SDA technology for yourself. You too will agree with Stereo Review's dramatic conclusion: “the result is always better than would be achieved by conventional speakers...it does indeed add a new dimension to reproduced sound.”

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## CUTTING REMARKS



**N**ow that I have had a first cataract operation, managing in the process to disrupt an entire operating room's musical decor, I think it is high time to broach a serious subject for all audio people: Background music. It is the dominant music of our time by an enormous margin. It is changing the entire meaning and function of the sonic arts.

In many ways, for music lovers, this is a deadly business, though fortunately there are humorous aspects too. Though I'm a lover of the music we call "classical," I really do not intend to be a spoilsport because of it. Never did like that word, classical, and I like plenty of other music not so rated. So I hope for a merely dispassionate discussion here, though actually I am all too often full of passion and even outrage. What people can do to the sheer sense of the music! It is the kind of thing that should not be perpetrated on a pig. Sheer murder in the second degree, without a thought. Or maybe worse, the first degree, diabolically planned. Chop it up in pieces, any old place—it's only music, after all. Slice it, snip it, put it through the wringer (one of those compressor circuits that makes background music sound as though it were choking).

For anyone with any respect for the music itself, this can be agony. I hear it every day, and I feel it exactly as I describe. It is a terrible thing to do. But nine-tenths of us never even notice. Does that big opera company care whether it smashes up and wrecks *its own music* in its ads? Not so you'd notice. Just kill off that soprano, she's too loud. *Scrunch*—she's gone. It's so easy. Right in the middle of a note. That's a crime, isn't it?

Sonic murder is easy, alas, because it is done via the technology of the audio trade. We can't escape any of the blame. It is all ours. Live music is almost never murdered in the middle of a note, unless maybe the tenor bursts a blood vessel, as happened to poor Enrico Caruso on stage, ending his long career. Or the pianist falls dead, or the violinist breaks all four strings simultaneously and is silent. Unlikely events! But not their recorded equivalents. That musical murder, in the name of background music, goes on a million times a day.

Sonic murder is so simple to avoid, with a bit of careful timing beforehand or an extra half-second so the thing can end gracefully at a humane location in the flow of musical sound. To do otherwise with music used as back-

ground, whether for a commercial or a highbrow commentary, is cold, crude, and ugly.

I should know, since for a quarter-century I myself sliced up classical music into thousands of usable bits of tape—and managed always to put it together with my talk, smoothly, respectfully, and I think musically, so the composer himself might listen without undue shock. It can be done, and better than ever with digital techniques, which are much more accurate and much faster. It is generally very easy to treat music with respect, though there are occasions, of course, when a lot of time and sweat must be expended to make it come out right.

Audio producers and engineers who prepare music for "foreground" release—i.e., to be listened to, to be heard for what it is, on its own terms—generally care and work hard. But too many of their fond efforts end up as background in somebody's living room or disco or restaurant, whether whole or dismembered. And some of it gets straight into the ads, the cheap way. You ask me whose copyright is being violated, I'll tell you. It is *the music's* "copyright"—the sense and meaning of the music, sliced up like so much baloney to fit the package.

Perhaps some of you are not clear as to what I mean. We hear this musical mayhem a hundred times every day; in itself, it is mostly just background and not to be noticed, like the everyday clothes most people wear. Suppose we change media, shifting from music to stage drama and from a recording to live performance. Alone on some exalted Shakespearean stage, before a vast audience, a man in costume begins to orate—one of those famous "solos" that are at the top of Shakespeare's bag of dramatic tricks. "*To be or not to be,*" he begins, "*that is the—*" CRASH! The curtain bangs down, and he is gone. Somebody with a stopwatch has pushed a button. So many seconds are allowed for that noise of speaking, and no more. Or switch again to the live musical stage: One of the great singers is in recital before a jammed house. Presto, in the middle of an aria, a little man rushes on stage, grabs her throat and throttles her; she slumps to the stage, then silence.

Illustration: Rollin McGrail

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Sonic murder is so simple to avoid. All you need is a bit of careful timing or an extra half-second so things can end gracefully.

Day in and out, these are the scenes that parade before my inner eyes, vividly, as I listen to what happens to the sense of music when that music is treated as so much background stuff by the yard or the inch or the second. Haven't you ever noticed it? The sound itself has no nerves for pain, but those

who love and understand the sound make up for that, just as I shout an involuntary "Ow!" when my car goes over a cruel bump. It's the car that is hurt, but I feel the pain.

I am not speaking of all background music! Far from it. The slicing up of hunks of classical works for back-

ground, mainly in commercials, is of course only a tiny part of the larger background scene, though it happens to hit my musician's soul in an unfortunate way. There's much, much more, as the ads put it, dozens of ways to use what Varese called "organized sound" in some sort of secondary, accompanying sense, or even co-equal with another kind of presentation. Nothing new about combining music with other things. In fact, there is probably more music composed in that way than there is stuff created strictly for listening. Music has always gone along with things, from funerals to banquets, not to mention soft music for seduction, à la Don Giovanni and Mozart.

But in the past the relationships were precise and well defined and the music written to fit. No mayhem. (Well, there's been some, but not generally approved of.) Supper music was supper music, a march was a march, as a polka was a polka—no matter that these were borrowed for other purposes! Mostly, they were borrowed with understanding and in appropriate adaptations in terms of the musical sense. Not, usually, with murderous intent. Not the way we do it today. In the past, musical sense was able to stand up on its own pretty well, as well as any other form of expression.

For similar reasons, the very best of our own multifarious background music is that which is written to fit. Again, it can be done! Then, you see, the relationship becomes positive, the music and its foreground both making a common sense. Why not? Both, moreover, can be of any sort, even crude, corny, commercial, and still fit together in a solid relationship without murder. It happens, in movies, TV, and at every level up to the highest, as in the more elevated ballet scores and their stage presentations.

The joining of music and its accompanying message can involve often acute hassles behind the scenes and ahead of time—I'll bet there's more agony in the pre-production phase of the average one-minute commercial than in the staging of a whole act of fancy ballet. But forget that for now. *The finished product* is what counts, at any level whatsoever.

And so I make a very big distinction, myself, between commercials which

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The best background music is that which is written to fit; its relationship to the foreground can then be a positive one.

feature music produced for and fitted to an ad, and those cheaper ads which deal in slices of hacked-off classics, or worse, imitation classics—the lowest of the low, to my mind. Even these are hacked off in the middle of a note. How about giving the music a half-second more? It could have been allowed, if

anybody had ever listened. I always listen, to see whether the audio man in charge cuts according to the stopwatch or according to the musical sense, however trite it may be. Even the dopiest music shouldn't have to fight for a merciful ending. Cruelty to dumb music? That's it

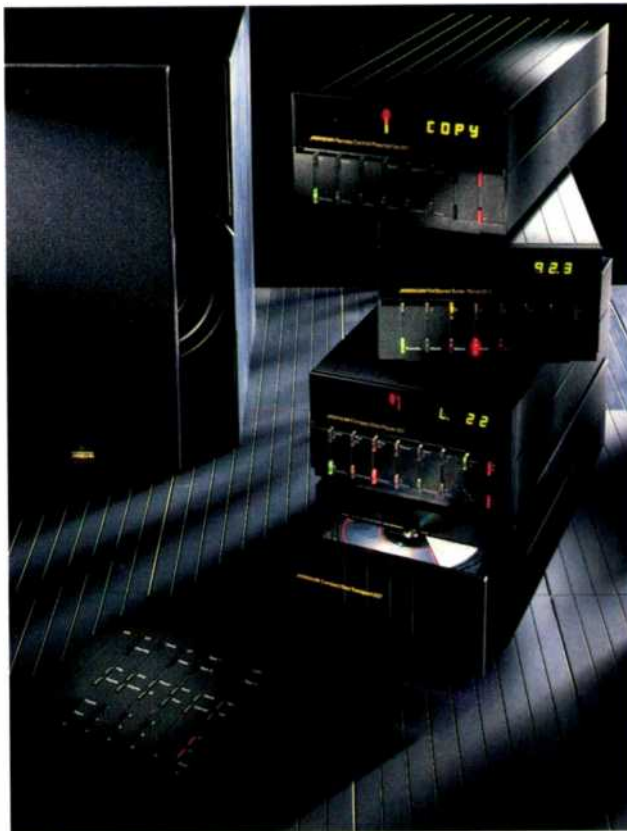
So what happened in that operating room where my cataract was being attended to? Well, you see, I was given some gentle anesthetic which did not kill my aesthetic sense, oddly, though the rest of me seemed to go out cold. I felt nothing, just comfortable and lazy, saw and heard not a thing except one odd sentence, far away: "Mr. Canby, you're in surgery!"

Later, I pondered that curious remark, and I asked the doctor what had happened. Had he actually said that? He certainly had. It seems I went into the operating room talking busily and refused to quit: there was background music playing from a radio, rock stuff, and I announced to all and sundry that I wanted classical music. I was quite emphatic, it seems, though this is entirely missing in my memory. As the attendants scurried to the radio, trying to find a classical background station, I got another shot and instantly subsided into loud snores. Then, just before the job was finished, I perversely "woke up" (did I?), announced that I wanted that thing off my eye, and started to reach up at it. Again, all this is blank to me. It was then that the doc said, "Mr. Canby, you're in surgery!" This I faintly heard and do remember. "Well, where's my classical music?" I asked, no doubt sourly. And again I went to sleep.

I heard no music, nor any of my own words. I was not there at all, as far as my conscious self was concerned. Apparently, the matter of background music goes deep into the subconscious. And that, I say, is why it is so important.

This ever-present music, then, is the biggest thing in audio. From top to bottom and side to side in all the musical arts we have it with us in the audio profession—on tape, in computers, on discs, everywhere. And consumers of audio are immersed in some form of it for an astonishingly large portion of their lives. So easy to manipulate! So easy to hack into pieces or shake into piteous groans via the variable compressor that keeps it out of the way of the words, the real message.

We've got music to listen to—yes. But also and more often, music to eat to, music to sleep to, music to dance, talk, play games to, shop to, bank to, get a haircut to, drive a car to. Or even to have an operation to. *A*



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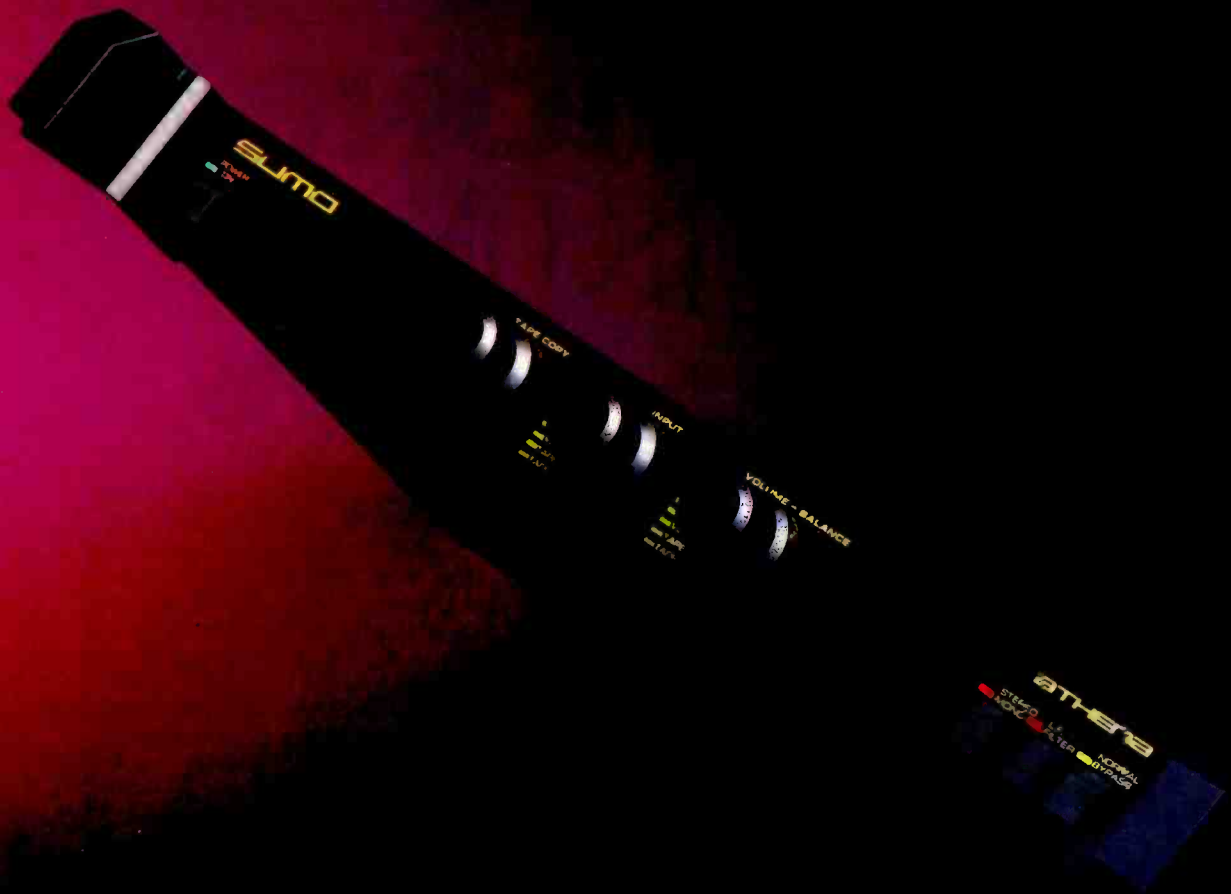
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# INSCRIPTIONS

## MILES DAVIS ON CD

A strong creative force seems always to be working within the pioneer jazz trumpet player Miles Davis. Noted jazz historian Leonard Feather says, "He has manifestly changed the entire course of an art form three or four times in 25 years—an accomplishment that no other jazz musician can claim." His changes of musical direction have often been wild and unexpected but have usually been followed by a major segment of the jazz world. Today, Davis keeps his position as a performer of unquestioned originality and deep influence on other players.

There has probably been more written on Davis than on any other performer in jazz, so it takes some consid-

erable audacity to attempt another summary of his career. But several factors have converged to prompt this piece: Miles' 1985 switch to the Warner Bros. label after 30 years of association with Columbia, his passing the age of 60 and, perhaps most important for *Audio* readers, the availability on CD of most of his great early sessions for Columbia, including his masterful collaborations with Gil Evans and his *Kind of Blue*, considered by many jazz critics to be the greatest modern jazz album ever made.

Miles Davis had his first group at age 16. He began as a be-bopper, influenced by Clark Terry and Dizzy Gillespie. His second phase was as the central figure in the justly famed *Birth of the Cool* session for Capitol in 1948. His third stage was as the leader of various small groups and as partner to arranger Gil Evans in the path-breaking, large-scale orchestral albums *Miles Ahead* (1957), *Porgy and Bess* (1958), and *Sketches of Spain* (1960). Early intimations of New Age music were heard in Davis' fourth stage, in the '60s (which included *In a Silent Way*, for example). By 1969, he was already into his fifth stage, upsetting the entire jazz world with the jazz/rock fusion of *Bitches Brew*, possibly the most influential modern jazz album ever. If there is a clear sixth stage, it would be funk/minimalism, such as is heard on *On the Corner* and *Big Fun* (1972-74) and *The Man with the Horn*, his big "comeback" album of 1981.

### JOHN SUNIER



**Gil Evans conducting Miles Davis and band during a 1959 session in New York.**

Frank Driggs Collection



*Photograph: Aaron Rapoport*

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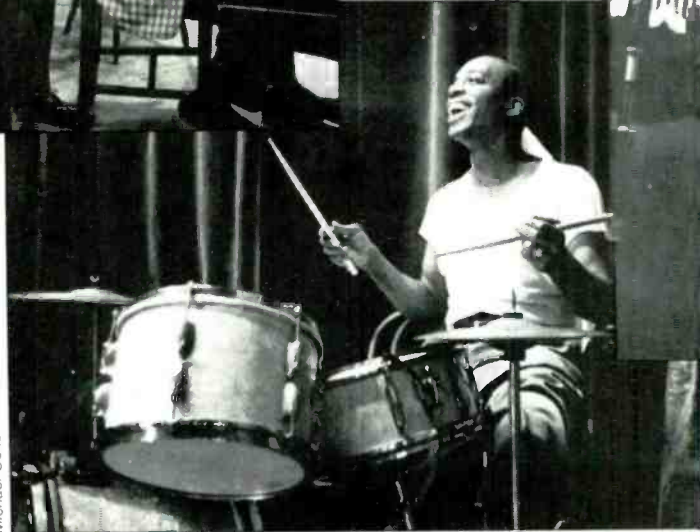


Michael Ochs Archives



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Collaborators on 1956's *'Round About Midnight* LP (clockwise, from top): John Coltrane, Paul Chambers (on bass, with Miles), Philly Joe Jones, Red Garland (on piano, with Miles).



Michael Ochs Archives



Frank Driggs Collection

Then in 1985 a new period began, when Davis signed an exclusive contract with Warner Bros. *Tutu*, released the next year, was the first result, making full use of modern musical technology with synthesizers, drum machines, MIDI keyboards, and other processors. While some of its tracks continue the funk approach (though with more electronics than before), others seem to hark back to some of the great orchestral efforts with Evans.

The various phases of Davis' career have confused and confounded quite a few of his fans. He won over many with his gorgeous and compelling muted sound, but his tuneless and directionless electronic funk—beginning with *Bitches Brew*—lost him many formerly staunch listeners. Let's start out by considering those Davis albums which display the unquestioned originality of the star before he left a good part of his audience behind; then we can take a glance at some of the more noteworthy albums of his later years.

Davis' Columbia debut was the album *'Round About Midnight*, recorded in New York in 1955 and '56 and titled after the Thelonious Monk classic, "Round Midnight." Miles really jumped into his groove as a trumpet master, fully out of the shadow of Dizzy. The Miles Davis Quintet at the time consisted of John Coltrane on tenor sax, Red Garland on piano, Paul Chambers on bass, and Philly Joe Jones on drums.

On the CD version (Columbia Jazz Masterpieces CK-40610), the digital remastering from the original mono analog tape is a great improvement on the original LP version in clarity and frequency range extension at both ends of the spectrum. But the real delight for audio buffs will be the thoroughly tasteful and convincing pseudo-stereo rechanneling that has been carried out here. The same is heard on other Columbia Jazz Masterpieces CDs made from mono originals.

Back in the days when rechanneling (nothing psychic about this!) was the

rage, Columbia seemed to have a most successful process. I can recall a Fletcher Henderson LP from 1933-78s that sounded almost as if it had been recently recorded in genuine stereo. Most of these rechanneled CDs sound so much cleaner and more wide-range than the LP versions that I wonder if some of the phasing and filtering tricks carried out in the process didn't disagree with the sensitive cutting-lathe head and cause distortions in the LP versions. However, results can vary: The Duke Ellington *Uptown* CD in this same series is much inferior to the original mono LP version. Columbia makes no mention whatsoever about rechanneling on the CDs' packaging, since "rechanneled for stereo" today is considered as foul an expression as "quadraphonic" and is likely to deaden sales. Yet I find the really successful rechanneling of classic mono tapes on CD to be a major attraction. Since most use minimal or no phasing tricks, the purists can always throw the mono switch on their equipment if they wish.

It's interesting to compare the *'Round About Midnight* CD to an earlier greatest-hits LP which contains the same track of "'Round Midnight." The LP merely pans most of the sound to the right channel—and that sound is so thin as to recall telephone-like quality, next to the wide range of the CD.

The next four albums in the Davis oeuvre are the favorites of many of his fans. (The fact that for some of us they are indelibly associated with the "make-out music" of our youth has nothing to do with this, mind you!) These are the albums done with the innovative Gil Evans, whose original approach to jazz orchestration helped make this one of the most fruitful and influential phases of Davis' career. Coming to public attention for his arranging stint with Claude Thornhill, Evans was preoccupied with providing an exciting orchestral setting for the new sounds of jazz. What he had in mind was something light-years away from the *Charlie Parker with Strings* type of approach that was previously heard. Evans added new instruments (such as French horns) and new colors to the makeup of the orchestra, but he also freed modern jazz from the constrictions of big-band swing that often restricted the projection of his tonal and rhythmic concepts.

Davis wanted to further the ideals of the path-breaking nine-piece band he had developed; for his first album experiment with a big band, both he and producer George Avakian wanted Evans' participation. The basic conception of *Miles Ahead* came from Davis; within the framework he provided, Evans developed the musical details, eventually producing the remarkable textures of a large jazz orchestra with some very classical influences.

The orchestra grew to 19 jazzmen, and Davis played flugelhorn instead of his customary trumpet. Evans arranged the 10 tunes that make up the album into a sort of suite, with no interruptions between the selections. The spirit of Duke Ellington is heard in many places, even though the only tune associated with him is Dave Brubeck's homage, "The Duke." Davis' lyricism is very evident in this session; the French jazz critic André Hodeir referred to it as tending "toward a discovery of ecstasy," particularly in the many slow-tempo songs on the album.

With this 1957 experiment a brilliant success, the Davis/Evans collaboration turned the next year to an orchestral approach to Gershwin's great folk opera, *Porgy and Bess*. Again, the influence of the Duke is in evidence, but Evans' unique approach in arranging,

combined with Davis' powerful creativity, takes things in a different direction. Not only the musical but also the literary implications of Gershwin's opera are sensed. The album's success is due in no small part to what Evans called "a new breed of cats" in the orchestra—classically trained musicians, such as Gunther Schuller, who could perceive the continuity of Davis' magnificent solos in relation to the structure of the orchestral backing.

The third of this great trio of jazz and symphonic orchestra masterpieces came two years later, in 1960. And what a blockbuster it was! *Sketches of Spain* had been presaged by the track "Blues for Pablo" on *Miles Ahead*, as well as by some tracks on the 1959 small-group session *Kind of Blue*. Miles felt a basic closeness with the musical temperament of Spain and its flamenco-based rhythms; on *Sketches*, it seems almost as if he had actually been born of Andalusian gypsies but happened to pick up a trumpet instead of the traditional guitar to express his tortured musical soul.

A moody, dark, and dramatic Spanish sound characterizes the five works on *Sketches*. Evans and Davis had listened to many flamenco recordings prior to the sessions, as well as Falla's ballet "El Amor Brujo" and other 20th-century Spanish music. The track "Will o' the Wisp" comes from the Falla ballet, and the longest track is based on the center movement of a guitar concerto by the Spanish composer Joaquín Rodrigo. Miles had no trouble improvising around Rodrigo's fiercely mournful minor-key melody, and the result is musical perfection unre-

One of the most fruitful phases of Davis' musical career was spurred by his work with Gil Evans.



Frank Driggs Collection



Michael Ochs Archives

Top: John Coltrane (center) with Davis and Paul Chambers (partly hidden). Left: Pianist Bill Evans, who played on *Kind of Blue*.



Artists appearing on Davis' *In a Silent Way* (clockwise, from upper left): Dave Holland, Wayne Shorter, Tony Williams, Herbie Hancock, John McLaughlin.



Michael Ochs Archives



strained by the bounds of traditional musical categories.

In the middle of this four-year large-orchestra phase, Miles took a break and returned to a sextet situation, with Bill Evans as the pianist, Julian "Canonball" Adderly on alto sax, John Coltrane on tenor sax, Paul Chambers on bass, and James Cobb on drums. This 1959 session, *Kind of Blue*, is the number-one jazz record ever, according to many jazz critics. The settings were conceived by Miles only hours before the recording sessions and are close to pure, spontaneous improvisation. Every single track is a first take, even though this group had never played any of the pieces prior to the sessions! "All Blues," basically a series of five scales, is the longest cut on the album; Miles played each scale as long as he wished until he ran through the series—almost like the sparse "game plan" for an avant-garde classical piece. With its improvisations over a

bed of repeated rocking rhythm, "All Blues" previews later Davis work in the funk/extended-noodling area.

*Miles Ahead*, *Porgy and Bess*, *Skeiches of Spain*, and *Kind of Blue* are all available on CD as part of Columbia's Jazz Masterpieces series (CK-40784, CK-40647, CK-40578, and CK-40579, respectively). Some had already been issued on earlier CDs, making for some interesting comparisons. Isn't it amazing that, only about five years into this format, we already are seeing reissues of earlier CDs?

**O**n the CD of *Kind of Blue*, the primary improvement is the removal of the annoying hiss that is present on the LP version. In addition, the string bass sounds a bit tighter and less sloppy in the lowest frequencies. It's like the sound of a properly damped subwoofer compared to one that isn't. However, the piano on this CD takes on a somewhat wooden quality compared to the LP

version played on a top-quality turntable.

On others of these CDs, the sonic improvement is drastic. The original CD issue of *Sketches of Spain* was easily surpassed by an old prerecorded open-reel tape version of the album without any noise reduction. This older CD had as much hiss as the tape, a restricted dynamic range, weak bass, and that familiar sonic veil over the entire orchestra. It sounded as if it were mastered from a partially erased master tape played on a badly maintained deck with dirty heads. The new Jazz Masterpieces CD is clean and wide-range, and most of the hiss is gone. It's as if all of the music has come out into the Spanish sun.

*Miles Ahead* is especially fascinating sonically. Although the original LP version had been "electronically rechanneled for stereo," the new CD sounds like *genuine* stereo. I didn't have a scope handy to check the Lis-

sajous pattern, but there are definitely instruments on one channel that aren't on the other. The overall clarity and depth of this CD is greater than the other rechanneled mono ones. This session dates from 1957, just a year before the introduction of the stereo disc and several years after a few record companies began issuing prerecorded stereo tapes. Some forward-thinking labels were already recording in stereo just to be prepared. Could this be one of those records where different instruments were multi-tracked on two channels for later mix-down to mono, something like those earliest Beatles albums were? But then the LP came from a mono source.

Did Columbia simply go to more effort in remixing this new CD issue than they had for the LP?

Two delightful, lyrical albums came out of the 1960s, the next period of Davis' work: *Someday My Prince Will Come* (1961) and *In a Silent Way* (1969). John Coltrane was still part of the quintet on the first, with Wynton Kelly and Hank Mobley. The title tune is the first and also the longest of the set, and three Davis originals are also heard. Columbia producer Teo Macero, another innovator in jazz and a composer in his own right, is responsible for both albums; Miles dedicated "Teo" on the first to him. Mobile Fidelity Sound Lab licensed the master of *Someday My Prince Will Come* from Columbia some time ago and issued it on CD (MFCD-828). It is far superior to the Columbia LP version, with a crystalline clarity and depth that put it in the same sonic category as the aforementioned *Sketches of Spain* CD.

*In a Silent Way*, probably the last of the albums featuring the "old Miles," is available as a Columbia Jazz Masterpieces CD, CK-40580. It boasts only two lengthy tracks, both laid-back but full of pent-up emotion. The personnel featured Herbie Hancock, Chick Corea, and Joe Zawinul on electronic keyboards; Wayne Shorter on tenor sax; John McLaughlin on guitar; Dave Holland on bass, and Tony Williams on drums. Rock fans were, by 1969, already picking up on Miles, and some were trying to imitate him, but there was little warning for the complete departure into the strong rock flavor of his epochal session later that year.

That session was *Bitches Brew*, a double-LP (and now double-CD) set that changed jazz more than anything that Davis had done prior to it. The album is often given credit for spawning the entire jazz fusion movement, which has brought jazz to a wider audience. Davis was joined by 10 top side-

men on the album including Chick Corea on electric piano, Bennie Maupin on bass clarinet, Wayne Shorter on soprano sax, and a four-man drum and percussion section. While undeniably path-breaking, *Bitches Brew* turned off many of Davis' fans with its strong rock element. Some called it mindless and tuneless funk with lots of annoying noodling-around.

Be that as it may, the electrified phase of Davis' art is beautifully captured in the sonics of the *Bitches Brew* CDs (Columbia Jazz Masterpieces G2K-40577). My earlier version of the album happened to be the prerecorded cassette rather than the LP. There is no contest—the CD has far snappier transients, wider dynamic and frequency ranges, and less hiss—in fact, no hiss is noticeable at all on these later analog albums transferred to CD. Corea's electric piano has an edge to it that's often dulled on many recordings of this instrument. The fancy footwork in the stereo effects—such as hearing Davis trumpet speaking from the right channel and then an instant later its processed reverberation coming from the left—is a kick. Perhaps with this improved sonic presentation, more people would have found Davis' experimentation more palatable back when *Bitches Brew* was first released.

Davis' many recordings since that historic album have broadened on the same funk-rock theme, with the recent addition of heavy synthesizer use. His foray into pop and rock has even included cover versions of songs by Michael Jackson and Cyndi Lauper (on *You're Under Arrest*, available on a CBS CD CK-40023).

In his first album for Warner Bros., 1986's *Tutu* (available as a Warner CD, 25420-2), Davis dives into synth-pop, with his muted trumpet sailing over varied and often orchestral-sounding electronic and percussive backgrounds. On some of *Tutu*, Davis seems to be getting away from his recent shrieking and atonal mewling and back to a feeling similar to what he achieved on the Gil Evans collaborations. Most of the selections on *Tutu* were composed by his young bassist, Marcus Miller, while the tunes are nothing special, Davis' trumpet always is. Some of his old-time lyricism is returning, even with real melodies and legato playing. "Portia" is an example of this reminding one of *Sketches of Spain* at some points. It's slow and dreamy, and even the percussion is melodic. Not all the *Tutu* tracks are like this, however. Some are simply funk, with sneezing and buzzing electronics galore.

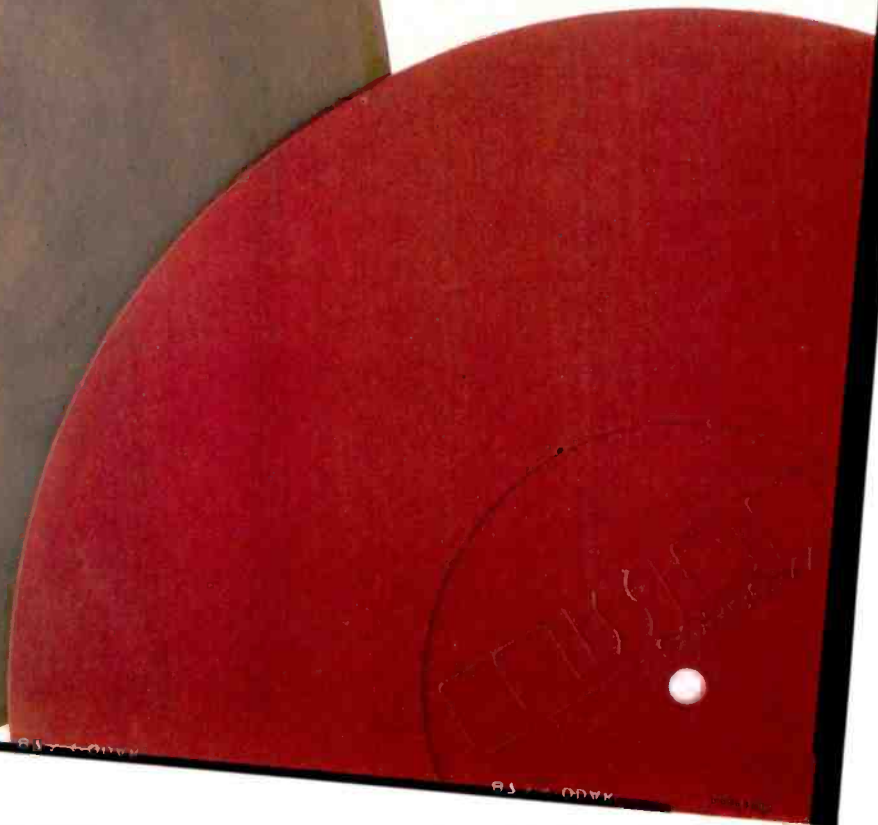
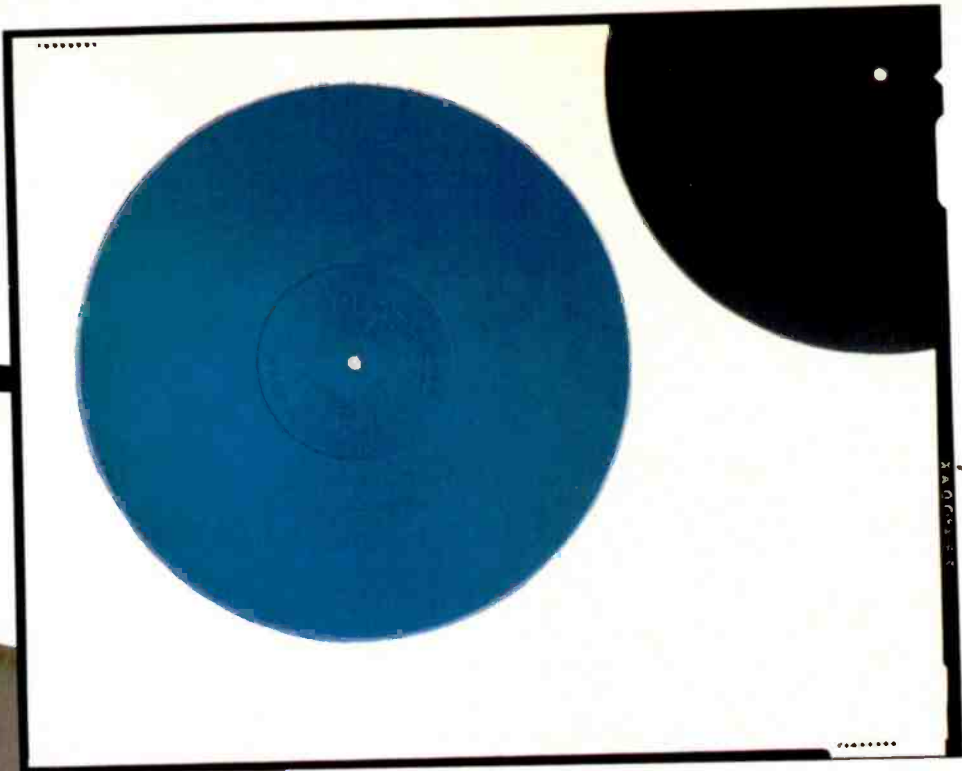
The tracks are built up with drums, drum machines, and keyboards, with

Fans may be annoyed by the music presented on *Bitches Brew*, but it is beautifully captured on the CD.

Miles soaring over them (even though he was probably crouched over with the bell of his horn near the studio floor). There are guest contributions from electric violinist Michael Urbanik, keyboardist George Duke, several percussionists including Paulinho da Costa and assorted synthesizers by Jason Miles and Bernard Wright. Davis' virtuosity here is astonishing, and those of us who prefer the *Sketches of Spain* phase will be using our CD players' programming facilities to select only those tracks on this CD which remind us of that earlier album, while hoping for more like them the next time around.

Michael Ochs Archives







# MATS & CLAMPS

## BY THE NUMBERS

### EDWARD M. LONG

In my reports on turntables and tonearms for *Audio*, I have tried to measure various performance characteristics and correlate them with audible effects. In the main, I have focused on the tables and arms, almost ignoring turntable platter mats, spindle clamps, and vacuum disc hold-downs, and yet these devices can have large effects on the quality of sound reproduction in both the frequency and time domains. For ex-



Photograph: David Hamsley

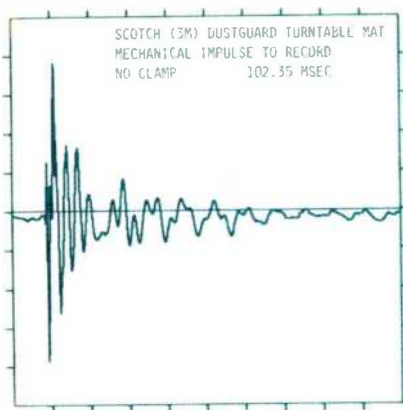


Fig. 1—Output vs. time for mechanical impulse applied to edge of stationary record resting on Scotch Dustguard mat, unclamped, with stylus in groove.

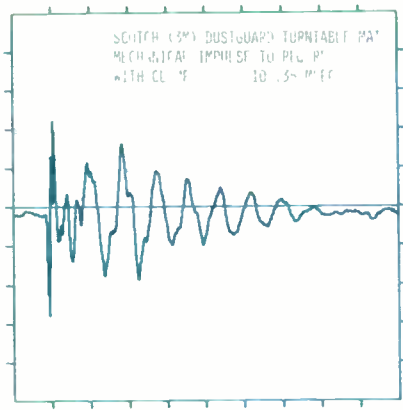


Fig. 2—Same as Fig. 1 but with clamp.

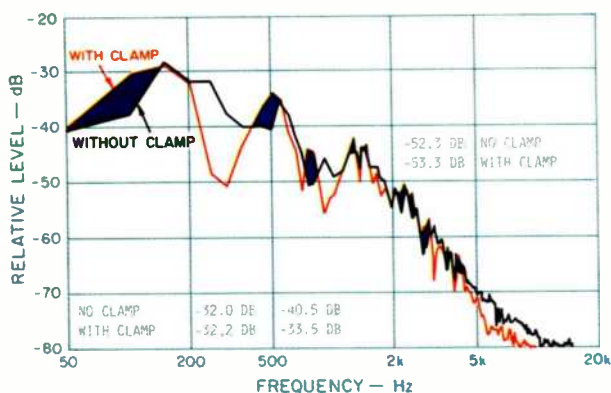


Fig. 3—Spectrum (averaged) of output caused by mechanical impulses applied to edge of stationary record resting on Scotch Dustguard mat, with stylus in groove, with and without clamp. (Reference signal level for this and other output spectrum figures is 10 cm/S at 1 kHz.)

ample, if two identical transient signals of very short duration occur simultaneously, and one of them is 20 dB lower in level, the stronger signal will certainly mask the weaker. The total output is increased by less than 0.05 dB, which is not an audible change. If the two transients are not synchronous, but one is delayed with respect to the other, then it isn't the level change that is important, but the delay. If the delay between two transient signals is long enough, the result is what everyone would call an echo. For a 33 $\frac{1}{3}$ -rpm record, the energy from a heavily modulated adjacent groove can produce a signal which is either 1.79 S before (pre-echo) or after (echo) the desired signal. This report isn't concerned with this phenomenon directly, although it can be a source of energy that reduces the clarity of reproduction in a less than obvious way. The problem of concern here is due to signal delays of much shorter duration. If a recorded signal is delayed slightly and then is added to the main signal, the level will be increased at each frequency where

the polarities are the same, while at each frequency where the polarities are opposite, the level will be decreased. This causes the resulting spectrum to have peaks and dips. So not only is the spectral energy dispersed or smeared in time, by having one signal slightly delayed from the other, but it now has coloration due to the peaks and dips.

Delayed energy can be created in a record during playback, resulting in coloration and smearing in the reproduced sound. My attention was first drawn to the problem and its cause in an article by Peter Moncrieff published in the *International Audio Review*. Another equipment reviewer concerned about the problem is Martin Colloms, who writes for the British publication *Hi-Fi News & Record Review*.

Let's briefly review how a record-playing system works. A record groove contains information which is stored in the form of very small changes in the average position of the spiral groove. When a record is rotating, these rapid variations in the relatively slow-moving

spiral groove impart mechanical energy to the stylus, causing it to move in relation to the cartridge, which remains relatively stationary. The force exerted upon the stylus is then converted by the cartridge from mechanical energy to electrical energy, and this is what produces the electrical signal which is fed to an amplifier. So far, I have only described something that most Audio readers probably already know. However, there is a problem which may not be as well known. As Newton's Third Law states, "Every force produces an equal and opposite force." While the undulating groove is imparting a force to the stylus, the stylus is, in turn, imparting an equal and opposite force back against the groove. What happens to this energy? I haven't seen a definitive study of this phenomenon in print, but it appears that the energy travels inside the record, bounces around, and is eventually dissipated, with some of it finding its way back to the stylus. This energy is delayed in time and therefore can be heard. And that's the problem. The remedy is to cause this energy to be absorbed and dissipated as quickly and completely as possible. The best way to do this appears to be by allowing the energy to be transferred from the undersurface of the disc into a record mat, where it is dissipated. What is attempted here is an initial quantitative study of the effectiveness in energy dissipation by a few classic or well-known mats, as well as of the effect of record clamps and vacuum record hold-downs on this process. (This is not an attempt at an exhaustive survey of any of these three categories, and we are aware that most of these mats are no longer on the market.)

### The Test Procedure

The problem of inducing mechanical energy into a record, to simulate the effect of a reactive force of a stylus as it travels in a groove, is not a simple one. There are some sophisticated ways of doing this, and they are certainly worth investigating. For instance, the use of the techniques employed in time-delay reflectometry is a possibility, but the very short time delay between the induced signal and the reflected signals makes it difficult. Time Delay Spectrometry, using the modern

instrumentation now available, would probably be a better method of obtaining data and would allow us to understand what is happening inside the record in a more precise way. The test signal could be injected into the record and recovered using the same transducer, but this is not as easy as it sounds: the transducer's characteristics would have to be carefully controlled to allow it to act as both sender and receiver.

Since I haven't come up with a transducer or the send/receive circuitry needed for such an elaborate test, I have opted for a different method. For this report, the test signal was applied as a mechanical impulse to the edge of the record. It was then picked up by a phono cartridge with its stylus resting in a stationary groove. Instrumentation consisted of a Nicolet Explorer III digital storage oscilloscope, which was used to obtain amplitude-versus-time waveforms, and a Nicolet 660A 2D digital Fast Fourier Transform analyzer, used to obtain the magnitude-versus-frequency spectrum data. All individual mat tests were conducted twice, first without a record clamp and then with a clamp placed down against the record to force it into more intimate contact with the mat. The same record was used for all the tests to make certain that variations in the plastics used by different manufacturers did not affect the results.

### The Mats and the Clamp

The mats tested in this report include one made of polyurethane foam, four made of what might be called synthetic rubber, and one made of acrylic. After testing these individually, I evaluated several combinations; finally, I tested the SOTA Star Sapphire turntable, which uses a vacuum system to pull the record against the mat. The polyurethane mat is very similar to a variety of mats which have been offered in the past and is not specifically designed for maximum energy absorption. It was included because mats of this type are widely used, and I thought it would be interesting to compare it to those designed specifically for energy absorption. The rubber mats vary from the relatively hard Oracle to the very soft Tuomat. The acrylic mat from SOTA is a fairly recent offering and represents

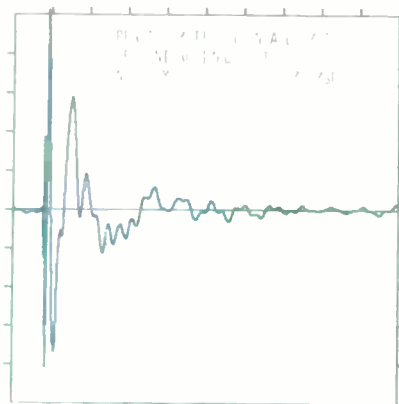


Fig. 4—Output vs. time using Platter Matter mat without clamp.

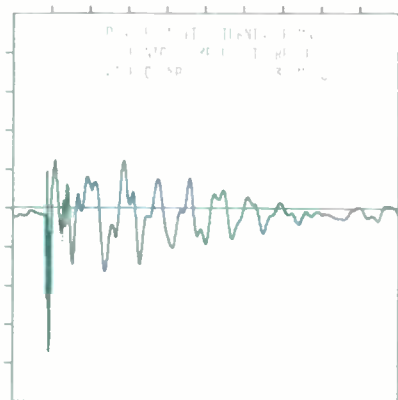
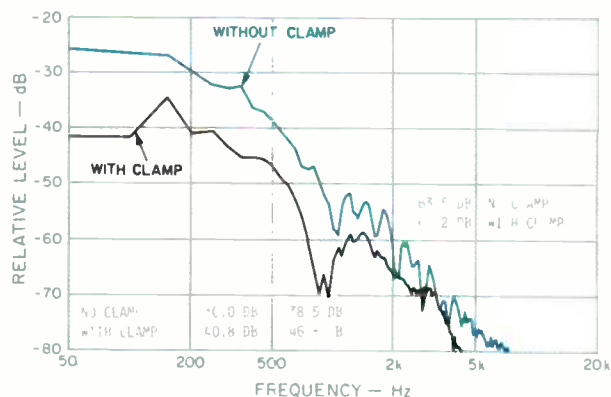


Fig. 5—Same as Fig. 4 but with clamp.

Fig. 6—Output spectrum using Platter Matter mat, with and without clamp



a slightly different approach to the delayed-energy problem.

The clamp used for this report was the Planax clamp, which is distributed by Monster Cable. It is machined from nylon, is 2<sup>5</sup>/<sub>16</sub> inches in diameter and 1/2 inch thick, and weighs 45 grams. A slot is machined across most of the clamp's diameter; the slot is enlarged at the clamp's center to fit over the turntable spindle and is V-shaped at its open end. A small cylinder is held against the V by an elastic band. Pushing in on the little cylinder wedges the slot open, causing the hole at the center of the clamp to expand. The clamp can then be slid over the spindle and down against the record. This causes the record to be pressed into contact with the surface of the record mat.

Another clamp which could yield the same results is the SOTA Reflex. This black-anodized aluminum clamp weighs 215 grams and is 3<sup>3</sup>/<sub>8</sub> inches in diameter and 1 1/2 inches thick. It resembles the type of clamp used to hold 10 1/2-inch reels on a professional tape recorder. The Reflex uses a flip-

lock system. When the lock tab is flipped up, the clamp can be slid over the turntable spindle and pushed against the record. When the lock tab is flipped down, the stainless-steel center is locked to the spindle, and the outside part is pulled down against the record label. This forces the underside of the record into intimate contact with the record mat.

Also, Souther Engineering makes the Clever Clamp, which appears as if it would do a reasonable job of holding a record against a turntable mat.

### Interpreting the Figures

The first two figures for each individual mat show the amplitude versus time of the cartridge output when a mechanical impulse was applied to the stationary record, without and with the clamp in place. The total time span of the window is 102.35 mS. In the third figure for each mat, I have shown the magnitude (averaged) versus frequency of the spectral components caused by a series of mechanical impulses applied to the edge of the record,

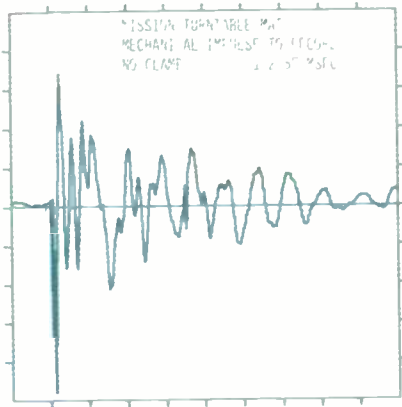


Fig. 7—Output vs. time using Mission mat without clamp.

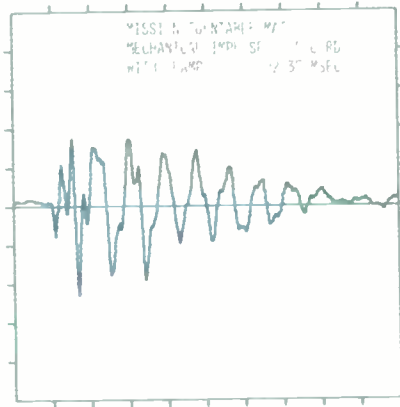


Fig. 8—Same as Fig. 7 but with clamp.

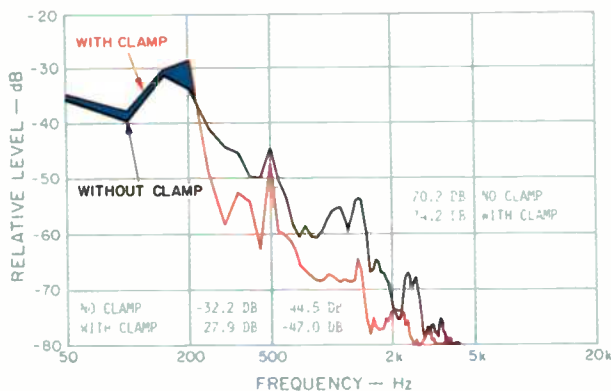


Fig. 9—Output spectrum using Mission mat, with and without clamp.

again both with and without the clamp. The magnitudes shown next to each of the cursors, which are at 200, 500, and 2,000 Hz, are in dB relative to a reference tone of 10 cm/S at 1 kHz. The top value is without the clamp and the bottom value is with the clamp. In a few of the figures, the with-clamp values climb up above those without the clamp. Ideally, this should not happen, but unfortunately it does. A record mat, or combination of mats, which produces a smooth spectrum seems to be preferable to one which actually provides more absorption at some frequencies but has a more uneven spectrum. This uneven distribution of absorption causes coloration in the reproduced sound.

#### Scotch Dustguard Mat

This mat is made of polyurethane foam which has been treated to give it anti-static properties. It is 11¾ inches in diameter by ¼ inch thick and is completely flat, with no indentation to accept the thicker part of a record near its center. If the diameter were 11½

inches, and if it had a slight recess at least 4⅞ inches across at the center, it might have been more effective in removing energy from the record. This is because a record is thicker at both the edge and the center, causing the grooves to be held away from a flat record mat. As it was, even the clamp was not able to press the record into complete contact with the mat across its entire surface. This particular brand of mat is no longer being sold, and with the inclusion of the anti-static treatment, it represents a high point for the basic type. Mats like this, without the treatment, were quite prevalent in the past, and some manufacturers provided them with their turntables.

This mat had the lowest energy absorption of the group tested. It did neutralize the static charge buildup on records, but that was not the main concern of this series of tests. Figure 1 shows the result with no clamp. While the clamp did help to reduce the initial transient, as shown in Fig. 2, it also caused the magnitude of the spectrum (Fig. 3) to be more ragged, especially

below 800 Hz, and this would tend to color the sound. Further, the clamp increased the output at a number of frequencies.

Listening verified that the clamp did actually increase the coloration of the reproduced sound. These results, both with and without the clamp, indicate that mats of this type probably should be avoided if sonic purity is the goal.

#### Platter Matter Mat

This blue mat was very effective in absorbing energy above 800 Hz. It is 11¾ inches in diameter on the bottom, 11⅞ inches on top, and ¾ inch thick. To accommodate the record label, it has a recess measuring 4⅞ inches in diameter, but it also has raised lettering that would keep the label area from making intimate contact with the mat. Comparing Figs. 4 and 5, one can see that the clamp reduced the initial transient, and the spectrum shown in Fig. 6 indicates that the clamp improved the performance over virtually the whole range. The mat did have a greater absorption of energy at about 1 kHz (shifting down to about 800 Hz when the clamp was in place), and this single dip is a problem because it allows the energy around 1 kHz to stand out. This caused a slight coloration in the reproduced sound, probably because the ear is very sensitive in this range. Figure 5 shows that the output has a definite periodic characteristic corresponding to about 10 mS. This would be about 100 Hz, but since I don't know the actual velocity of sound in the record's particular plastic formulation, I can't be certain of the exact frequency. There is a peak at approximately 150 Hz in the spectrum shown in Fig. 6.

The outside diameter of the Platter Matter is less than that of a record, and this allows the underside of the record to make uniform contact with the mat. When the clamp pushes the record down against the mat, much more energy is drawn from the record. The performance of the Platter Matter was definitely improved when the clamp caused intimate contact between the record and the mat. Not currently available, this mat was rated good because, though the improvement in clarity was only moderate, there was a relatively low level of coloration.

### Mission Mat

The Mission mat has a slightly bevelled edge and measures  $11\frac{9}{16}$  inches in diameter on the top surface and  $11\frac{1}{8}$  inches in diameter on the bottom. This dark red mat is  $\frac{1}{8}$  inch thick and is relatively compliant. It is made of Sorbothane, a synthetic material originally developed to have the characteristics of human flesh and which is currently being used for the mats sold by Audio-Quest, though these don't appear identical to the Mission mat. The  $4\frac{1}{2}$ -inch center section is recessed more than is necessary and has raised lettering, which means that the label area of the record does not make intimate contact with the mat.

The Mission has very good absorption above 200 Hz. Figures 7 and 8 indicate that, while the clamp is effective in reducing the initial transient, it actually increases the output at about 150 to 200 Hz. This is verified by the breakthrough area at the lower frequencies of Fig. 9, indicating that the magnitude is greater when the clamp is used to push the record down. The spectrum of Fig. 9 also indicates that the Mission mat's absorption characteristic varies with frequency. The peaks appear to have a certain harmonic relationship, which may be the main reason for the slight coloration that this mat adds to the reproduced sound. The clamp helps to increase the absorption above 200 Hz; even with the resulting unevenness in the absorption, I rate the mat as being good, because the slight coloration is easily counterbalanced by the increased clarity of reproduced transients.

### Oracle Mat

No longer offered, this moderately stiff mat has a smooth surface which can be kept shiny by periodic cleaning; to this end, the manufacturer had supplied a bottle of cleaning fluid and a bottle of polish. The top and bottom diameters of the mat are  $11\frac{1}{4}$  and  $11\frac{3}{8}$  inches, respectively, which gives a slight taper to the mat's edge. This dark gray mat is about  $\frac{3}{16}$  inch thick and has a  $3\frac{15}{16}$ -inch recess for the record's raised label area. The recess is deeper than necessary and has raised lettering, which means that, as with the Platter Matter and Mission mats, the label area is not allowed to

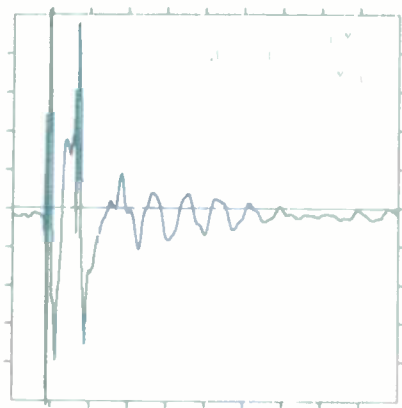


Fig. 10—Output vs. time using Oracle mat without clamp

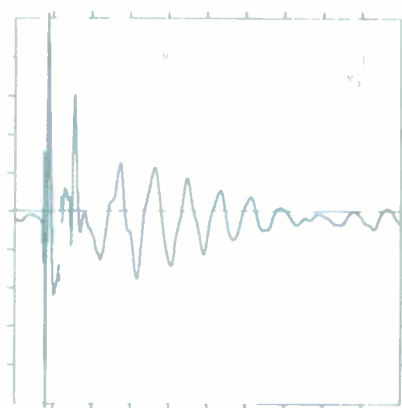


Fig. 11—Same as Fig. 10 but with clamp

Fig. 12—Output spectrum using Oracle mat, with and without clamp.



come into complete contact with the mat's surface.

A comparison of Figs. 10 and 11 shows that the initial transient is not reduced much with the clamp in place, but the lower frequency components of the secondary transient are reduced considerably. Figure 12 shows a very smooth absorption-versus-frequency characteristic, both without and with the clamp. Because of this smooth characteristic, the Oracle mat caused very little coloration. As is evident in Fig. 12, the clamp is very effective in increasing the absorption of the delayed energy from the record, and it does not cause any significant change in the coloration of the reproduced sound. I rate the Oracle as being very good. Even though some other mats have greater absorption, the smoothness of the Oracle's absorption characteristic is better, and it has less coloration.

### Turomat

This mat, the most limp of all those tested, is light tan with a dull finish. It

has a very distinct bevel on its outer edge—a diameter of  $11\frac{1}{8}$  inches on top and  $11\frac{1}{4}$  inches on the bottom, and a thickness of just less than  $\frac{1}{4}$  inch. The upper diameter allows the record to overhang slightly so that its thicker edge does not keep it raised above the mat. This allows the underside of the record to make good contact with the top surface of the mat. The center indentation of the mat has a diameter of  $4\frac{1}{2}$  inches, wide enough to allow for the record's thicker center part. However, it is deeper than it needs to be and also has raised lettering, which does not allow intimate contact between the mat and the record near the label area. The maker has turned largely to cleaning materials and apparently no longer offers the mat.

Comparing Figs. 13 and 14, it is easy to see that not only is the initial transient reduced with the clamp, but the secondary transient is reduced even more. The magnitude-versus-frequency data of Fig. 15 shows that, with the clamp in place, the Turomat has the greatest absorption of all the mats

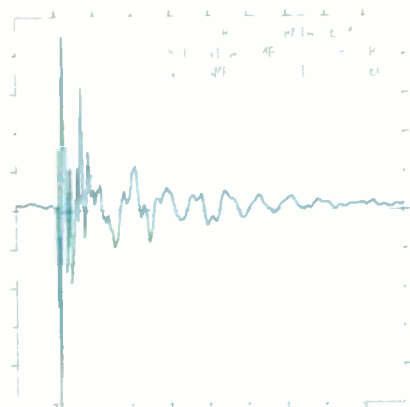


Fig. 13—Output vs. time using Turomat without clamp

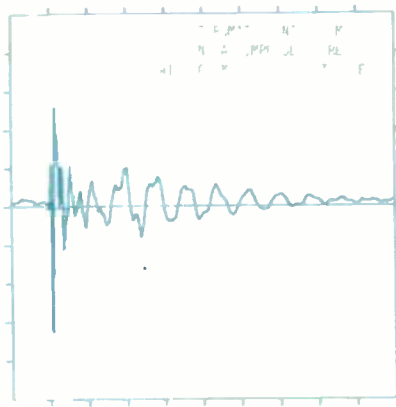


Fig. 14—Same as Fig. 13 but with clamp

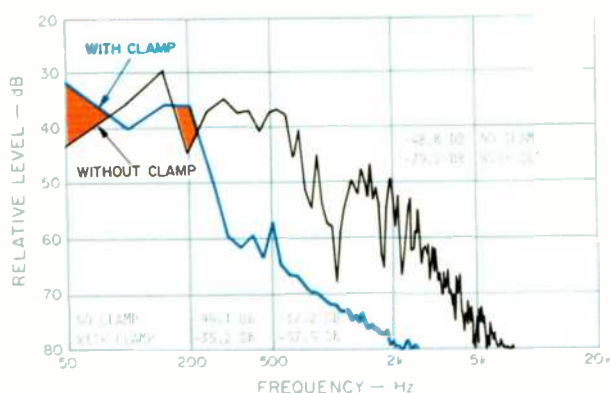


Fig. 15—Output spectrum using Turomat, with and without clamp.

for frequencies above 200 Hz. Except for the little peak that stands out at 500 Hz, the spectrum also exhibits excellent smoothness. The peak is very narrow and low in level, so it probably doesn't cause coloration which can be heard easily. Figure 15 also clearly indicates that the use of a clamp with the Turomat is definitely recommended. The clamp does increase the output slightly at a couple of spots below 200 Hz, but close inspection reveals that the spectrum is actually smoother when the clamp is used. The Turomat is the best of the group tested.

### SOTA Supermat

This mat is very different from the others in that it is made of acrylic material and is very hard. The rationale behind the use of acrylic is the idea that energy transfer should be greater and more uniform across the audio spectrum if the mat material is similar to the record material. The mat is 3/16 inch thick and is translucent because its top surface is machined. The outside edge is rounded rather than straight, and the

mat's diameter is 11½ inches on top and 11¼ inches on the bottom. The smooth center recess is 4¼ inches across and just deep enough to accommodate the thicker part of a record near the label. The Supermat is designed to be used with another, more conventional, mat underneath it. Accordingly, the first tests were performed with the standard SOTA rubber mat under the Supermat.

Figure 16 shows the amplitude versus time for this combination with the clamp in place, and Fig. 17 shows the magnitude versus frequency, both with and without the clamp. Figure 17 indicates that there is a good amount of absorption but that there are peaks at 500 Hz and 1 kHz. The clamp causes an increase in output between 150 and 400 Hz and between 800 Hz and 3 kHz. This combination is good, but the next one is better.

### SOTA Supermat and Turomat Combination

Comparing Figs. 16 and 18 shows that the initial transient is much re-

duced when the softer Turomat, rather than the standard SOTA mat, is used under the SOTA Supermat. There is still a considerable amount of output below 200 Hz, as Fig. 19 shows. The peaks at 500 Hz and 1 kHz are still present when the clamp is not forcing the record against the Supermat and the Supermat against the Turomat. When the clamp is in place, the peaks are reduced considerably and would not be expected to cause any coloration in the reproduced sound.

Comparing Figs. 15 and 19 gives some insight into the reason why the Supermat Turomat combination is preferable to the Turomat by itself. When the clamp is in place, the more gentle slope of Fig. 19 compared to Fig. 15 is less likely to cause coloration. The clamp is very effective and does not increase the magnitude of the output except in a couple of places in the spectrum, and then only very slightly. When the clamp is not used, the spectrum of Fig. 19 is certainly better than that shown in Fig. 15. This indicates that when the clamp is not securely in place, doing its job perfectly—which is likely to happen from time to time—this combination will still do a very effective job in absorbing energy from the record. The spectrum will also have a gentle slope, which is good. This is the best combination of mats that I tested, with good absorption and very low coloration.

### SOTA Star Sapphire Vacuum Turntable with SOTA Supermat and Rubber Mat

Figure 20 shows the amplitude versus time for the Supermat used over the rubber mat on the SOTA Star Sapphire Turntable, with the turntable's record-holding vacuum system activated. The initial transient is very low, as is the secondary. The magnitude-versus-frequency spectrum shown in Fig. 21 indicates an extremely high output at low frequencies when the vacuum is not applied. The record is actually held up away from the surface of the Supermat by the rubber lip which surrounds it at the periphery. When the vacuum is applied, the absorption of energy is very smooth across the whole spectrum. The absorption in the low frequency range is the best of any that I measured during this investigation.

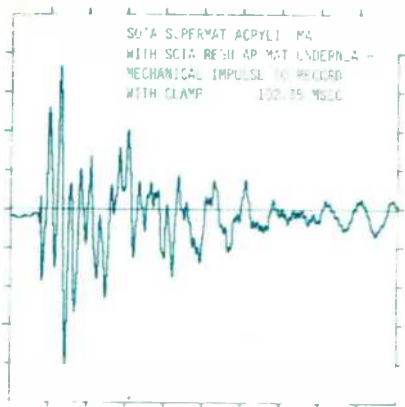


Fig. 16—Output vs. time using SOTA Supermat resting on SOTA regular mat, with clamp.

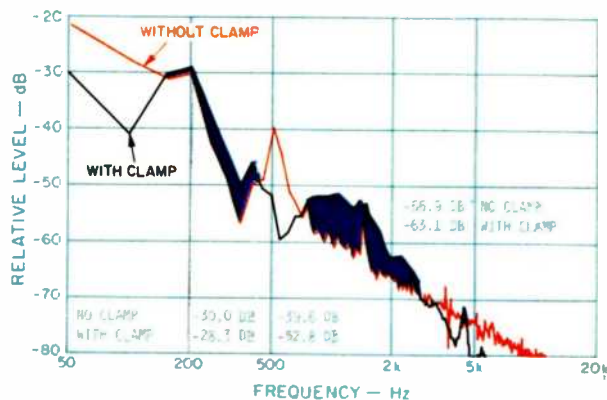


Fig. 17—Output spectrum using SOTA Supermat resting on SOTA regular mat, with and without clamp.

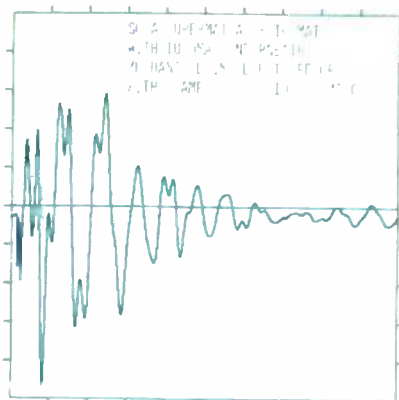


Fig. 18—Output vs. time using SOTA Supermat resting on Turomat, with clamp.

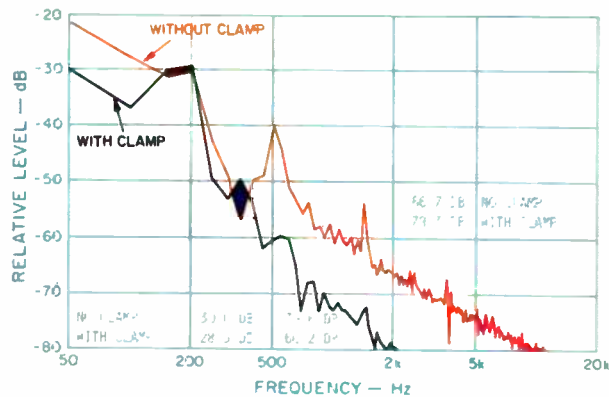


Fig. 19—Output spectrum using SOTA Supermat resting on Turomat, with and without clamp.

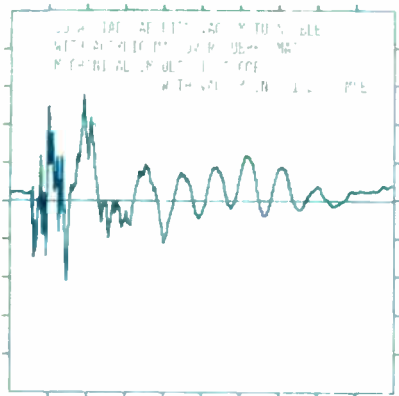


Fig. 20—Output vs. time using SOTA Supermat over rubber mat on SOTA Star Sapphire turntable, with turntable's vacuum system on.

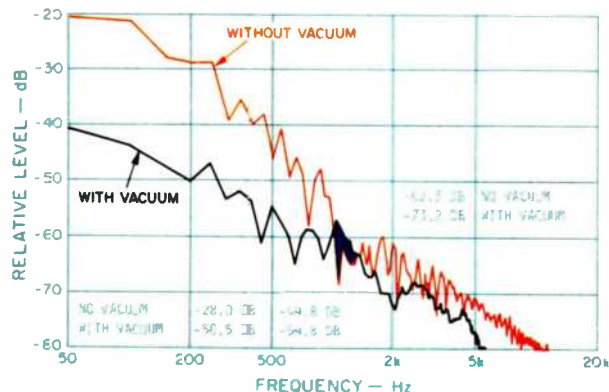


Fig. 21—Output spectrum using SOTA Supermat over rubber mat on SOTA Star Sapphire turntable, with and without turntable's vacuum system on.

# MEASURED DATA

## SCOTCH DUSTGUARD MAT

Frequency	200 Hz	500 Hz	2 kHz	Average
Without Clamp	-32.0 dB	-40.5 dB	-52.3 dB	-39.7 dB
With Clamp	-32.2 dB	-33.5 dB	-53.3 dB	
Clamp Difference	-0.2 dB	+7.0 dB	-1.0 dB	
Comments	No change	Worse	No change	Poor

**Summary:** Poorest of all; low absorption; high coloration; clamp makes worse.

## PLATTER MATTER MAT

Frequency	200 Hz	500 Hz	2 kHz	Average
Without Clamp	-30.0 dB	-38.5 dB	-63.5 dB	-51.3 dB
With Clamp	-40.8 dB	-46.8 dB	-66.2 dB	
Clamp Difference	-10.8 dB	-8.3 dB	-2.7 dB	
Comments	Better	Good	Moderate	Good

**Summary:** Good absorption; slight coloration from dip; clamp effective.

## MISSION MAT

Frequency	200 Hz	500 Hz	2 kHz	Average
Without Clamp	-32.2 dB	-44.5 dB	-70.2 dB	-49.7 dB
With Clamp	-27.9 dB	-47.0 dB	-74.2 dB	
Clamp Difference	+4.3 dB	-2.5 dB	-4.0 dB	
Comments	Worse	Moderate	Good	Good

**Summary:** Good absorption; slight coloration peak at 500 Hz; clamp effective.

## ORACLE MAT

Frequency	200 Hz	500 Hz	2 kHz	Average
Without Clamp	-27.5 dB	-32.2 dB	-63.5 dB	-47.9 dB
With Clamp	-34.8 dB	-40.0 dB	-68.8 dB	
Clamp Difference	-7.3 dB	-7.8 dB	-5.3 dB	
Comments	Good	Good	Good	Very good

**Summary:** Mild absorption; no coloration; best clamping.

## TUROMAT

Frequency	200 Hz	500 Hz	2 kHz	Average
Without Clamp	-44.1 dB	-37.2 dB	-48.8 dB	-57.3 dB
With Clamp	-35.2 dB	-57.5 dB	-79.2 dB	
Clamp Difference	+8.9 dB	-20.3 dB	-30.4 dB	
Comments	Worse	Excellent	Excellent	Very good

**Summary:** Good absorption; best at high freq.; low coloration; clamp good at high freq.

## SOTA MAT AND SUPERMAT

Frequency	200 Hz	500 Hz	2 kHz	Average
Without Clamp	-30.0 dB	-39.6 dB	-66.9 dB	-48.1 dB
With Clamp	-28.3 dB	-52.8 dB	-63.1 dB	
Clamp Difference	+1.7 dB	-13.2 dB	+3.8 dB	
Comments	Worse	Excellent	Worse	Good

**Summary:** Good absorption, especially at high freq.; some coloration; clamp worsens.

## SOTA SUPERMAT AND TUROMAT

Frequency	200 Hz	500 Hz	2 kHz	Average
Without Clamp	-30.0 dB	-39.6 dB	-66.7 dB	-56.0 dB
With Clamp	-28.5 dB	-60.2 dB	-79.3 dB	
Clamp Difference	+1.5 dB	-20.6 dB	-12.6 dB	
Comments	Worse	Excellent	Very good	Very good

**Summary:** Good absorption; best at high freq.; very low coloration; clamp good

## SOTA STAR SAPPHIRE VACUUM TURNTABLE WITH SOTA SUPERMAT AND RUBBER MAT


Frequency	200 Hz	500 Hz	2 kHz	Average
Without Vacuum	-28.0 dB	-44.8 dB	-62.3 dB	-59.5 dB
With Vacuum	-50.5 dB	-54.8 dB	-73.2 dB	
Vacuum Difference	-22.5 dB	-10.0 dB	-10.9 dB	
Comments	Excellent	Good	Good	Excellent

**Summary:** Best absorption; very smooth; low coloration; best at low freq.

The increase in output around 800 Hz when the vacuum is applied is very slight and does not stand out, and the depression between 700 Hz and 1.5 kHz which is present when the vacuum is not activated is now gone. The clarity of the reproduced sound is excellent, the best obtained during this series of tests. Another advantage of using the vacuum is that the entire record surface is pulled flat, thereby eliminating the vertical component of wow which occurs during play.

## Conclusions

With the exception of the Dustguard, all of the mats and mat combinations discussed in this report improved the clarity of the sound, especially when the clamp was in place. The coloration of the sound due to the variation of absorption versus frequency was the main difference between the Platter Matter, Mission, Oracle, and Turomat; in this regard they rank in reverse order, with the Turomat having the least coloration. The combination of the Turomat and the SOTA Supermat was slightly better than the Turomat by itself, because it seemed to have slightly less coloration. The sound reproduction with the combination of the Supermat and the regular SOTA turntable mat was brighter and more colored than that of the Turomat by itself. The SOTA vacuum system yielded the best results with the greatest clarity and lowest coloration of anything I tested. The lack of wow was also a definite plus. I think the vacuum provides such an improvement in the reproduced sound that other manufacturers should look into the possibility of offering similar systems, at least on their best turntables.

During the turntable tests I have conducted over the last few years, I have found a definite improvement in clarity and a lessening of coloration in analog record reproduction. I know much of this has been due to improvements in the way delayed energy has been dealt with by both turntable and accessory manufacturers. I strongly recommend that you investigate the current crop of turntable mats and clamps for your system. Then you will hear for yourself the improvement in the quality of reproduced sound that they can make. 



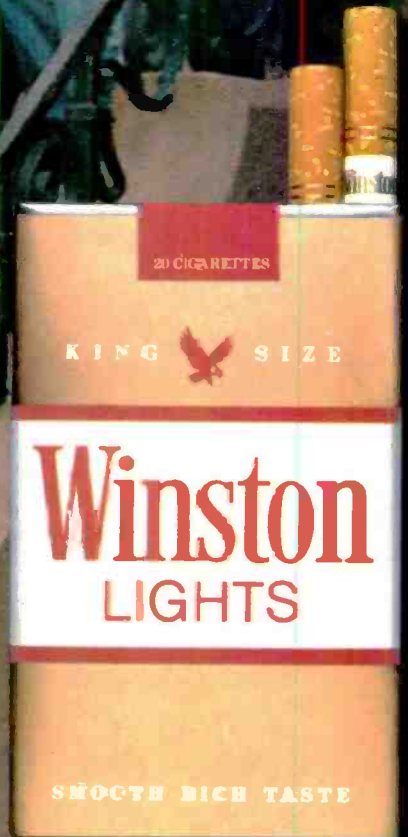
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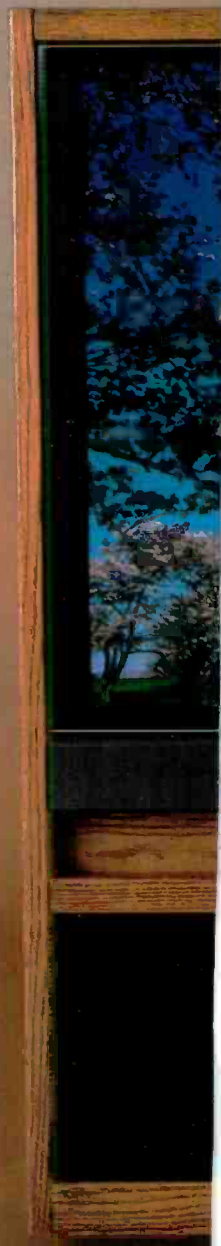
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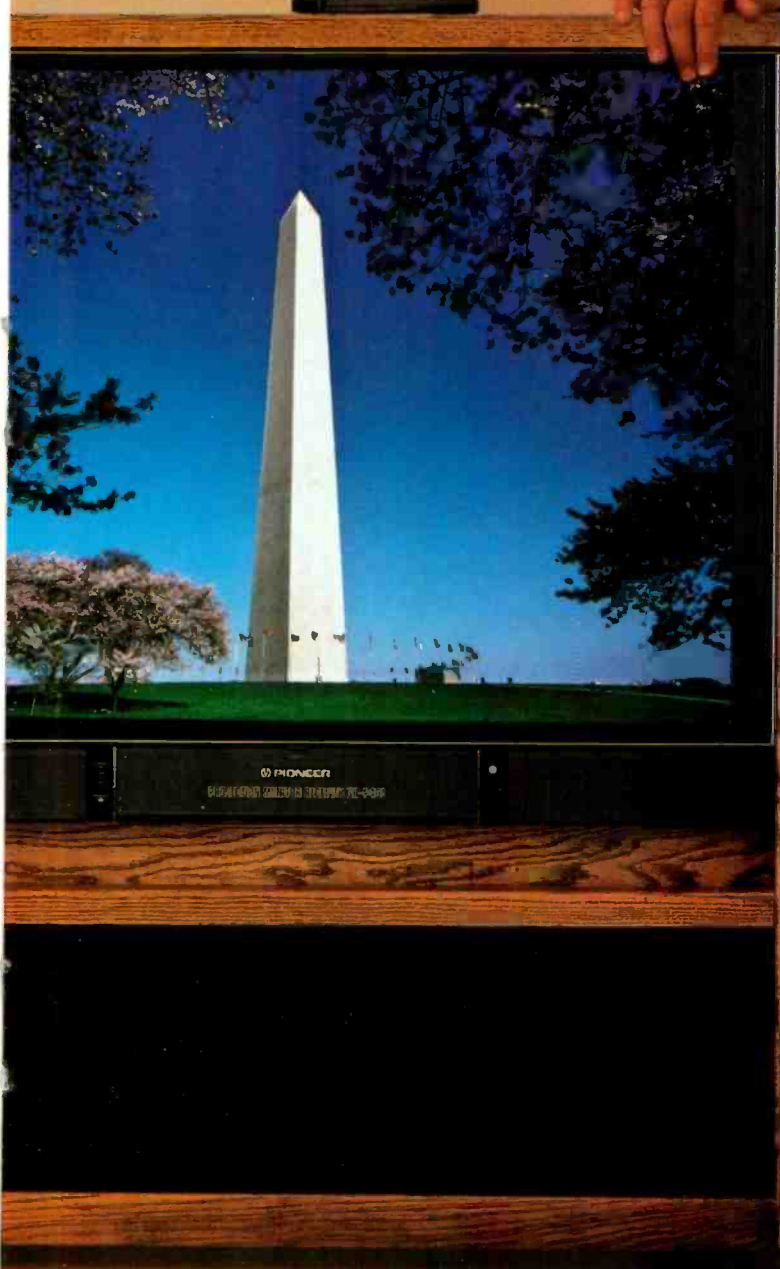
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# EQUIPMENT PROFILE

# 1

## SONY CDP-707ESD COMPACT DISC PLAYER

### Manufacturer's Specifications

**Frequency Response:** 2 Hz to 20 kHz,  $\pm 0.3$  dB.

**Signal-to-Noise Ratio:** 115 dB (EIAJ).

**Dynamic Range:** 100 dB (EIAJ).

**THD:** 0.0015% (EIAJ).

**Separation :** 110 dB (EIAJ).

**Wow and Flutter:** 0.001% wtd. peak (EIAJ).

**Number of Programmable Selections:** 20 (see text).

**Number of Discs Unit Can "Recognize":** 226.

**Number of Customized Index Points per Disc:** 6 (see text).

**Output Level:** Fixed, 2.0 V rms; variable, 0 to 2.0 V rms.

**Digital Output:** Coaxial, 0.5 V peak to peak; optical, per EIAJ Standard.

**Headphone Output Level:** 28 mV.

**Power Requirements:** 120 V a.c., 60 Hz, 18 watts.

**Dimensions:** 18½ in. W x 4<sup>15</sup>/<sub>16</sub> in. H x 14¾ in. D (47 cm x 12.5 cm x 37.5 cm).

**Weight:** 39.6 lbs. (18 kg).

**Price:** \$1,800.

**Company Address:** Sony Dr., Park Ridge, N.J. 07656.

For literature, circle No. 90



If you have been wondering just how much more a manufacturer could do to extract every last bit of recorded information from a Compact Disc without introducing extraneous noise or distortion, I commend to you Sony's latest state-of-the-art CD player, the CDP-707ESD. Frankly, I am still a bit dazed after measuring and listening to this unit. I thought that the industry had gone about as far as it could with some of the latest high-end CD players that have appeared recently. I was wrong. The CDP-707ESD beats anything I've ever measured or heard—and not by a small margin, either. I am just thankful that it arrived *after* I acquired my Audio Precision System One test gear; otherwise, I might never have been able to measure the residual noise and distortion levels that this incredible player exhibits.

Before I tell you about the measurements and the sonic excellence of this unit, I want to discuss some of its more attractive convenience features. Several of these are almost beyond belief, but trust me, they all work as described.

Perhaps the most outstanding of these are the "Disc Memo," "Custom Index," and "Program Bank" features. "Disc Memo" allows you to compose a message of up to 10 letters, numbers, or symbols and have the message memorized with respect to a specific disc. The stored message is then shown in the front-panel display whenever you load that particular disc. If you wish, the message can be displayed during play as well. "Custom Index" allows the player to memorize up to six index points on each disc as a way of marking your favorite musical passages. These personal index points are in addition to any specific index points that the record company may have encoded onto a given CD, and they can be applied even to discs that have not been so encoded by the manufacturer. What a boon for those of us who own a lot of early CDs, many of which are without index points. The "Program Bank" allows you to program favorite selections from a given disc into the CDP-707ESD's memory, in any order you choose. Once you do that, any time you load a disc for which a program has been "banked," the unit will automatically play only those selections you have stored. Any of these features can be applied to as many as 226 different discs. "Disc Memo" and "Custom Index" or "Disc Memo" and "Program Bank" may both be filed for any given disc, but you cannot use "Custom Index" and "Program Bank" simultaneously for a disc.

If all of this sounds as though the age of the read/write or erasable CD has arrived, rest assured that it has not. You see, every CD that's ever been made has its own identifying code. When you use any of the three features I've just described in the Sony CDP-707ESD, the player reads the unique identifying code associated with the disc and stores that code along with your programming or memo instructions. Then, the next time that disc is loaded, the player's microprocessor matches the code to the programs that have been stored for that code.

Of course, the more familiar operating features found on earlier Sony (and other) CD players are here too. Up to 20 tracks (or tracks plus index points) can be programmed in any order for immediate playback. As a further enhancement, you can also perform a "Program Edit." That is, you can program a sequence of selections with a built-in pause point. For example, you might create a program 50 minutes



"Disc Memo" allows you to assign a message of up to 10 characters to each CD; every time a disc is loaded, its "memo" is displayed on the player's front panel.

long with a built-in pause at 25 minutes. During playback, the CD will automatically pause at the end of the first part (25 minutes) and will resume, to play the second part of your program, when you press the "Pause" button.

The popular "Shuffle Play" (random play) feature introduced by Sony more than three years ago has been retained, and it too is augmented. Now you can instruct the player to "Shuffle Play" only those tracks or selections that you want. This feature, called "Delete Shuffle," is aptly named: After requesting "Shuffle Play" mode, you designate the tracks that you *don't* want included by its use. Incidentally, this unit will play the 3-inch CDs too.

Fast audible search is available, and access time to any point (track or index) on a disc remains under 1 S, as in earlier top-of-the-line Sony CD players.

#### Circuit Refinements and Construction

For all of these useful and impressive convenience features, of even greater significance, in my opinion, are the circuit improvements and structural refinements that have been incorporated in the CDP-707ESD.

This player is the first that I know of to employ eight-times oversampling. Sampling, in a digital audio system, is the process of looking at incoming waveforms as a series of discrete events in time. The speed of this process is the sampling rate. In a digital filter, the sampling rate is the rate at which the filter reads and calculates binary values, outputting them as a data stream to the D/A converter or converters.

In general, as the sampling rate increases, high-frequency performance is improved, output waveforms become more linear, and phase shift and losses due to steep analog filtering at the output of the system are minimized. The use of digital filtering and oversampling doesn't provide any more *real* data from a Compact Disc, as some have suggested. Rather, the filter creates its own additional data, producing a given number of "calculated" output levels for every "real" value read from the CD (which carries data

This Sony player employs true 18-bit D/A conversion, and it is the first one I know of with eight-times oversampling.

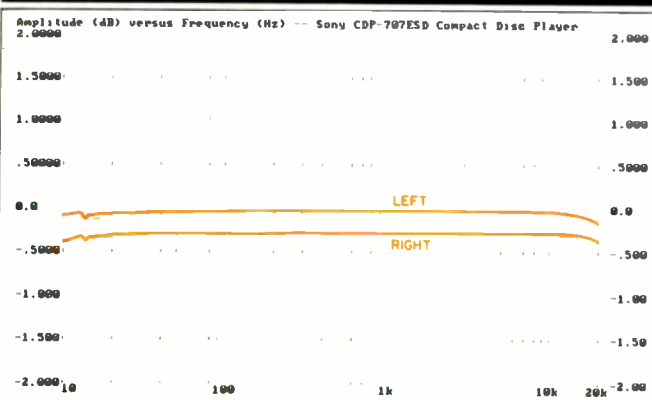


Fig. 1—Frequency response of left and right channels; curves have been separated for clarity.

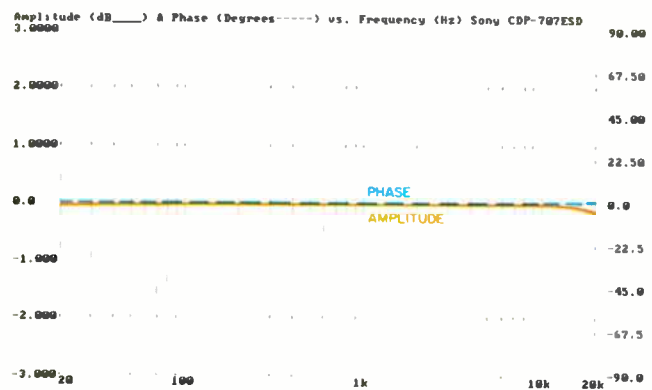


Fig. 2—Comparison between amplitude response of one channel (solid curve) and relative phase response (dashed curve) of opposite channel. Phase, in degrees, can be read from right-hand scale.

recorded at the standard sampling rate of 44.1 kHz). In doing so, it makes for a smoother, more linear waveform while at the same time shifting unwanted modulation noise farther out in frequency, where it can be more easily filtered out by simpler analog filters.

The digital filter chip that Sony has developed (identified as a CXD-1144) employs 18-bit technology to match the 18-bit D/A converters used in this model (about which more in a moment). Oversampling at eight times the 44.1-kHz CD

sampling rate results in a very dense data stream. This increased density improves linearity even beyond that achieved by four-times oversampling.

By employing true 18-bit D/A conversion, the CDP-707ESD takes advantage of the increased data density available from the digital filter. Both the D/A converter and the digital filter use full 18-bit processing, so there is no need to employ bit register shifts such as those used in the quasi-18-bit systems. Eighteen-bit linear conversion of the 16-bit signals contained in a CD provides 12 dB more signal-to-noise headroom, since the lowest two bits are never actually required to describe a signal amplitude. The number of possible quantization values in a 16-bit system is 65,536; adding two bits (as in 18-bit D/A conversion) increases that number to  $2^{18}$ , or 262,144. Clearly, having this many incremental values available reduces distortion at lower levels, because quantizing values are available at the bottom of the "bit" scale, so to speak.

Signal-to-noise capabilities are calculated by allowing just over 6 dB of S/N for each bit. Sixteen-bit systems, therefore, can have a maximum wide-band signal-to-noise ratio of 98.1 dB, while 18-bit linear converters have a maximum S/N capability of 110.1 dB.

It should also be noted that there are 14 power-supply subregulation stages within the CDP-707ESD. The digital output terminal has been configured in accordance with newly adopted Sony/Philips Standards for CD graphics as well as CD audio. The optical output conforms to the recently agreed-upon EIAJ Standard for optical digital interfacing.

The base of this player is built from multiple layers of both copper and Sony's "G" material (plastic resin and calcium carbonate, reinforced with glass fiber to resist vibration). These layers are then bonded to a steel plate for added rigidity. The base is acoustically, magnetically, and electrically inert. Dual-wall construction is also used; a second inner side wall of copper plating completely encloses the player, providing r.f. and magnetic shielding. Plastic-sealed wire-harness openings prevent the transfer of vibration from one stage to the next. As in previous models, the linear motor that drives the laser pickup assembly has been mounted in a double suspension system; part of the base or mounting surface is made of a ceramic/resin compound to reduce vibration and resonance caused by the laser assembly's fast motion.

The dual transformers and the motor assembly are mounted in a separate chassis compartment to isolate the power supply and the drawer mechanism from digital and analog circuit boards. As in earlier Sony units, circuit refinements such as single "master-clock" architecture and an advanced error detection and correction system have been employed. Finally, the analog filters used in the output stage are of a linear-phase design and employ only a three-pole architecture.

#### Control Layout

"Power" and "Timer" switches are at the far left of the front panel, beneath the disc drawer. Major pushbuttons running across the lower portion of the front panel include those for drawer "Open/Close," play, pause, and stop, plus "AMS" (Automatic Music Search) buttons for moving ahead

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Overall S/N when playing a quiet test-disc track was the highest I've ever seen: 115 dB unweighted and 118 dB A-weighted.

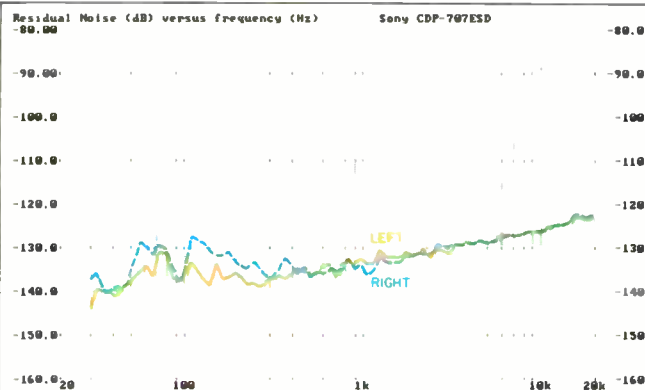


Fig. 3—Residual noise vs. frequency for "quiet" track of CD-1 test disc. Note low noise level at 60-Hz power-line frequency and its multiples (see text).

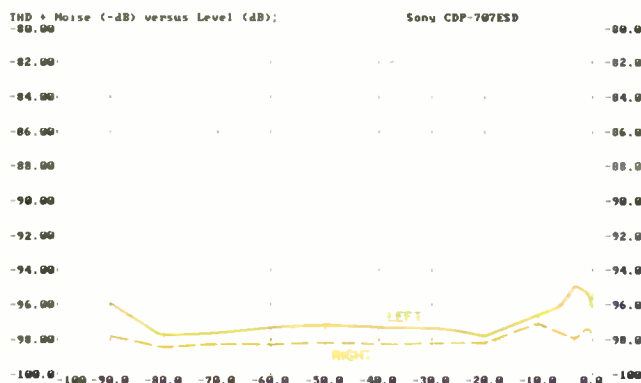


Fig. 4—Quantization noise and distortion vs. signal level.

or back to the next or previous track. Fast-forward and fast-reverse search buttons come next, followed by an "Erase" button. This is used to erase information stored in programming or in any of the "files" created for your discs when using the "Disc Memo," "Custom Index," "Program Bank," "Program Edit," or "Delete Shuffle" features.

Above the main transport buttons is a large display area that includes a "calendar" indicating the status of up to 20 tracks, the alphanumeric "Disc Memo" message, readouts

for various modes of CD playing time (track, total, or remaining time), a readout for programming data, and much more. To the right of the display are 20 small, numbered keys used both in accessing a particular track and in programming. Still farther to the right are the headphone jack, a level control for the variable line outputs, and buttons for selecting the "Continue/Single," "Shuffle," and "Program" play modes.

A row of small keys controlling secondary functions is arranged between the display area and the primary controls. These secondary buttons include "Display" (for recalling "Disc Memo" notations and the like), "Space/Pause," "Repeat," forward and reverse "Index," ">20" (used to access track numbers higher than 20), "Check," "Clear," "File," and "Index Mode."

The rear panel is equipped with fixed and variable line-level analog output jacks, a coaxial digital output jack, an optical digital output jack, and a switch that selects either analog or digital outputs.

The player comes with an infrared remote control which duplicates nearly all of the control and programming functions found on the front panel. The remote even has a pair of pushbuttons for controlling output level if the player is connected to an amplifier via the variable output jacks.

### Measurements

Just as I was getting ready to measure this player with the aid of my newly acquired Audio Precision System One test equipment, the good people at Audio Precision—almost as if on cue—sent an application note on CD testing along with a floppy diskette full of newly devised tests and procedures. These new procedures involve the CD-1 CD test disc, which conforms to the proposed EIA Measurement Standard that I have been working on with other members of the audio industry for the past couple of years. This disc, produced by CBS Records, has some important test tracks providing information about CD player performance that no other test discs yield. Needless to say, the ability to run these tests on Audio Precision software meant that I didn't have to create test panels on my computer screen to go with the Audio Precision System One hardware.

Figure 1 shows the CDP-707ESD's frequency response from 10 Hz to 20 kHz. Even with an expanded scale of 0.5 dB per divider, the curves follow an almost perfectly straight line over most of the audio range. Deviation from perfect flatness was  $-0.15$  dB at 20 kHz. (Curves of left and right response have been deliberately separated for clarity; actual output levels for the two channels were within 0.1 dB of each other.)

In Fig. 2, I plotted the amplitude response of one channel (solid curve) versus the relative phase of the opposite channel (dashed curve). As you can see, there was no detectable phase error between channels, even at 20 kHz!

Overall signal-to-noise ratio of the CDP-707ESD, when playing a "quiet" track of the CD-1 test disc, was the highest I have ever measured for any CD player: 115 dB unweighted and 118 dB A-weighted! It should be understood that this test produces no information concerning the *digital* portions of the system, since there is no data on the "quiet" track to exercise the D/A converters.





CD Video Disc



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# Yamaha introduces four wheel drive.



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The CD Video disc is a combination of audio and video. So when you play one on the CDV-1000, you not only get an incredible 425-line horizontal resolution of the video, but also the clear, clean audio that can only come from digital technology.

Of course, we wanted to keep the CDV-1000 simple

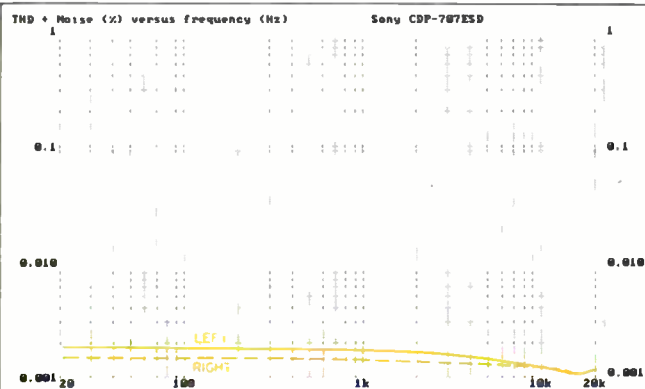
and easy to use. That's why we gave it fast access. And a super-tracking tilt servo laser head for accurate tracking. All of which makes the CDV-1000 an incredibly versatile, high performance component. And one that no home theatre environment should be without. Just ask your Yamaha audio dealer for a demonstration. Then hear, and see, for yourself what we're driving at.



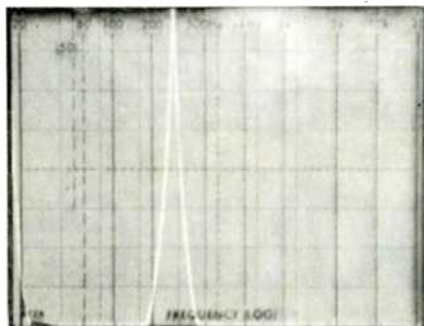
## YAMAHA®

YAMAHA DIGITAL HOME THEATRE  
Yamaha Electronics Corporation, P.O. Box 6660, Buena Park, CA 90622.

Amazingly, instead of increasing at higher frequencies, THD + N actually decreased as 20 kHz was approached.



**Fig. 5—Quantization noise and distortion vs. frequency. Note decrease at high frequencies (see text).**



**Fig. 6—Spectrum analysis of 20-kHz signal; note absence of 24.1-kHz "beat" tone seen on many other players. (Vertical scale: 10 dB/div.)**

A spectral analysis of the residual noise will show whether a CD player's power supply is adequately filtered and shielded. On one or two other players that I have subjected to this test, I could see rather large peaks of noise at 60 and 120 Hz and, in some cases, at 180 Hz, all attributable to the players' power supplies. Notice that in Fig. 3, the CDP-707ESD's residual noise at these power-supply related frequencies is  $-130$  dB or lower in every case but one, and just a bit above  $-130$  dB in that one case.

Quantization noise and distortion, on the other hand, are due to errors (binary round-off or approximation) that occur during the digitization process as the player converts a recovered analog signal's amplitude to the nearest available number. If all other forms of noise and distortion were negligible, quantization noise and distortion would set a "floor" ( $-98.1$  dB for the CD's 16-bit linear system) that would be constant in absolute magnitude for all signal levels up to 0 dB. The graph of Fig. 4 expresses quantization noise and distortion level in dB (vertical scale) against signal amplitude from maximum (0 dB at the right) down to  $-90$  dB. At all but the very highest levels and the very lowest level, the quantization noise and distortion come remarkably close to the theoretical 98.1 dB. The slight rise at the high end of the plot for the left channel (solid curve) may well be due to a minute amount of distortion in the analog amplifier stage. Bear in mind, however, that even  $-95$  dB corresponds to 0.00178%!

An alternative method of presenting THD + N versus output amplitude is to express it as a *percentage* of the available signal level. Of course, when presented in this way, THD + N rises linearly with decreasing signal levels. Fixed, spot readings of this player's THD + N at 0-dB recorded level were 0.00135% on one channel and 0.0014% on the other—again, the lowest results I have ever obtained for any CD player.

Perhaps even more amazing is the fact that this THD + N level, rather than increasing at higher frequencies because of nonharmonically related out-of-band "beats," actually decreased as the test frequencies approached 20 kHz, as shown in Fig. 5. To confirm this phenomenon, I applied a 20-kHz test signal to a spectrum analyzer, as I have been doing now with most CD players I test, to generate the 'scope photo of Fig. 6. The sweep is, as usual, linear from 0 Hz to 50 kHz, but there is absolutely no evidence of the 24.1-kHz beat so commonly seen from most players. I even stepped up the gain of the analyzer to just below its own clipping level in order to display a full 80 dB of dynamic range on the 'scope. (I usually settle for 70 dB, in order to leave a safety margin for the analyzer's circuits.) Even then, there were absolutely no spurious products—only the desired signal at 20 kHz, where it belonged. If I had any doubts about the benefits of eight-times oversampling or of 18-bit D/A conversion and digital filtering, Figs. 5 and 6 dispelled those doubts completely!

Figure 7 is a plot of separation between channels; the results from left to right and from right to left were so close to each other that I did not bother to identify which curve is which. Suffice it to say that at 1 kHz, separation in either direction was greater than 125 dB, and that at 20 kHz, where separation often decreases to 70 dB or less, it still measured well over 100 dB!

Next, I investigated an important (and excellent) characteristic of the CDP-707ESD, its linearity. When reproducing undithered test signals, the player showed virtually no deviation from perfect linearity from 0 dB (maximum level) down to about  $-80$  dB. In other words, output levels were almost perfectly proportional to the signal levels recorded digitally on the test disc. There was a very slight departure from linearity at  $-90$  dB, but this was very hard to see in a



## “It’s no trick to make a great speaker when price is no object”

Andy Petite, chief designer, Boston Acoustics

“It is a far greater engineering challenge for speaker designers to build a great-sounding speaker for \$200 than \$2000. When cost is no object, they can include whatever they need to get the quality they’re looking for.

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“The midrange and tweeter are ferrofluid cooled for greater power handling capacity. The diaphragms of all three drivers are made of copolymer. Although it is more costly than conventional materials, we used copolymer because of its structural uniformity and immunity to atmospheric changes.

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“For the enclosure, we used the same dense, non-resonant structural material as in our highest-priced system. To keep the cost down we used wood-grain vinyl instead of costly wood veneer. It looks rich, and makes absolutely no difference in sound quality.

“More important than what we put into our systems is the quality of sound that comes out—and how that matches your expectations.

“From our very first product to our latest, audio critics have appreciated what we’ve accomplished—delivering demonstrably high performance at truly affordable prices. Here’s what Julian Hirsch said about the T830 in *Stereo Review*:

*‘In all measurable respects, the Boston Acoustics T830 delivered outstanding performance. Few speakers we have tested have had such a flat frequency response or such low distortion, for example, and most of those were considerably more expensive... we were enormously impressed.’*

“When you compare the T830 against similarly-priced systems, you’ll also find it sounds better in a number of ways. More musical, smoother, its imaging more precise. And it can play louder without distortion.

“What we’ve accomplished is no trick. It’s knowing what to do, then doing it.

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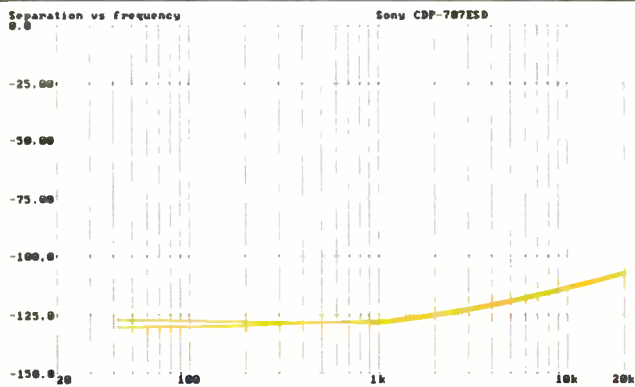
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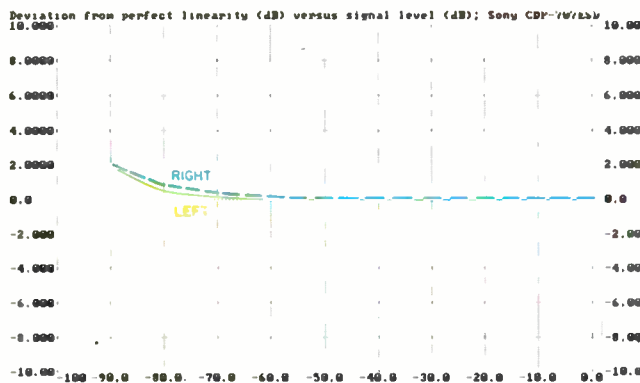
## **Boston** Acoustics

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(617) 532-2111

When I got the unit to mistrack, by hitting it rather hard, there was no skipping around but just a brief moment of muting.



**Fig. 7—Interchannel separation. Note the unusually close match between the two curves (see text).**



**Fig. 8—Deviation from perfect linearity for undithered 1-kHz signal at levels from -90 to 0 dB.**

conventional linearity graph (output versus input amplitude). This is where one of the "procedure" files supplied with my new CD test software comes in. In a series of computations and corrections, the file translates the measured output-versus-input linearity data into a graph that shows *deviation* from flatness with decreasing level. Here, in Fig. 8, it is much easier to see that at -90 dB, linearity was off by a mere 2.0 dB.

The CD-1 test disc contains low-level signals (from -70

to -100 dB) to which dither noise has been added. Although dither reduces the ultimate signal-to-noise ratio of a recording, it also reduces distortion. To put it another way, it extends linear operation below the undithered theoretical limit. Signals whose peak amplitude is less than one-half the least significant bit's value could never be recorded in a nondithered system. With dither, signals at such low amplitudes are still converted, since the dither acts to ensure that the lowest significant bit is always exercised. If this seems hard to fathom, think of dither in the frequency domain as spreading the quantization noise across the spectrum, rather than having all the energy concentrated at harmonics of the desired signal frequency.

In any event, Fig. 9 is a plot similar to that of Fig. 8, but using signals which are dithered and which extend only from -70 to -100 dB. Again, the deviation from perfect linearity is only about 2 dB (a bit more in one channel, but a bit less in the other) at -100 dB!

Two methods for measuring a CD player's dynamic range have been proposed. The first, offered by the Electronics Industries Association of Japan, involves measuring the THD + N of a -60 dB signal, expressing it in dB, and adding the negative number of dB to -60 dB. Spot readings of my test equipment yielded an EIAJ dynamic range of approximately 98 dB for the CDP-707ESD.

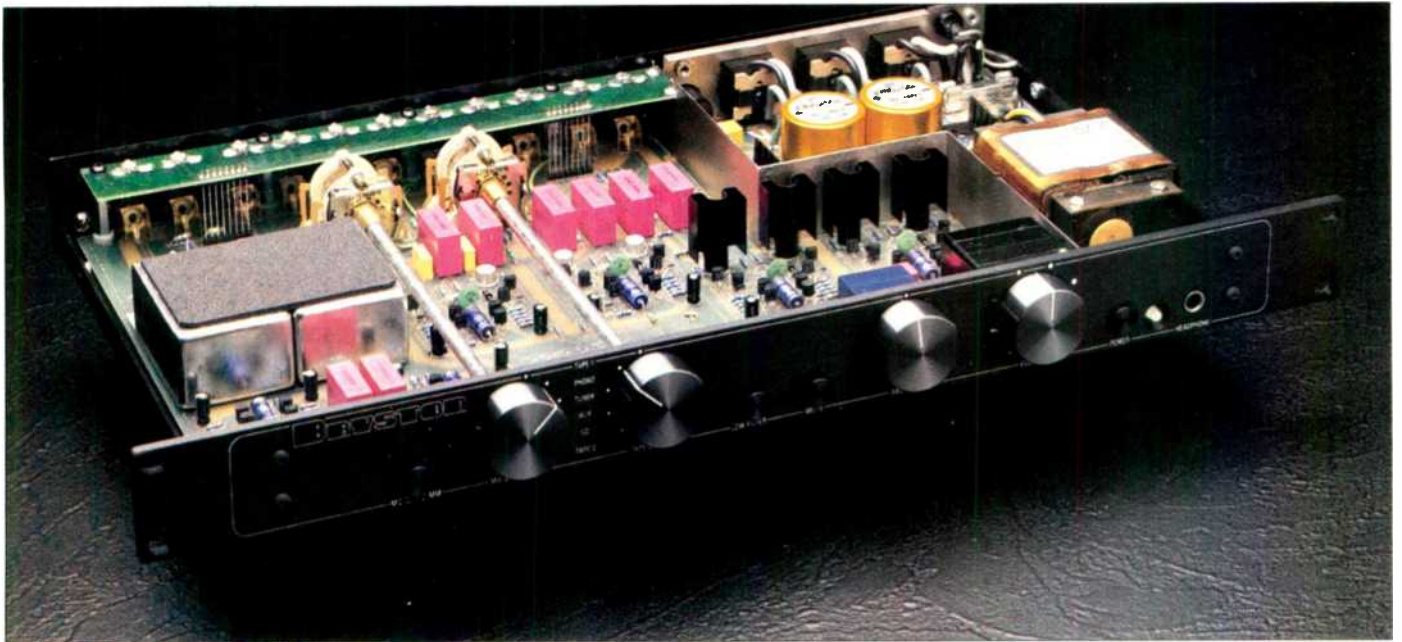
A second method, proposed by the Electronics Industries Association, utilizes a special dithered signal on the CD-1 test disc that "fades" from -60 to -120 dB (into the noise). Dynamic range is then considered to be the difference between 0 dB (maximum level) and the point during the fade where the signal level is 3 dB higher than the lowest point it ever reaches. In the past, I have tried to measure this point by eyeballing an a.c. voltmeter, but I've found that, at best, results have been none too accurate. Thanks to another "procedure" file created by Audio Precision, the task became quite simple. The system performed a complex series of tests, computations, translations from time frame to level, and the like. During the first stage of this multiple-test procedure, I was able to easily pick out the reading that was 3 dB above the minimum reading; it was -111 dB, which therefore is the EIA dynamic range of this CD player. The final results of this procedure are plotted in Fig. 10, a graph of departure from perfect linearity down to -120 dB.

Despite the greatly increased sensitivity of my new test equipment over the gear I had been using, the wow-and-flutter test, conducted as a function of time for a period of 25 S, yielded a line along the "0" baseline of the grid on which it was plotted. As they so often say in the published specs, wow and flutter was "below measurable limits"—even though those limits have now been extended downward by a couple of orders of magnitude.

SMPTÉ IM was measurable. I read 0.006% for one channel and 0.005% for the other. CCIF twin-tone distortion, using 11- and 12-kHz test signals from the CD-1 test disc, was 0.00123% on either channel. Clock accuracy—the accuracy of the player's 44.1-kHz master clock—is another parameter I am now able to test. Any gross errors in clock accuracy would result in a deviation from correct musical pitch when playing CDs. No such worry with the CDP-707ESD: Its clock was off by only 0.0175%. To put it in

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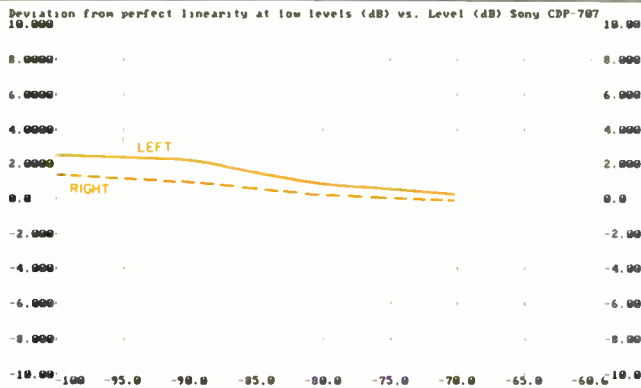
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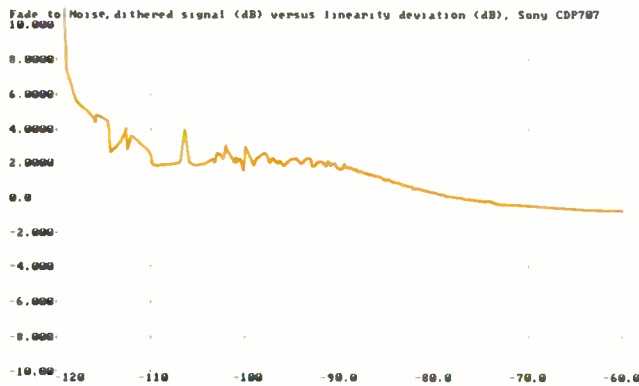
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I was able to figure out just about all of this player's features without trouble, even lacking an English owner's manual.



**Fig. 9—Deviation from perfect linearity for dithered 1-kHz signal at levels from -100 to -70 dB.**



**Fig. 10—Linearity deviation for EIA "fade-to-noise" dynamic-range test, using dithered signal.**

perhaps more meaningful terms for those of you who study music, a 440-Hz tone (A above middle C) reproduced on this player will come out as 440.07 Hz.

Figures 11 and 12 show how the player reproduced a 1-kHz square wave and a unit pulse, respectively. The slight ripple on the horizontal portions of the square wave are due to the CD system's bandwidth limitation (cutoff at 20 kHz) and not to any other cause. The unit pulse merely confirms that this player does not invert polarity.

### Use and Listening Tests

The Sony CDP-707ESD is so well constructed, and its laser pickup assembly so well isolated from the rest of the unit, that even rather severe pounding on its top surface failed to cause any mistracking. When I finally got the unit to mistrack, by hitting its side panels rather hard, it did not skip all over the disc, as other players have done. Instead, there was only a brief moment of muting and then a resumption of play at almost precisely the point where the music had been interrupted.

The "Disc Memo" feature is intriguing. I don't know what 10-letter messages people will assign to their discs, but if nothing else, the feature is fun to use and experiment with. The "Custom Index" function, on the other hand, I consider to be extremely useful. I own many discs to which I would like to assign my own index points, in order to more easily find musical passages that I enjoy listening to or that I use in testing audio equipment performance. With the "Custom Index" feature, I could identify these passages easily and recall them accurately. It is a credit to this unit's designers that although the English-language owner's manual was unavailable when I tested the CDP-707ESD (such manuals are, of course, available now), I was able to figure out just about all of its regular functions—and even its unique special features—without too much trouble.

When you get beyond all the clever features, a top-of-the-line CD player is expected to reproduce music as accurately and as faithfully as the CD medium will permit. To my way



....remarkable!



**par.a.digm** (par'adim) *noun*: serving as an example or model of how something should be done.

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Even if you can't afford one, you should listen to the CDP-707ESD. It is a shining example of what CD technology's all about.

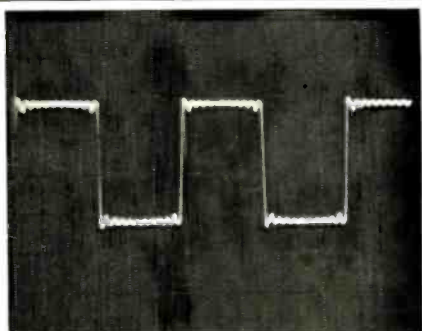


Fig. 11—  
Reproduction of  
1-kHz square  
wave.

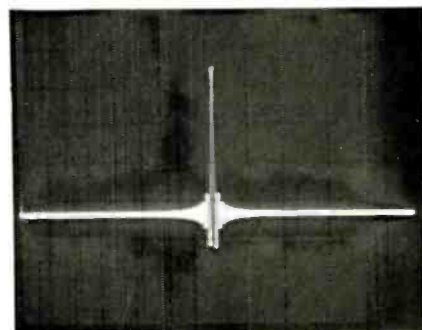


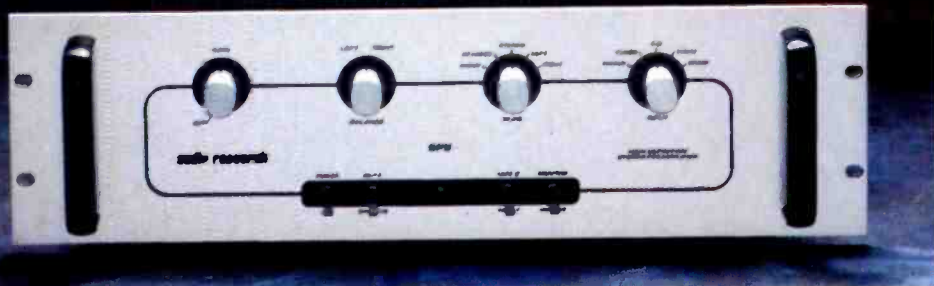
Fig. 12—  
Single-pulse test.

of thinking, the CDP-707ESD does just that. I will not list all of the discs I auditioned on this player; to do so would make an already long report even longer. Three that stand out, though, are a Telarc disc (CD-80142) of Mendelssohn's "Quartet in A Minor" and his "Octet in E Flat Major," a Delos disc (D/CD 3062) which contains Haydn's Symphony No. 21 in A Major as well as his Cello Concerto No. 1 in C Major, and another Telarc disc (CD-80155) of Brahms' Symphony No. 4 in E Minor as well as his "Academic Festival Overture." There's enough variety on these three discs to put any audio system through its paces. I particularly like to play music of small instrumental groups when judging a CD player or, for that matter, any audio component. The clarity and warmth of the cello on that Delos disc has never been reproduced more faithfully than on this Sony player. Even if you can't afford a CDP-707ESD, you owe it to yourself to listen to how it performs and to try out its unique features.

If nothing else, the CDP-707ESD should serve us all as a reference against which to judge the new crop of players that will appear in the coming months. Perhaps they too will employ true 18-bit D/A converters (some already do), eight-times oversampling with 18-bit digital filters, and all the other circuit innovations found in this unit. But until they arrive, the Sony CDP-707ESD stands alone as a shining example of what Compact Disc technology is all about.

Leonard Feldman

## The affordable new hybrid from Audio Research



The new SP9 hybrid preamplifier combines the controls and musicality listeners want most, with the robust construction Audio Research is noted for. Using just two 6DJ8 vacuum tubes and proprietary FET-based circuitry, the SP9 provides more than enough gain (66 dB) for moderate-to-high output moving coil phono cartridges (loading may be set internally). High-level circuits have been optimized for overload-proof reproduction from compact discs. Two tape inputs / outputs, plus automatic / manual muting, add convenience and protection.

With phono noise (IHF weighted) measuring 72 dB below 1 mV input, the SP9 allows music to bloom dynamically from a near-silent background. Staging is broad and deep, with focus of individual voices palpable and rock-steady. In the end, the new SP9 is true to its heritage: it sets surprising new standards of musical accuracy at its price — and invites comparison with the most expensive competitors.



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## 2

**AUDIOLAB  
8000A  
INTEGRATED  
AMPLIFIER**
**Manufacturer's Specifications**

**Power Output:** 50 watts per channel, 20 Hz to 20 kHz, both channels driven into 8-ohm loads.

**Rated THD:** 0.05%.

**Rated IHF IM:** 0.05%.

**Frequency Response:** Phono, RIAA/IEC, 20 Hz to 20 kHz,  $\pm 0.5$  dB. High level, 20 Hz to 20 kHz,  $\pm 0.5$  dB; 2 Hz to 65 kHz, +0, -3 dB. Power amp only, 20 Hz to 20 kHz,  $\pm 0.3$  dB; 1 Hz to 80 kHz, +0, -3 dB.

**Channel Balance:** Within 1.0 dB.

**Input Sensitivity:** MM phono, 2.0 mV; MC phono, 110  $\mu$ V; high level, 100 mV.

**Phono Overload:** MM, 175 mV; MC, 10 mV.

**S/N:** MM phono, 76 dB; MC phono, 74 dB; high level, 78 dB.

**Channel Separation:** 60 dB at 1 kHz for any input.

**Polarity:** Noninverting for all inputs and outputs.

**Tone-Control Range:** Bass,  $\pm 6$  dB at 20 Hz; treble,  $\pm 6$  dB at 20 kHz.

**Power Requirements:** 120 V, 50/60 Hz; maximum power, 250 VA.

**Dimensions:** 17 $\frac{1}{2}$  in. W x 2 $\frac{15}{16}$  in. H x 13 $\frac{3}{8}$  in. D (44.5 cm x 7.4 cm x 34 cm).

**Weight:** 16 $\frac{3}{4}$  lbs. (7.6 kg).

**Price:** \$695.

**Company Address:** c/o Artech Electronics, P.O. Box 1165, Champaign, N.Y. 12919.

For literature, circle No. 91



Here's a neat little "sleeper" of an integrated amplifier which would go well with any of the higher efficiency speaker systems that have been introduced since the era of digital audio began in earnest. No bigger than most preamplifiers, the Audiolab 8000A delivers extremely clean sound at power levels well beyond its conservative specifications. Manufactured in the United Kingdom and distributed by Artech Electronics of Canada, the amplifier has a beautifully styled front panel with easy-to-grip rotary controls and positive-acting pushbutton switches.

This unit's similarity to a preamplifier goes beyond its appearance. As supplied, the "Power Amp In" terminals are internally connected to the "Pre-Amp Out" jacks. However, with a simple internal modification, the preamp and power

amp sections can be used independently, for biamped systems or for driving active loudspeakers, for example. Those "Pre-Amp Out" jacks are driven by an amplifier with low-impedance output so that they can be used to drive other power amps or active speakers, even via long cables, without signal degradation or high-frequency attenuation.

Like many more elaborate (and more expensive) integrated amplifiers, the 8000A provides independent signal source selection for its main and tape outputs. Thus, you can listen to one program source while recording another. Two full tape monitor loops are provided, and dubbing is possible in either direction between two tape decks.

I was impressed by this amplifier's speaker-switching arrangement; clearly, its designers considered real-world



Why is it that the simplest ideas are always the hardest to explain?

Ivor S Tiefenbrun had already turned the hi-fi industry on its head once before. You'd think they'd have been ready for him this time.

With the Linn LP12 turntable he'd set a new standard for the industry to strive for.

No longer were they **flummoxed** by the idea that listening is the only way to judge a turntable.

No longer was Ivor shunned at the annual American trade shows.

They wined him. They dined him. They called him the Analogue Guru of Glasgow.

But no one could understand a word he was saying.

Needless to say, the **confusion** was entirely mutual. From Ivor's point of view there were two main **enigmas**.

Why was it that Americans were buying loudspeakers without direct listening comparisons? And, why do they change the rules of ice hockey after every inning?

Realising that it would be easier to solve, he started with the first **question** first.

Ivor knew that, to change this situation, he would have to bring the industry on board with him.

So he told them a wee bit about his Isobarik DMS loudspeakers and asked them to have a listen.

But they were too **baffled** by the Isobarik's radical design to sit down and listen. No one could understand why there was a second bass unit hidden **inside** the cabinet.

Which certainly didn't stop them from questioning it.

In fact, they had a field day. Some people even took them apart and tried to put them together again. Which was an unmitigated disaster since, in order to work, they must be kept airtight.

But it was a good lesson learned.

When the Sara 9 loudspeakers were introduced few people bothered to try and carve them up.

Instead they contented themselves with plotting frequency response graphs.

These graphs confirmed Ivor's earlier **hypothesis**. Namely, if you feed a signal into a loudspeaker, it will produce a sound.

## THIRTEEN YEARS AGO

## THIS MAN CREATED A

## LOUDSPEAKER IN HIS OWN IMAGE.

The one drawback these graphs have is that reading them gives you absolutely **no clue** as to what the sound actually sounds like.

Only one research method exists for doing this. In Scotland we call it 'listening.' Ivor begged them to try it. His critics found this suggestion highly irregular.

Ivor knew that if he wanted them to understand his feelings of anguish and **frustration** he would have to 'speak their language.'

"Having people misunderstand your life's work is like watching your favourite linebacker miss the convert in the bottom of the ninth when the bases are loaded."

## IT BECAME THE MOST MISUNDERSTOOD PRODUCT IN THE INDUSTRY.

To which everyone nodded politely before asking to see how the new Nexus loudspeaker performed in **anechoic** conditions.

**Exasperated**, Ivor explained the acid test he applies when comparing loudspeakers.

(The steps outlined in the next three paragraphs are perfectly safe and may be conducted in a softly lit room.)

Only one pair of loudspeakers should be in the room at the one time. Otherwise, when one pair plays, the other

pair will vibrate and the sound will be **distorted**. Once everything is set up, sit down.

Listen.

Consider the performance of the loudspeaker. This may be done over a cup of coffee, or, if you prefer, tea.

Musical qualities are the only sensible criteria for judging hi-fi.

So, ask yourself qualitative questions like, do all the musicians seem to be playing together? Are the bassline and melody easy to follow?

Anyone can hear the difference between good and bad hi-fi. All you have to do is listen.

This fundamental belief is at the root of everything we do. And it governs the design of all our turntables, tonearms, cartridges, amplifiers and loudspeakers.

Equipment comparisons, using a single set of speakers, (see paragraph 28) are a matter of course at all our dealers. And have been ever since the dawn of Linn. No gimmicks. No obligations. Just a straightforward listen.

These days it seems incredible that anyone ever questioned something so overwhelmingly obvious.

But, as Ivor often says, "When you have more than three bases to run or the seventh down you can't afford to risk a penalty for **frosting**."



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I can't quite work out what to do with this coupon. What do I fill in if I never want to hear from you again?

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\_\_\_\_\_

Clearly, the designers of this amplifier considered real-world situations and didn't add extra switches for their own sake.

situations and did not add needless switches for their own sake. Though there are two independent sets of speaker terminals at the rear of the amplifier, there is only a single pushbutton speaker switch on the front panel. This switch activates speakers connected to the terminals labelled "Switched Speakers." It's a logical setup; in most practical applications, the main speakers would be on all the time and therefore would require no front-panel switch. Just as logically, should you wish to listen to headphones, insertion of a headphone plug deactivates both sets of speakers, regardless of the setting of that front-panel pushbutton.

I was not supplied with a schematic wiring diagram, but I did remove the 8000A's cover. This revealed a massive power transformer, more than adequate filter capacitance, and a generally neat and well thought-out component layout with sufficient heat-sink area for the output devices.

### Control Layout

The power on/off pushbutton is located (surprise!) at the right end of the slim front panel. (Most of us are right-handed, after all. So why do manufacturers make us reach

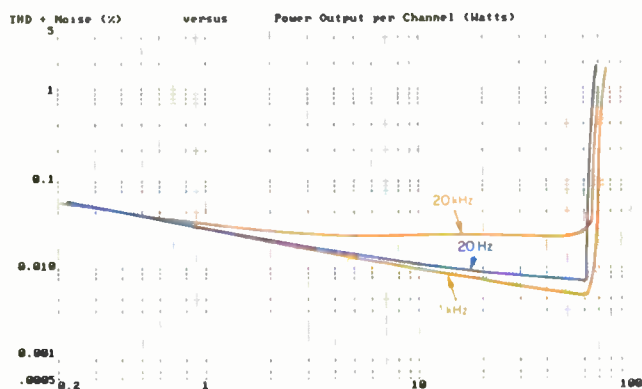


Fig. 1—THD + N vs. power into 8 ohms.

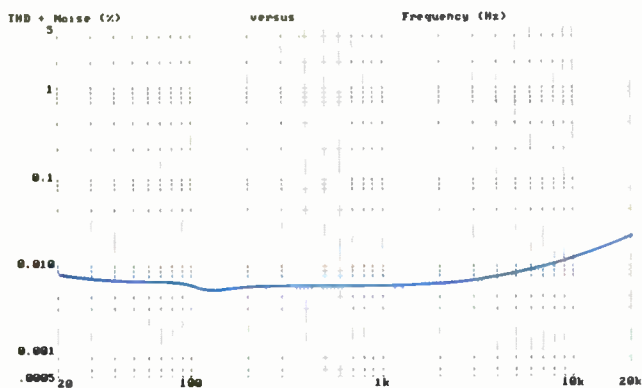


Fig. 2—THD + N vs. frequency at rated output (50 watts) into 8 ohms.

across the front panel to turn our equipment on?) The next control, working right to left, is the "Speakers" on/off pushbutton, and just beyond it is the master volume control. The smaller balance control comes next, followed by calibrated treble and bass controls. Between them is a "Tone" pushbutton, used for defeating the tone-control circuits. At the left end of the panel are two identical rotary knobs. One selects the input you want to listen to, and the other chooses the signal to be sent to the record-out jacks. If the "Record" control is set to "Tape 1," you can dub from the deck connected to the "Tape 1" loop to the deck connected to the "Tape 2" loop. Conversely, if you set the "Record" switch to "Tape 2," you can dub from "Tape 2" to "Tape 1." The "Input" and "Record" selectors are positioned side by side and share one set of nomenclature, printed between them. It took me a while to get used to this arrangement.

Below the "Input" selector are two tiny LED indicators, one labelled "MM," the other "MC." Since the switch that selects the phono preamp mode (MM or MC) is on the rear panel, these lights let the user know which cartridge input circuit is active. And since one of these two lights will always be illuminated when power is applied to the amplifier, there is no need for an additional power-on indicator. In art circles, this might be called a "minimalist" approach. In audio circles, I call it common-sense design.

A power cord is supplied separately, so the amp need not be reconfigured physically for different countries and different voltages. The line fuse, together with a spare, is in a small drawer, on the rear of the amp, that can only be opened once the cord is unplugged. Color-coded speaker terminals are positioned at the left side of the rear panel, near the power-cord receptacle. "Power Amp In" jacks and "Pre-Amp Out" jacks come next, followed by the eight "In" and "Out" jacks associated with the two tape monitor loops. Next come the high-level input pairs, labelled "CD" and "Tuner." Farther to the right are four jacks associated with the MM phono inputs. Why four? Because two can be used to alter the existing load impedance presented to the phono cartridge if the 47-kilohm resistance and 85-pF capacitance built into the unit are not precisely the values required by your cartridge. To alter those "default" values, you can easily wire up a pair of phono plugs with the right resistance and capacitance in parallel, or you can order the proper load from your dealer. The other pair of MM phono jacks are, of course, for the cartridge itself. At the extreme right of the panel are a pair of MC phono inputs and a switch that selects MM or MC operation. Independent jacks are provided for either type of cartridge. Therefore, if you own both types, mounted in two different tonearms or on two turntables, you can connect one of each and choose between them without having to unplug and plug cartridge cables again and again. A ground terminal in the vicinity of these phono jacks completes the rear-panel layout.

### Measurements

Evaluating the Audiolab 8000A on the lab bench provided my first opportunity to use Audio Precision's System One computerized test equipment for measuring an amplifier's performance. Figure 1 is a plot of THD + N versus power output per channel, with both channels driving 8-ohm resis-



# The Quietspeakers

Revox speakers play to the civilized ear. And they speak most distinctly where the civilized ear does its listening.

We make speakers that make beautiful music—absolutely clear, richly detailed music. At low listening levels, where other speakers are at a loss, the sound from Revox speakers is always precise, focused, vividly present. These speakers impress with their fineness, their ability to reveal music's quiet subtleties, its lucid stillness.

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For a 1-kHz signal at rated power, distortion was just 0.005%, a whole order of magnitude lower than the manufacturer's spec.

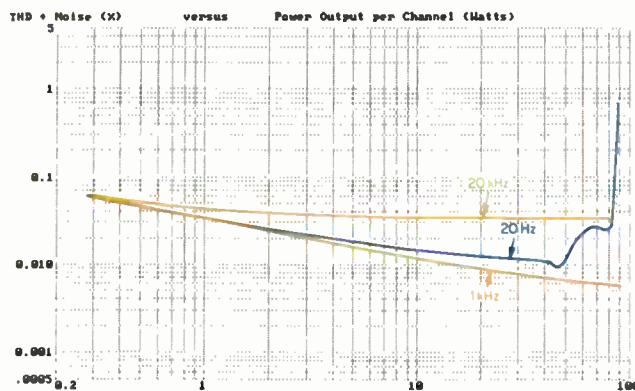


Fig. 3—THD + N vs. power into 4 ohms.

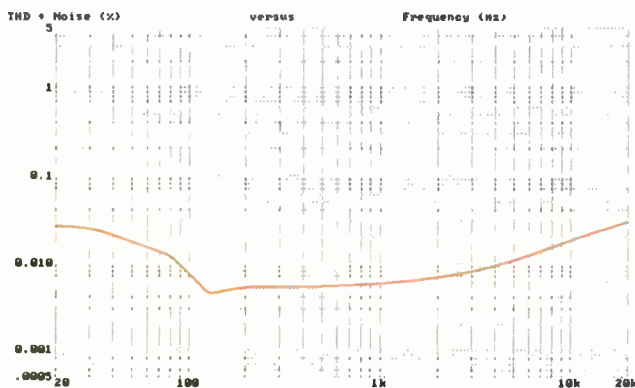


Fig. 4—THD + N vs. frequency at 80 watts into 4 ohms.

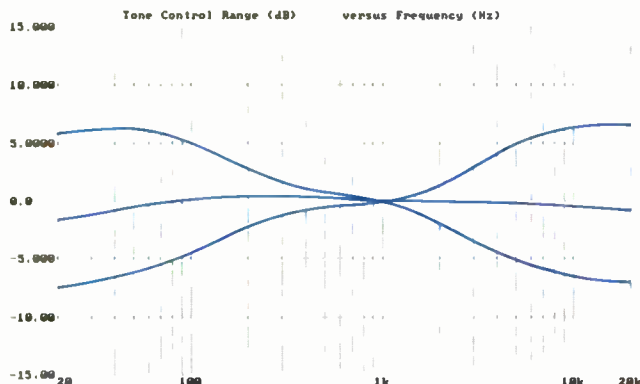


Fig. 5—Tone-control characteristics.

tive loads. The plots are for test frequencies of 1 kHz, 20 Hz, and 20 kHz. Distortion reached its rated level of 0.05% for a 1-kHz signal at around 67 watts, well above the manufacturer's rated level of 50 watts. Even when a 20-kHz test signal was used, power output for 0.05% THD + N was an impressive 63 watts, and at 20 Hz it was 61 watts. Backing off to the rated 50 watts per channel, I plotted distortion versus frequency from 20 Hz to 20 kHz. Results are shown in Fig. 2. At 1 kHz, the reading was 0.005%, a whole order of magnitude lower than the manufacturer's specification. Worst-case THD + N (at 20 kHz) was just under 0.02%, still well below the published rating of 0.05%.

Although the manufacturer doesn't provide an FTC power rating for operation with 4-ohm loads, I repeated the measurement using this lower load impedance at the output of each channel. Figure 3 shows how THD + N varied with increasing power output, again for frequencies of 1 kHz, 20 Hz, and 20 kHz. Under steady-state conditions, the high current required for these tests popped the amp's line fuse. This explains why the curves in Fig. 3 don't extend beyond about 90 watts per channel. Yet even at that power level, worst-case THD + N (for the 20-Hz test signal) was still below 0.05%, with a reading of approximately 0.34%. (Figure 3 is a bit misleading here, as the 20-Hz curve actually represents interpolations between readings taken above and below 90 watts.) Next, I set the test system to provide a constant regulated output of 80 watts per channel into 4 ohms (so as not to pop more fuses) and plotted THD + N versus frequency. Results are shown in Fig. 4: THD + N was only 0.0061% at 1 kHz, 0.028% at 20 Hz, and 0.03% at 20 kHz.

Damping factor, referred to 8 ohms and at a test frequency of 50 Hz, measured 130, and dynamic headroom was a very high 2.77 dB. SMPTE-IM distortion at rated output measured 0.04%, and CCIF IM was also 0.04%.

Overall frequency response via the high-level inputs was within 1.18 dB from 20 Hz to 20 kHz when the tone-control circuitry was turned on. Tone-control range was moderate, compared to some amplifiers—a wise design choice for a relatively low-powered integrated amplifier. Furthermore, the tone-control circuitry had only a moderate effect on mid-frequencies even when maximum boost or cut was employed. Multiple sweeps, using the Audio Precision test system, produced the composite response curves of Fig. 5. Frequency response with the tone controls out of the circuit was within 3.0 dB from below 10 Hz to 55 kHz.

Figure 6 is a plot of the response characteristics of the phono preamplifier section. Since the 8000A is of European origin, its response curve corresponds to the IEC-modified RIAA Standard. Notice the roll-off below around 35 Hz. This roll-off is of considerable help when using turntables that have a moderate amount of rumble. In this country, the RIAA has obstinately refused to adopt this modification even though it's endorsed by the International Electrotechnical Commission, a world organization charged with setting uniform voluntary standards of measurement for all industrialized nations. In any event, Fig. 7 shows the deviation of the amp's playback response curve from the RIAA Standard. At 20 Hz, it differed by just a bit more than 3 dB. When I inserted the inverse of the IEC-modified filter in the mea-

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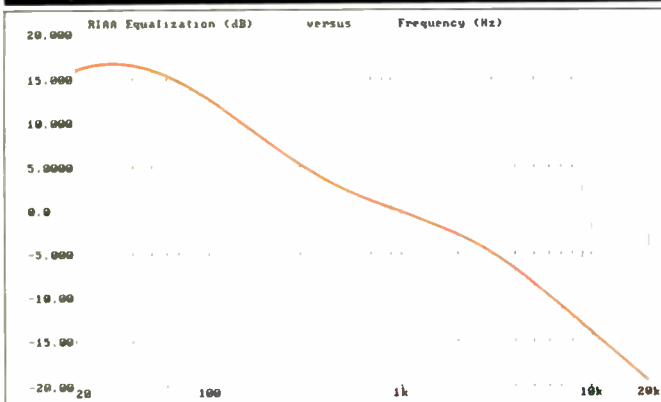
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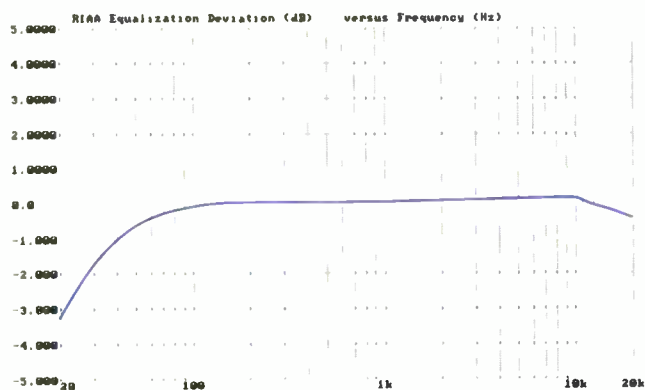
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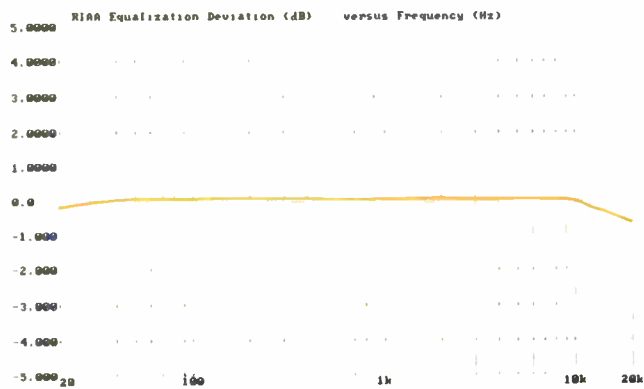
You can probably buy a lot more power for the price of the 8000A, but you're not likely to buy better sound or obtain a better layout.



**Fig. 6—Response characteristics, phono preamp section. Note roll-off below 35 Hz; see text.**



**Fig. 7—Deviation of phono playback response from RIAA equalization. See text.**



**Fig. 8—Deviation of phono playback response from IEC/RIAA equalization. See text.**

surement path, the response curve proved to be extremely accurate at the low end; it was off by only  $-0.3$  dB at 20 Hz, as shown in Fig. 8.

Although Audiolab measures signal-to-noise the same way I do (using the IHF/EIA Standard), for some reason they quote input sensitivity based on rated output rather than on 1 watt output. Consequently, my measured input sensitivities do not correlate with the published values. If you want to compare my results with the published specifications, simply multiply my numbers by 7.07 (the input voltage ratio needed to get from 1 watt to 50 watts). Sensitivity for the CD input was 28 mV; other high-level inputs required only 14 mV for 1 watt output. Sensitivity for the MM phono inputs was 0.32 mV, and the MC phono inputs required a signal level of 18.4  $\mu$ V to produce 1 watt into 8-ohm loads with the volume turned fully up.

Signal-to-noise ratio for the high-level inputs, referred to 1 watt output and with a 0.5-V input, measured slightly more than 96 dB. Residual noise, with the volume control set at minimum, was 100.3 dB. S/N via the MM phono inputs, referred to 1 watt output and with a 5-mV signal applied, was exactly 80 dB; via the MC inputs (using a 0.5-mV input signal to produce 1 watt output), S/N was 75.4 dB at the left-channel output and 77.0 dB at the right. All of these results are significantly better than Audiolab's specifications.

#### Use and Listening Tests

The simple elegance and clean design of this medium-powered amplifier was matched by its sound quality. The term "transparency" has perhaps been overused in describing how amplifiers reproduce audio signals, but I can't think of a better term to use with regard to the Audiolab 8000A. To be sure, it wasn't quite powerful enough to drive my KEF 105.2 reference speakers to the levels I like when I auditioned some of my more dynamically recorded CDs, but it came remarkably close. I normally drive these speakers with an amplifier rated at more than 200 watts per side; that should give you some idea of how much dynamic headroom this Audiolab amplifier actually has.

Tone-control action was just the way I like it, with mid-settings of these controls producing very subtle changes, rather than crude overall alterations of tonal balance.

Phono inputs were as noise-free as the bench measurements suggested. So for a change, I actually dug out some old LPs, cleaned them well, brushed off the stylus tip of a Shure V15 Type V-MR cartridge, and sat back to listen to some of my favorite Beethoven and Brahms recordings. Interestingly, with those LPs playing, there was enough power to drive my reference speakers, after all. (I guess it's true what they say about CDs and dynamic range. Sometimes I wonder whether the peaks in CDs aren't occasionally somewhat bigger than in real life.)

But I digress. The fact is that the Audiolab 8000A could well serve as the central component in an audio system that employs reasonably efficient loudspeakers in a listening room of average dimensions. You can probably buy a lot more power for the price of this amplifier, but you are not likely to buy better sound quality or a more intelligently configured control layout—not for that sum or, in fact, for even more.

*Leonard Feldman*



# Brain vs. Bulk.

## FOR UNDER \$625 YOU CAN OWN AN AMPLIFIER JUDGED TO HAVE THE EXACT SOUND CHARACTERISTICS OF AN ESOTERIC \$3000 MODEL.

Bob Carver recently shocked the staid audiophile world by winning a challenge that no other amplifier designer could ever consider.

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**CARVER'S GREAT AMPLIFIER CHALLENGE.** Bob Carver made an audacious offer to the editors of *Stereophile Magazine*, one of America's exacting and critical audio publications. He would make his forthcoming amplifier design sound exactly like ANY high-priced, esoteric, perfectionist amplifier (or amplifiers) the editors could choose. In just 48 hours. In a hotel room near *Stereophile's* offices in New Mexico! As the magazine put it, "If it were possible, wouldn't it already have been done? Bob's claim was something we just couldn't pass up unchallenged."

What transpired is now high fidelity history. From the start, the *Stereophile* evaluation team was skeptical ("We wanted Bob to fail. We wanted to bear a difference.") They drove the product of Bob's round-the-clock modifications and their nominees for "best power amplifier" with some of the finest components in the world. Ultimately, after exhaustive listening tests with carefully selected music ranging from chamber to symphonic to high-impact pop that led them to write, "... each time we'd put the other amplifier in and listen to the same musical passage again, and bear exactly the same thing. On the second day of listening to his final design, we threw in the towel and conceded Bob the bout. According to the rules... Bob had won."

**BRAIN vs. BULK.** Pictured is a photo of the 20-pound, cool-running M-1.0t. Above it are the outlines of the pair of legendary mono amplifiers used in the *Stereophile* challenge. Even individually, they can hardly be lifted and demand stringent ventilation requirements. And yet, according to some of the most

discriminating audiophiles in the world, Bob's new design is their sonic equal.

The M-1.0t's secret is its patented Magnetic Field Coil. Instead of increasing cost, size and heat output with huge storage circuits, Magnetic Field Amplification delivers its awesome output from this small but powerful component. The result is a design with the dynamic power to reproduce the leading edge attacks of musical notes which form the keen edge of musical reality.

**A DESIGN FOR THE CHALLENGES OF MODERN MUSICAL REPRODUCTION.** The M-1.0t's astonishingly high voltage/high current output and exclusive operation features make it perfect for the demands of compact digital discs, video hi-fi and other wide dynamic range playback media. The M-1.0t:

*Has a continuous FTC sine-wave output conservatively rated at 200 watts per channel into 8 ohms 20 Hz to 20 kHz with no more than 0.15% THD.*

*Produces 350-500 watts per channel of RMS power and 800-1100 watts momentary peak power (depending on impedance).*

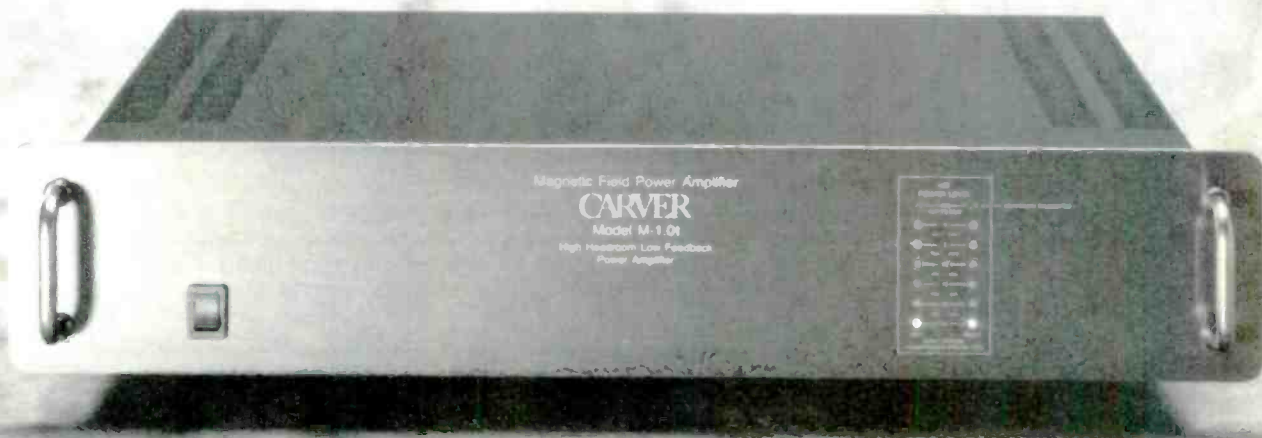
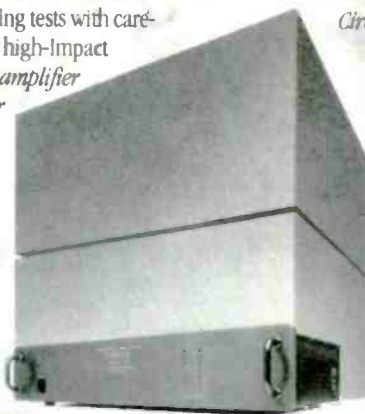
*Delivers 1000 watts continuous sine wave output at 8 ohms in bridging mode without modification.*

*Is capable of handling unintended 1-ohm speaker loads.*

*Includes elaborate safeguards including DC Offset and Short Circuit Power Interrupt protection.*

**SHARE THE RESULTS OF VICTORY.** We invite you to compare the new M-1.0t against any and all competition. Including the very expensive amplifiers that have been deemed the M-1.0t's sonic equivalent. You'll discover that the real winner of Bob's remarkable challenge is you. Because world class, superlative electronics are now available at reasonable prices simply by visiting your nearest Carver dealer.

**Specifications:** Power, 200 watts/channel into 8 ohms 20Hz to 20kHz, both channels driven with no more than 0.15% THD. Long Term Sustained RMS power, 500 watts into 4 ohms, 350 watts into 8 ohms. Bridged Mono power, 1000 watts into 8 ohms. Noise, -110dB IHF A-weighted. Weight, 20 lbs.



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## KENWOOD KX-660HX CASSETTE DECK

### Manufacturer's Specifications

**Frequency Response:** 20 Hz to 16 kHz with Type I tape; to 17 kHz with Type II tape, to 18 kHz with Type IV tape.

**Harmonic Distortion:** 0.9% at 0 VU.

**Signal/Noise Ratio:** 67 dB with Dolby B NR, 74 dB with Dolby C NR.

**Input Sensitivity:** Line, 77.5 mV; mike, 0.35 mV.

**Output Level:** Line, 0.35 V; headphone, 0.3 mW.

**Flutter:** 0.06% wtd. rms,  $\pm 0.16\%$  wtd. peak.

**Fast-Wind Time:** 90 S for C-60 cassette.

**Dimensions:** 17<sup>5</sup>/<sub>16</sub> in. W x 4<sup>7</sup>/<sub>16</sub> in. H x 12<sup>13</sup>/<sub>16</sub> in. D (44 cm x 11.3 cm x 32.6 cm).

**Weight:** 11.1 lbs. (5 kg).

**Price:** \$300.

**Company Address:** 2201 East Dominguez St., Long Beach, Cal. 90810.

For literature, circle No. 92



The Kenwood KX-660HX cassette deck provides a number of interesting, useful features for a moderate price. Record/playback performance is improved by the inclusion of Dolby HX Pro, which matches the bias to the spectral content of the music. The KX-660HX also has a bias-trim control to improve tape-to-deck matching for a wide variety of tapes. Both Dolby B and C NR are included, and there is automatic tape-type sensing to set EQ and nominal bias.

The Kenwood deck offers a number of play-mode conveniences in what it calls its Direct Program Search System (DPSS). These include fast winding to a selected tune, repeat playback, index scan, and other choices, all of which will be discussed more fully later. The counter, which nor-

mally shows elapsed time in minutes and seconds from wherever it was reset to zero, also provides a readout of information for various modes of DPSS operation. This counter is not a mere clock that times recording and play, but has the more important feature of updating time readings even while fast winding. Recordists can benefit from the "Blank Search" function, which finds a blank section of tape if it is at least 1 minute long, measures its length in time, rewinds back to the beginning of the blank portion, and changes the counter display to indicate the recording time remaining on that blank segment. Other interesting features include peak-responding meters, microphone inputs, and a master level control with two channel-level pots.

## Control Layout

At the left end of the front panel are the eject button (top) and the power on/off switch (bottom). With their different shapes and the latter's good-sized "Power" label, these pushbuttons will likely not be confused, as is possible on many decks. The cassette compartment door opens wide for easy tape loading and removal. Access for cleaning and demagnetizing is good with the door open, but it makes sense to slide the door/cover completely off, for then access is excellent.

To the right of the cassette compartment are three small display panels. From left to right, they are labelled "DPSS/Linear Tape Counter," "Operating Ind.," and "Auto Tape Sel." The DPSS and counter numbers are bluish white, which makes for easy reading. The DPSS numbers indicate how many tracks (up to 16) the deck has been instructed to fast wind through (in either direction) before switching to playback, as well as the countdown to the desired selection. This area also shows the number of repeats when the deck is in its repeat-play mode. The tape-counter readout shows elapsed time in minutes and seconds from the point of reset, unless "Blank Search" is used, in which case the readout is in remaining time. The "Operating Ind." panel has a small yellow-green indicator for "Play" and a small red one for "Rec." "Auto Tape Sel." has red LEDs for "Norm," "CrO<sub>2</sub>," and "Metal."

To the right of the display area is the "Index Scan" pushbutton, and below it the "Blank Search" button. (These functions will be discussed later, in conjunction with the transport switches.) Below the display panels, from left to right, are the "Counter Reset" button and two slide switches, one for "Timer" ("Rec/Off/Play") and the other for "Dolby NR" ("B/Off/C").

Below these switches are the large, light-touch transport-control pushbuttons. In the upper row are buttons for rewind, play, and fast forward, with "Rec/ARM Pause" to their right. A large, horizontal stop bar is below the other three motion-control switches, and "Pause" is to its right. Record mode is secured with a single push of "Rec/ARM Pause." If this button is pushed during recording, Automatic Record Mute takes over, muting the signal and flashing the "Rec" LED for 4 S, after which the deck stops in record/pause mode and the "Play" LED flashes. Holding in "Rec/ARM Pause" prolongs the muting; pressing it again before 4 S elapse removes the mute and continues the recording. A push of regular "Pause" during the 4-S muting period stops the recorder in record/pause at that point; resumption of recording then requires a push of "Rec/ARM Pause." If "Pause" is used when in play mode, the "Play" indicator on the display will flash; resumption of playback then requires a push of the play button. If the play button is pushed in record/pause, the deck drops out of record mode into play. There are good features here, but the user does have to keep the protocol in mind.

The transport switches are also used in various ways to activate the DPSS functions. The deck can be instructed to find and play a cut up to 16 selections away from the tape's current position; one simply taps the fast-forward or rewind button the appropriate number of times while the deck is in play mode. During this operation, as mentioned earlier, the

counter readout keeps track of the input number (the number of selections to be skipped) and counts down as the desired selection is neared. Repeating a selection 16 times is a simple matter of pushing the play button twice while in stop mode, or once if the deck is already in play. The repeating can be terminated with a push of the stop bar.

Pushing both fast-wind buttons at the same time gets what Kenwood calls "Dash & Play" operation. In this mode, the entire side of a tape can be repeated 16 times, and the deck will fast forward past any blank sections of more than 16 S. A simultaneous push of the rewind and play buttons gets a rewind to the beginning of the tape, with play beginning at the first selection. If "Index Scan" is pushed, the tape advances rapidly to the beginning of each selection in turn and plays back the first 10 S of each. When a desired tune is reached, pushing the play key returns the deck to normal operation.

If there is a blank section of at least 4 S before the start of a recorded passage, a push of rewind while in record mode will get an automatic rewind to the start of that passage and then a switch into record/pause—making it easy to re-record. The KX-660HX also has a feature called "Zero Stop," which amounts to what other makers call memory stop: If the stop key is pushed at the same time as the fast-forward or rewind key, the transport will stop when the time display shows ":00."

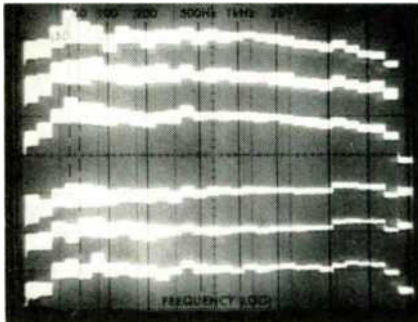
"Blank Search" accomplishes quite a bit with the push of a button. The deck goes into fast forward to find a blank section of tape at least 1 minute long, measures the normal-speed record time of the blank section while still in fast wind, resets the counter at the end of the section to -10 S (99:50), rewinds the tape to the beginning of the blank portion, goes into record/mute for 4 S, and then switches to record/pause. At this point, the counter shows the time available for recording, and as you record, it counts down to show remaining time. It might take the KX-660HX a little while to measure the length of the blank portion of tape, but it's faster than the user doing the same thing—and the procedure brings the welcome gift of a remaining-time counter. I consider this one of the best features in any moderately priced deck.

To continue with the front panel: Just to the right of "Pause" is the valuable bias adjustment pot with a center detent and a small bar knob. To its right are the fluorescent peak-responding level meters for the two channels; these run vertically and are easy to read. To their right are the left and right "Preset" level controls, and at the far right is the "Master Rec Level" pot. The labelling helps to get across the idea that one should use the channel-level controls for basic level setting and balancing and the master control for fading both channels in and out. This is a desirable level-control arrangement, and relatively few decks have it. Below these pots at the panel's far right are the left and right microphone jacks and the headphone jack.

All of the front-panel labels are white; on the black of the panel, they are very easy to read, even in relatively low lighting.

The back panel is very simple, with just the stereo in/out phono jacks and the power cord. I removed the top and side cover to get a look at the internal construction. The

Worthy of applause are the responses at  $-20$  dB, which were very flat for all three tape types over nearly the entire band.



**Fig. 1—Record/playback responses with Dolby C NR for "PN/Music" signal. Top three traces show response for signals recorded at an rms level equivalent to Dolby level, using (top to bottom) Maxell XL I, Denon HD8, and SKC ZX. Bottom three traces are for  $-20$  dB recording level using the same tapes. (Vertical scale: 5 dB/div.)**

main p.c. board is about half-chassis size, fairly well supported but slightly springy. Two small vertical boards are plugged into it, one for Dolby NR circuitry and the other for bias. There is also a fair-sized vertical board just behind the front panel, which holds the controls and displays. The few adjustments are labelled by function. The majority of the parts are identified, and the ICs are soldered in place. Soldering was very good at all points that could be seen. Interconnections are made with multi-pin plugs and sockets, sometimes with ribbon cabling and sometimes with individual wires. I did not spot any fuses, but one resistor looked as though it might function as a fuse. The transformer is mounted at an angle, a good distance from the p.c. board, and it was just warm after a long period of use. The two-motor transport was very quiet in all modes. One motor is used only for driving the capstan, and the other one is for the tape-drive hubs and the cams used for shifting the tape heads. A small solenoid is also part of this design. The bottom chassis plate is folded up at the sides to create side rails, which makes the assembly quite rigid. The back panel flexed rather easily but was well restrained with the cover on and the two back screws in place.

### Measurements

Playback response using TDK ( $120\text{-}\mu\text{S}$ ) and BASF ( $70\text{-}\mu\text{S}$ ) alignment tapes was very good overall. A little high-frequency roll-off occurred with each tape, but most of the points for both channels were within 0.7 dB of the Standard for both equalizations. Dolby play-level indications were right at the meters' double-D Dolby symbol. Tape play speed was 1.1% fast.

Record/playback response was checked using "PN/Music," which is pink noise whose response is shaped to make it more music-like: The signal's extremes are rolled off sharply, and there is a shelf at about  $-8$  dB from 5 to 16 kHz. The pink noise is flat on a  $1/3$ -octave basis from 25 Hz to

1.6 kHz, with a downward transition from 2 to 5 kHz. The playback from the deck is given compensating equalization so that a flat record/playback response will produce a flat display on my real-time analyzer.

Many tapes were tried with the Kenwood deck, and the great majority of them provided good response when the bias adjustment was made carefully. The owner's manual for the KX-660HX has a page showing bias requirements for more than 30 tapes, and the settings that gave me the best results were fairly close to the suggestions in the manual. In supplying this information, Kenwood has provided a very helpful—and all too uncommon—service to the user.

Among Type I tapes, the best responses were obtained with BASF LH Maxima I, Denon DX3, Maxell XL I, Memorex MRX I, SKC AX, TDK D, and Triad F-X. Among Type II tapes, Denon HD8, Memorex HBX II and CDX II, Sony UX-ES, TDK SA, and Triad EM-X gave the best results. Nakamichi ZX, SKC ZX, and TDK MA-X stood out above the other metal-particle tapes. I selected Maxell XL I, Denon HD8, and SKC ZX for the detailed tests to follow because they worked somewhat better than others of the same type, with TDK D and Memorex CDX II very close behind.

Figure 1 shows record/playback responses using Dolby C NR, with PN/Music at an overall rms voltage level to match the 400-Hz Dolby level ( $200\text{ nWb/m}$ ) and at 20 dB lower. The peak-responding meter indications for these two levels were "+8" and "-10," respectively. At the higher level, a gentle roll-off starts at about 1.6 kHz and is down by 1.5 to 2.0 dB at 10 kHz. More worthy of applause are the responses at  $-20$  dB; they are very flat for all three tapes over nearly the entire band. The sine-wave record/playback responses are listed in Table I, and from the results one can see the benefits of Dolby C NR in extending response at higher levels. The possible benefits of HX Pro were not clear in this regard. The multiplex filter was in at all times, leading to a very sharp roll-off above the limits listed for recording at  $-20$  dB.

Table II presents a number of record/playback characteristics. Although the 10-kHz phase figures are not impressive, the other results are excellent. Crosstalk was far down in the noise, much more than 90 dB below the recorded 1-kHz tone. The 64-dB erasure of Type IV tape at 100 Hz is better than what many other decks accomplish, and the separation and the multiplex notching are similarly superior.

Third-harmonic distortion was measured at 400 Hz for the three tapes. This test was conducted using Dolby C NR from 10 dB below Dolby level ( $200\text{ nWb/m}$ ) up to the point where the HDL<sub>3</sub> reached 3%. Table III shows that the lowest distortion at  $-10$  dB was achieved with Denon HD8 but that Maxell XL I had the highest 3% limit. The HDL<sub>3</sub> was also measured from 50 Hz to 5 kHz at  $-10$  dB with Denon HD8. The results, shown in Table IV, are very good, with moderate rises in distortion at the frequency extremes. The good performance at the high-frequency end is judged to be a benefit from this deck's HX Pro circuitry.

S/N ratios for the three tapes, with and without Dolby C NR, were obtained with dBA and CCIR/ARM weightings at Dolby level and at the 3% distortion point. Results are shown in Table V. Denon HD8 had the best ratios, though the figures for all three tapes are certainly very good.

All scale calibrations were accurate to within 0.6 dB, and most of them were within 0.3 dB, which is very good.

Various input and output properties are listed in Table VI. All of the results are close to specification, and that is good, but I would prefer a higher output level. The headphone output delivered 0.34 mW to an 8-ohm load, a helpful bit higher than the specified 0.3 mW. There was a good, high level on all of the several headphones tried. The two sections of the "Master Rec Level" pot tracked within 1 dB from 0 to 55 dB of attenuation, which is excellent performance. In record mode, the output polarity was the same as that of the source, but it was reversed in tape playback.

The level meters were 3 dB down at 30 Hz and 19.8 kHz. Meter zero was 2 dB below Dolby level. Tone-burst tests showed that the meters were truly peak-responding: Not only did they reach zero in 10 mS, but the indications were at least somewhat higher—as they should be—if the burst had a plus or minus d.c. offset. The decay time was only 0.58 S, definitely on the short side compared to the IEC Standard 1.7 S. The vertical meter display has 13 segments for each channel. The segment at the bottom (for minus infinity) is illuminated whenever the deck is on. The color of this segment and of those from "-20" to "-2" is bluish-white, and from "0" to "+12" it is orange-red. All of the scale calibrations were accurate to within 0.6 dB, and most were within 0.3 dB, which is very good.

Tape play speed was substantially constant regardless of the line voltage. Play speed dropped slowly from the beginning of a C-90 cassette, about 0.04% over the 2-minute check time. Flutter was quite good and very consistent over the length of a C-90: It was 0.055% wtd. rms and  $\pm 0.075\%$  wtd. peak. Fast-wind times were rather slow, 89 S for a C-60 and 124 S for a C-90. Run-out to stop in fast-wind or play took about 2 S. Changes in fast-wind direction took about 1 S, as did going from fast wind to play. Punch-in recording (going to record mode while in play) is not possible with the KX-660HX, but this feature is not common even on more expensive decks.

### Use and Listening Tests

The owner's manual uses illustrations well to guide the user, and the call-outs which explain the controls and their locations are more helpful than usual. The manual includes good general statements on setting record levels, although more detail would be of value. The instructions for the Direct Program Search System are generally well done, with good illustrations accompanying them. The language describing one DPSS mode is ambiguous, suggesting that up to 16 different selections can be chosen for play in any order when, in fact, fast winding and then play is possible for a single selection up to 16 tunes away from the current one. The other six DPSS modes ("One-Tune Repeat," "Index Scan," "Dash & Play," "Rewind Play," "Blank Search," and "Re-record Standby") are also nice to have, and their instructions are clear. I do want to comment again that Kenwood provides a valuable service to the user by listing the bias requirements for a number of tapes.

All of the controls and switches were completely reliable throughout the testing. When I first started using the deck, I did not have an owner's manual and found some of the deck's reactions to the transport switches to be unexpected. With the aid of the manual and a little practice, I was

Table I—Record/playback responses ( $-3$  dB limits).

Tape	With Dolby C NR				Without NR			
	Dolby Lvl		$-20$ dB		Dolby Lvl		$-20$ dB	
	Hz	kHz	Hz	kHz	Hz	kHz	Hz	kHz
Maxell XL I	13.3	10.2	12.4	16.9	13.3	9.6	12.5	17.8
Denon HD8	13.2	11.3	11.4	17.1	13.2	10.5	11.5	17.9
SKC ZX	13.3	11.8	12.7	17.0	13.3	10.8	12.9	17.8

Table II—Miscellaneous record playback characteristics with Type IV tape and Dolby C NR.

Erasure At 100 Hz	Sep. At 1 kHz	Crosstalk At 1 kHz	10-kHz A B Phase Error	Jitter	MPX Filter At 19.00 kHz
64 dB	63 dB	$< -90$ dB	$-15$	30	$-40.0$ dB

Table III—400-Hz HDL<sub>3</sub> (%) vs. output level (0 dB = 200 nWb/m).

Tape	NR	Output Level					HDL <sub>3</sub> = 3%
		$-10$	$-8$	$-4$	0	$+4$	
Maxell XL I	Dolby C	0.15	0.16	0.32	0.40	1.0	$+6.6$ dB
Denon HD8	Dolby C	0.05	0.11	0.22	0.63	2.0	$+4.9$ dB
SKC ZX	Dolby C	0.11	0.18	0.36	0.84	2.2	$+4.5$ dB

Table IV—HDL<sub>3</sub> (%) vs. frequency using Dolby C NR.

Tape	Level	Frequency (Hz)						
		50	100	400	1k	2k	4k	5k
Denon HD8	$-10$ dB	0.20	0.20	0.05	0.10	0.10	0.09	0.13

Table V—Signal/noise ratios with IEC A and CCIR/ARM weightings.

Tape	IEC A Wtd. (dBA)				CCIR ARM (dB)			
	W/Dolby C NR		Without NR		W/Dolby C NR		Without NR	
	( $\alpha$ DL)	HD=3%	( $\alpha$ DL)	HD=3%	( $\alpha$ DL)	HD=3%	( $\alpha$ DL)	HD=3%
Maxell XL I	69.5	76.1	52.5	59.1	70.4	77.0	49.9	56.5
Denon HD8	72.9	77.8	57.0	61.9	73.9	78.8	54.5	59.4
SKC ZX	72.8	77.3	56.7	61.2	73.4	77.9	54.1	58.6

Table VI—Input and output characteristics at 1 kHz.

Input	Level		Imp., Kilohms	Output	Level		Imp., Ohms	Clip (Re: Meter 0)
	Sens.	Overload			Open Ckt.	Loaded		
Line	71 mV	$>30$ V	51	Line	325 mV	280 mV	1,960	$+18.4$ dB
Mike	0.33 mV	29 mV		Hdphn.	210 mV	132 mV	29.5	

For its moderate price,  
the Kenwood performs  
very well in most respects,  
and its many features  
offer real benefits.

able to take advantage of the many record/play functions that this Kenwood deck offers. "Zero Stop" was used frequently, and I benefited from "Index Scan." My personal favorite was "Blank Search," with its determination of recording time available and its remaining-time counter.

When the deck went into record, pause, or stop modes, all sounds were very low, both by ear and by meter. Setting record levels with music was easier than I anticipated, although a longer meter decay time would have been helpful. The meter display was very easy to observe, and setting levels was quite easy with the two channel pots and the master control. My first recording/listening checks with the Type I Maxell XL I were a little puzzling at first; then I realized that I hadn't set bias trim for the best results. This emphasized that such adjustments can make a very noticeable difference.

CDs were used as the sources and references for all listening tests. Tape playback even with Dolby C NR could not match the CDs in terms of low noise, and close listening during quiet passages always revealed that. Bach's "Brandenburg Concerto No. 5," performed by I Musici (Philips 412790-2), is a favorite of mine, and I really enjoyed the playback of a copy made on Maxell XL I when I got the bias trimmed correctly. There was a slight tightness in the violin tone, however, and an obscuring of details in comparison to the source.

*Chronicle* by Creedence Clearwater Revival (Fantasy FCD-623-CCR-2), copied onto Denon HD8, benefited from having the record level reduced a couple of dB from where I first set it. The sound was really quite good, but I perceived an obvious lack in the tape's lowest bass compared to the Compact Disc.

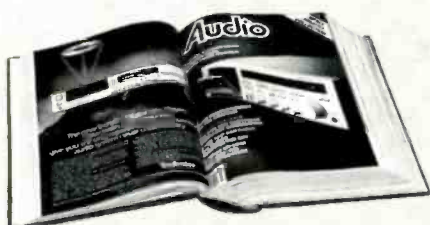
I used the SKC ZX tape to record music of Debussy ("La Mer" and other works) performed by the Saint Louis Symphony Orchestra with Leonard Slatkin conducting (Telarc CD-80071). The playback was quite good, but I kept thinking that I ought to be able to hear more of the subtle detail in some of this music. I tried reducing bias, but that did not improve the results. There was also some loss of the deepest bass—perhaps slight, but somehow obvious once it was noticed.

The playback of the KX-660HX cannot match a CD and it cannot be pushed to high record levels if the music has considerable high-frequency energy. For a moderately priced deck, however, the Kenwood performs very well in most respects, delivering flat response except at high levels, low flutter, low noise, and good distortion characteristics. The many convenience features require a bit of a learning period, but the benefits are real for those who can take advantage of them. The KX-660HX is definitely worthy of comparison to other decks in the same and somewhat higher price ranges.

Howard A. Roberson

# Audio

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## MARK LEVINSON NO. 23 DUAL MONO AMP

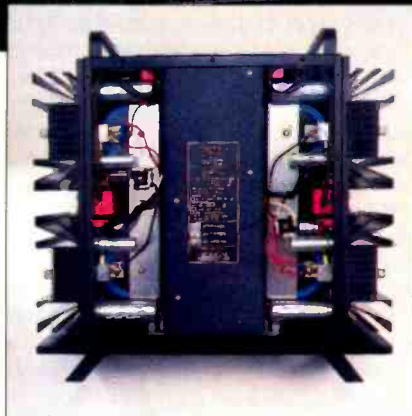
**Company Address:** c/o Madrigal Ltd., P.O. Box 781, Middletown, Conn. 06457.  
For literature, circle No. 93

The Mark Levinson No. 23 power amplifier is a direct descendant of the No. 20 monaural power amplifier reviewed in the August 1987 issue of *Audio*. It is not a pure Class-A amplifier, but it does offer nearly twice the power of two No. 20s at about half the price. It's rated at 200 watts rms into 8 ohms, 400 watts into 4 ohms, and 700 watts into 2 ohms. The amplifier is very much a high-end product. At \$4,700, it is certainly expensive, although in a world where a reference mono amplifier can be priced in excess of \$10,000, the issue of what is really high cost is becoming more and more uncertain.

Power-amplifier technology is a difficult thing to discuss, given the number of really superb-sounding amplifiers that use radically different circuit topologies. Also, I am less and less sure that most amplifier specifications and test results are relevant to performance. Virtually every mid-fi and high-end power amplifier has vanishingly low rated distortion. On this, the No. 23 certainly qualifies. Its harmonic distortion is 0.03% at 200 watts into 8 ohms, and IM distortion is 0.04%. Most amplifiers have excellent bandwidth, and the No. 23's is 4 Hz to 140 kHz. Most amplifiers have a high damping factor, and the No. 23's is over 700.

As has already been mentioned, the No. 23 can deliver very high wattages, but sheer wattage also seems to be less and less important as more high-end speaker manufacturers opt for complex impedances and for designs that require that an amplifier deliver large amounts of current as well as voltage. As a result, the No. 23's peak capabilities may be more important, and these are also outstanding. The No. 23 is said to deliver peak power of 3,025 watts, peak voltage of 55 V, and peak current of 55 amperes.

As for physical characteristics and circuit layout, this is a large amplifier; it measures 8½ inches high, 17½ inches



wide, and 15 inches deep and weighs 83 pounds. Two entirely separate monaural amplifiers are housed within the same chassis. The a.c. input is filtered to remove radio-frequency interference, and a circuit corrects for any d.c. offset in the a.c. line. The No. 23 has new toroidal power transformers with a capacity of 1,200 VA each, and these feed two separate power supplies in each channel. The actual power supplies have a total of 144,000  $\mu\text{F}$  of capacitance, with 36,000  $\mu\text{F}$  on each rail and 36,000  $\mu\text{F}$  connected to the output devices through an impressive set of copper bus bars.

The manufacturer's description of the No. 23's audio stages takes up about three pages of closely spaced

type, and there are indeed a number of impressive features discussed. The No. 23 uses nothing but discrete bipolar junction devices. All of the drive stages except the output stage are pure Class-A. There are special bias, current, and regulation features in virtually every gain stage, and feedback is very carefully handled. Clipping is well controlled to minimize audible distortion, and the output stages have ample reserve to handle the power required. There are optional balanced inputs, and exceptional protection is provided with minimal interference with the signal.

If you want all the technical details concerning this amp, I suggest you contact a dealer or write to the manufacturer. All I can really say in this space is that the design of the No. 23 reflects a strong effort by a team of engineers who very clearly know both electronics and how to listen. Accordingly, it is yet another demonstration that no one approach to circuit design is as important as the experience and skill that go into a given design approach.

The Mark Levinson No. 23 is an interesting challenge to anyone who believes that all amplifiers sound alike. To start with, it is far more dynamic than

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Unlike other high-end designs, the No. 23 amp is relatively universal in character, and its sonic trade-offs are well chosen.

most amplifiers with the same power rating, and this is particularly apparent with the difficult loads imposed by many of today's best high-end speakers. This superiority in dynamics may not seem important until you hear the difference. Many systems, even high-end ones, tend to have a "polite" sound. They veil the excitement in musical dynamics, and many sacrifice bass depth and power and harden the upper midrange when confronted with sudden loud passages.

Unlike amplifiers with weak or trick power supplies, the No. 23 opens up the sound of virtually all precoded music without any loss of transparency. This is as important in simple music as in large-scale symphonic or rock music. It is immediately apparent with a good harpsichord recording and in rapid soprano vocal changes. It improves percussion and such sounds as the bowing of a stringed instrument

Equally important, the No. 23 has the combination of power and stability to drive virtually any speaker system to its best. I have heard 300-watt mono amplifiers that had trouble, for instance, with the Infinity 9 Kappa, but the No. 23 takes it easily in stride. It performs superbly with the Apogee Duetta and with some hand-built ribbon and electrostatic speakers whose characters I have heard sharply altered by other amplifiers.

Further, the No. 23 delivers its power without any sacrifice of clarity at low listening levels. As little as two years ago, even the best high-end transistor amplifiers had a tendency to emphasize and harden the upper midrange. In the case of very high-power amplifiers, there was an additional tendency to veil or color all music at low levels and to allow medium- and high-level passages to sound their best. As a result, there was a clear trade-off between low-power amplifiers, which were optimized for sweetness and transparency, and high-power amplifiers, which stressed power. These problems also led to a great deal of debate in the high end over tube versus transistor and Class A versus Class AB.

Well, there are still differences among amplifiers. The Mark Levinson No. 23, the Krell Class-A amplifiers, hybrids like the Audio Research M300,

and pure tube designs like the OTL Counterpoint SA-4 do provide a slightly sweeter and more detailed upper midrange and more treble than does the No. 23. I cannot say, however, that the margin of difference is going to be important to anyone but the most demanding audiophile. Besides, all of those models are more expensive than the No. 23. By every other standard, the No. 23 shows that a Class-AB transistor amplifier can provide all the power needed to deliver the deepest and loudest bass passages with all the musical sweetness that anyone could possibly desire.

As for the sound stage, it is difficult with an amplifier of this caliber to distinguish between the inherent quality of the amplifier and that resulting from the amplifier/speaker interface. This is, however, an unusually three-dimensional power amplifier, surpassed only by the larger conrad-johnson tube amplifiers and a handful of ultra-expensive reference transistor designs. The sound-stage width is excellent, and imaging is very good. Unlike some of the older Mark Levinson amplifiers, there is no hardening of the sound, which can make an amp's character slightly forward and two-dimensional; the No. 23 clearly outperforms the last generation of Mark Levinson Class-A amplifiers in this regard.

The pleasures of an amplifier like the Mark Levinson No. 23 only really become clear after prolonged listening to a wide range of music on a top-quality system, one that includes speakers good enough to demonstrate its merits. The No. 23 is one of the best reference amplifiers around. Unlike many other expensive, high-end amplifiers, it is relatively universal in character, and its sonic trade-offs are well chosen to fit into virtually any system. It is scarcely cheap, but it also is the kind of amplifier you can use for years longer than many competing units.

Equally important, the No. 23 reveals the kind of unique sonic character that deserves high praise. There may be some who feel that this amplifier sounds like its less costly counterparts that have similar specifications. Perhaps they are the same people who believe that all wines taste alike, and all cars drive the same way.

Anthony H. Cordesman



## NEW RECORDING ARTISTS

## Carolann Martin Conducts A Journey Into Uncharted Territory

Journalists, conductor Carolann Martin has found, tend to have trouble with her title. They ask if she should be addressed as *Maestra* (the answer is no) or perhaps be referred to as a conductress (no again; conductor will do fine, thank you).

Furthermore, the media appear uncommonly interested in what Martin wears on the podium (a long skirt). And once, after a concert during which the male conductor made a most emphatic gesture toward the orchestra at a climactic moment, a reporter asked whether she felt she could do such a thing (of course; after all, women were once experts at beating rugs).

The point is, Carolann Martin, who in 1980 became the first woman to take first prize in the National Adult Conducting Competition held each year in La Crosse, Wisconsin, would prefer not to be treated as a musical oddity. "We're all yearning for the day when we're integrated into the mainstream, when every time you appear you don't have to see 'Woman Conductor' in the headline," she remarks of herself and fellow conductors who also happen to be female.

In spite of this, Martin admits to playing the part of crusader on her debut recording, *Journeys*, recently released on Compact Disc by Leonarda Productions, features Martin conducting the music of seven contemporary American women. Most of the compositions are recorded here for the first time, and one is a premiere performance as well. All but a single work are played by the Bournemouth Sinfonietta, which was augmented by 25 players for two of the pieces; Martin leads *Arioso*, a New England-based chamber orchestra, on the album's final selection.

*Journeys* is named for the first and longest piece on the 65-minute disc, a dynamic composition begun by Nancy Van de Vate in 1981 in Bali and completed in Indonesia three years later.



Carolann Martin

Kay Gardner's delicate and exotic "Rainforest" bears the influences of Oriental, Minimalist and Impressionistic music while Libby Larsen's "Overture—Parachute Dancing" is based on what must have been a spectacular Renaissance court dance; as this progressed, performers carrying huge, brightly-colored silk umbrellas leaped along and finally jumped from courtyard walls.

The recording also contains Marga Richter's 1956 "Lament" and Katherine Hoover's "Summer Night" (for which the composer doubles as flute soloist). Ursula Mamlok's "Elegy" is excerpted from a larger piece for woodwind quintet, string orchestra and percussion while "Perihelion II", by Jane Brockman, is a string version of a related work composed for both strings and computer-generated tape. This last was added when it was decided *Journeys* would be released on Compact Disc. In lieu of often perfunctory liner notes, the CD's jewel box contains an especially informative 12-page booklet; this includes photos of Martin and all seven composers, each of whom comments briefly on her own work.

In spite of the album's unifying factors, the sex and contemporaneity of its composers, *Journeys* reflects Martin's belief that a program should be

balanced and contain more than a single style or mood. The composers show a variety of influences, and built into the musical sequence are such emotional transitions as the shift from Larsen's energetic, color-filled piece to Richter's mournful lament for her dying mother.

Martin, who resides in Pittsburg, Kansas and teaches at Pittsburg State University as well as serving as conductor for the Southeast Kansas Symphony Orchestra and the Mid-America Youth Symphony, admits that, until a few years ago, even she was unaware of the number of women composing music today and the quality of their work. In January, 1986, after deciding on the concept for her recording, she made a week-long reconnaissance trip to New York, where she knocked on many doors and talked with a large number of people in the city's musical circles. It was at that time Martin met two of the composers featured on *Journeys*, Katherine Hoover and Ursula Mamlok. She had gotten to know Kay Gardner and Nancy Van de Vate earlier and has since met the others.

"After I got home, scores started arriving," Martin recalls. "Altogether I had about 24 to choose from." She credits fellow conductor Harold Farberman with providing ongoing assistance during the preparation of *Journeys*, and notes it was he who suggested she record with the Bournemouth Sinfonietta.

Was Martin not concerned that the repertoire she selected for her debut recording would limit its appeal? "Of course," she replies. "I realize it's targeted for a special audience, but I was choosing a definite theme, living American women composers."

"It's unique in that way," says Carolann Martin of *Journeys*. "And I thought it was something that needed doing. I felt a real sense of mission because I know, as a woman conductor, what I've had to contend with."

## VOICE OF EXPERIENCE



**Unchain My Heart:** Joe Cocker  
Capitol CDP 7 48285 2, CD, CLT  
48285, LP.

Sound: A Performance: B+

If you were to look up the term "rock 'n' roll journeyman" in the dictionary, certainly the definition would read: Joe Cocker. Here's a performer who has been to music's mountaintop as well as to its Death Valley. He has had hits in the '60s, '70s, and '80s, and yet has also been discarded in the same decades. Now, don't let Cocker's ups and downs bring tears to your eyes. The fact is, he has *endured*, because he has the talent and the heart that it takes to do so.

*Unchain My Heart* is Joe Cocker's third Capitol Records release. On it he is joined by saxophonist Clarence Clemons and "guest vocalists" Renée Geyer and Phoebe Snow. In addition, there is a very hot backing band that features T. M. Stevens on bass, David Beal on drums, Phil Grande on guitar,

and Jeff Levine on keyboards. The album, produced and partially written by Charlie Midnight and Dan Hartman, is a collection of 10 no-frills rock tunes—from uptempo to ballad—including covers of Ray Charles' "Unchain My Heart" and John Lennon's "Isolation." The album does not hedge its bets by making concessions to the dance clubs or the latest music wave. It's clean, uncomplicated rock performed by a timeless singer. And while this is not a *great* album, it is one which can be played anywhere, anytime. It's got consistency, and it's got Cocker's voice, which can carry even a weak song quite a distance.

The title song is certainly the highlight, but there are several others which give Cocker room to vocalize, including "Two Wrongs," "I Stand in Wonder," "Isolation," "A Woman Loves a Man," and "The One," where he is joined by Phoebe Snow. This last song is a heartfelt ballad which could have been made much stronger had Snow

been given the opportunity to actually sing a duet with Cocker, rather than just adding harmony lines and choruses and performing lightweight vocal gymnastics. Snow's voice is a gift; the producers should have taken the time to unwrap it. (In fact, her contribution here raises a question: Why is it that no record company has recently given Phoebe Snow the chance to make a new album?)

I was able to compare the CD and LP versions of *Unchain My Heart* and found a limited sonic difference between the two. The CD provides (as it should) a crisper top end and punchier midrange, which manifest themselves in a more prominent hi-hat, tambourine, and cymbals, as well as in more distinct keyboards and guitars and more snap on the snare drum. The LP provides a deeper, mellower bass and kick drum. (Some LP detractors would say the bottom end of the LP is "soft" compared to the CD, but it's tough to dislike that warm bottom end on a rock record.) The CD is quiet—zero surface noise—but the LP is also very quiet, more so than many other LPs on the market. This recording will provide quality listening in either format.

As of this writing, *Unchain My Heart* is sitting nicely in *Billboard's* Top 100 Pop Album chart. It's a position well deserved by a singer who has paid his dues and who is late in receiving his dividends. *Unchain My Heart* could well become a listening staple in many homes. Other recordings should be as consistent as this one is.

Hector G. La Torre

**Savage:** Eurythmics  
RCA 6794-2-R, CD; 6794-1-R, LP.

Sound: B+ Performance: B

Eurythmics is back from a brief foray into guitarland. Their last two LPs really rocked and were turntable faves in this household, but were only moderately appreciated by most critics and the public. With *Savage*, the duo has returned to its original sound. Synthesizer-based and built on minor chord sequences, these tracks are less like the traditionally structured pop/rock tunes of *Revenge* and *Be Yourself Tonight* and more like atmospheric beds for Annie Lennox's dependable vocal gymnastics.

Perhaps Lennox feels that she must put more stylistic space between herself and peer Chrissie Hynde—*Revenge* sounded more like the first Pretenders record than the first Eurythmics LP—or maybe she just feels that since she doesn't play guitar, it's time to return to the synth-pop format. *Savage* is deliberately guitar-shy, and the band sound is dispensed with, except on "I Need a Man." This cut resembles some of the material on Mick Jagger's *Primitive Cool* (which Dave Stewart produced), except it's better. There are moments of brilliance in "Brand New Day," "I've Got a Lover," and "Beethoven," but the consistency of latter-day Eurythmics—the rock band as opposed to the synth duo—is lacking. It sounds like there's less Dave Stewart on this record, although the credits don't really indicate one way or another. However this situation has evolved, it is bringing diminished returns. Not a bad record—just not an incredible one. *Jon & Sally Tiven*

**Canciones de mi Padre:** Linda Ronstadt  
**Asylum 60765-1, LP.**

Sound: B Performance: B+

For many years, Linda Ronstadt had wanted to record the music her father loved to play and sing and listen to as she was growing up. Now she has



Linda Ronstadt  
 and Daniel Valdez

done it, with an album of 13 Mexican songs sung in Spanish.

Ronstadt has taken a very traditional approach to the music, and so it drips with mariachi-horn colors, gut string guitars and guitarron, weeping violins—and, of course, her lovely and assured singing. Several songs feature the harmony vocals of Linda and her brothers Mike and Pete. Throughout, the sound is richly colored and alive. The arrangements are usually fine, best when simplest. Only when the

strings go overboard, as in "La Calandria," do the arrangements miss the mark. A Spanish-and-English lyric sheet and Linda's notes about the songs' origins are an integral part of the presentation, as are the guitar contributions of Daniel Valdez.

Clearly, as a mature performer Ronstadt loves to stretch herself. In recent years she has done "La Traviata," "The Pirates of Penzance," three albums of standards with Nelson Riddle arrangements, and an album of country music with Dolly Parton and Emmylou Harris. In all of these she has enjoyed at least some degree of success. It would appear that there is little she would not dare to attempt, except possibly the lead role in *Hamlet*. As for this very personal project, it is a triumph.

*Michael Tearson*

**Get Rhythm:** Ry Cooder  
**Warner Bros. 25639, LP.**

Sound: B+ Performance: A

On his first non-soundtrack LP in years, Ry Cooder presents a virtual encyclopedia of American music and weaves its many strands together in some very novel ways. Take the title track (by Johnny Cash!), an uproarious foot-stomper where Afro-beat meets gospel, blues, and doo-wop. Or the Leon Redbone/Hawaiian-jazz novelty of "Going Back to Okinawa." Or the Bahamian fingerstyle playing (à la Jo-



Eurythmics

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Ry Cooder



seph Spence) on Chuck Berry's humorous "13 Question Method," which segues into the Calypso-cum-Tex/Mex irony of "Women Will Rule the World." There's funked-up rockabilly on "All Shook Up," zydeco-tinged outrageousness on "I Can Tell by the Way You Smell!," country with a social conscience on "Across the Border Line," and a hot slide-guitar instrumental, "Low-Commotion." All is unified by Cooder's dominant artistry and performed with his unerring intuition for smooth and intellectually pleasing transitions.

As for sound, well, Cooder was one of the early digital recording pioneers on 1979's *Top Gun*. This is full but uncluttered, Direct Metal Mastered, Perfecto.

Ry Cooder's *Get Rhythm* is danceable, intelligent, witty, moving, and fun. It was worth the wait! *Michael Wright*

#### Swing Street: Barry Manilow Arista AL 8527, LP.

Barry Manilow is the Rodney Dangerfield of pop music. Although passionate and devoted fans consistently fill his concerts to the rafters and his records sell in the millions, Manilow can't get no respect from critics.

Which is a real shame, because Manilow is both a master craftsman in the pop genre and a showman par excellence, with a smooth, friendly voice; an easy, endearing stage manner, and a talent for delivering the engaging refrain. But in his search for critical recognition, Barry has now changed his tune—literally—and turned back from pop to the world of jazz.

Actually, Manilow attempted to do this once before, with a collection of

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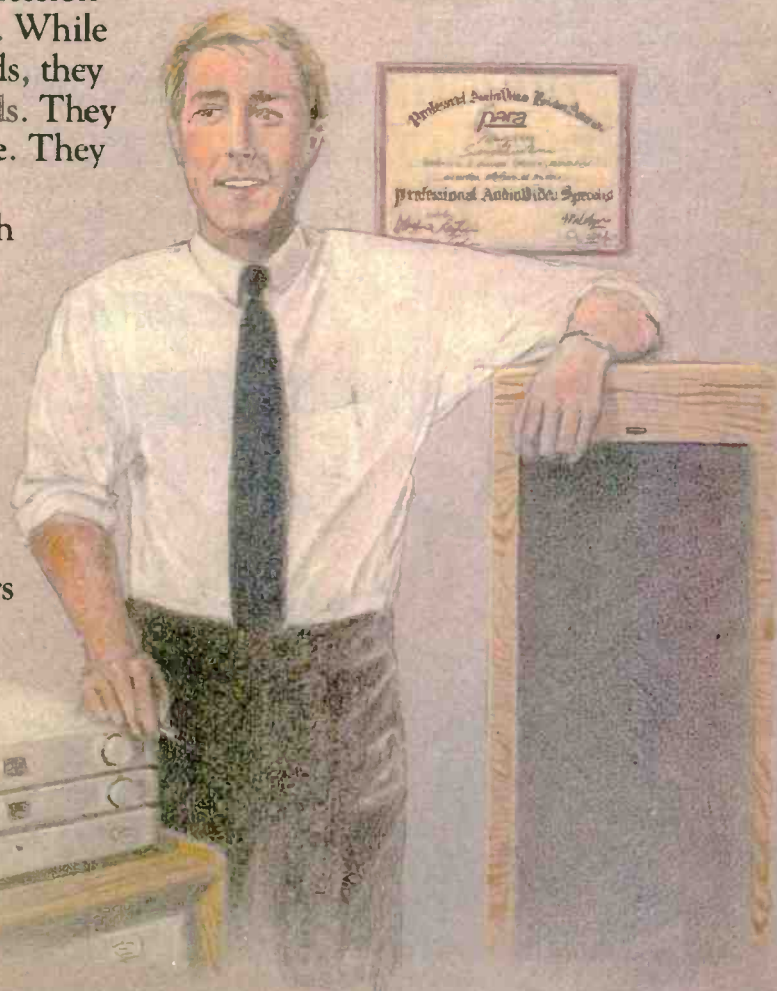
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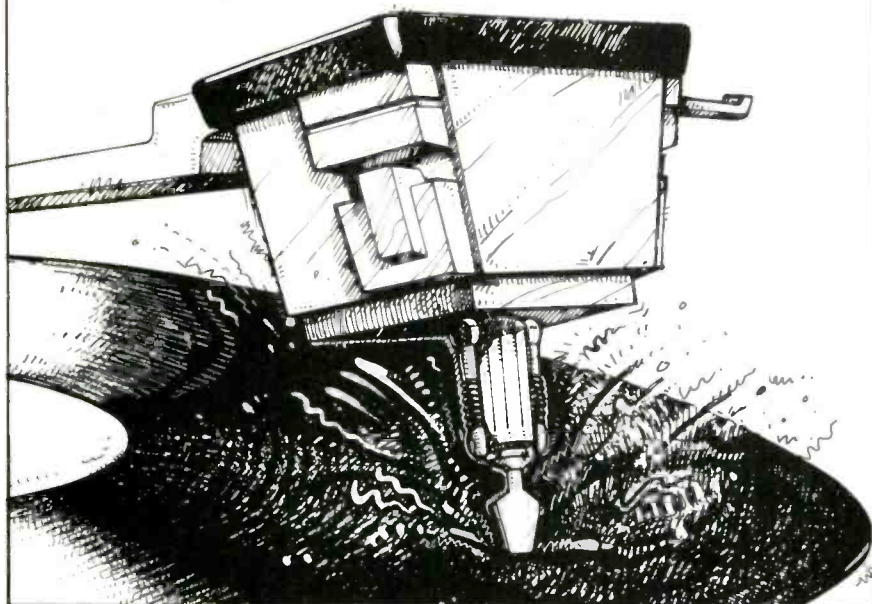
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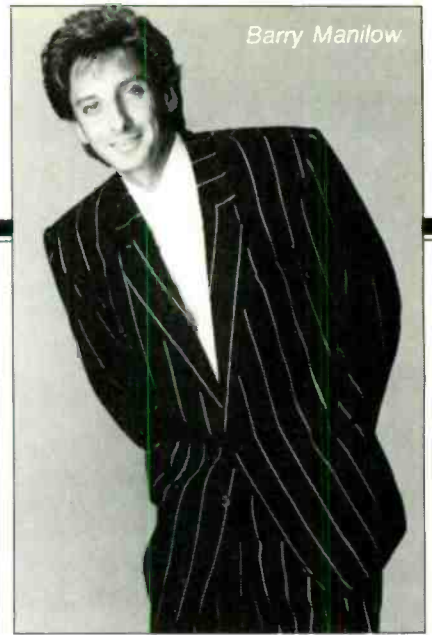
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Barry Manilow



saloon songs entitled *2:00 A.M.—Paradise Cafe*, released in 1984. With *Swing Street*, he supports himself (as he had on *2:00 A.M.*) with an impressive collection of jazz artists, among them Gerry Mulligan, Stan Getz, Diane Schuur, Phyllis Hyman, and Tom Scott. There's also Kid Creole and the Cocoanuts. He takes some grand old classics—"Stompin' at the Savoy," "Stardust," "Summertime"—and mixes them up with new material from his own pen and from other contributors. The result is a sophisticated, great-sounding, gently swinging album with one major flaw: It ain't jazz.

Manilow is a popster at heart, and when he attempts to compose and perform in this new idiom, all he comes up with are clichés. The stuff comes out sounding like TV's idea of jazz—watered-down, calculated versions tailored to accompany small-screen action in 30- and 60-second segments. His sincerity is obvious, but he just doesn't seem properly equipped. Any good jazz musician—vocalist or instrumentalist—travels from the beginning to the end of a tune like a river or a stream, with numerous eddys, ripples, and undercurrents that make the voyage rich and deep. Barry's voice pretty much gets there in a straight line, with little nuance and no side trips.

*Swing Street* is a fine *pop* album. Associating with established jazz artists, calling on tried-and-true jazz material, and all the sincerity in the world do not make it anything else. For his very real talents, Manilow has already earned the admiration of many. His desire to grow and move on is commendable, but it looks like he'll have to sweat a while before he earns the kind of respect he still craves. *Paulette Weiss*

# COMPACT DISCLOSURES

April CDs of Note



Nick The Knife a.k.a. The Abominable Snowman a.k.a. The Jesus Of Cool—these are among the guises of The Godfather Of Power Pop, Nick Lowe. He's back

with his seventh album suitably titled "Pinker And Prouder Than Previous." Nick's reunited here with fellow Rockpile-emeritus rocker Dave Edmunds, who produced the first single, "Lovers Jamboree." He's better than ever on these 11 cuts recorded over a two-year period in London and Austin, Texas. Rock and roll as it ought to be played.

For the past few years, T BONE BURNETT has been providing more musical food for thought than practically any other artist. T Bone's newest LP, "The Talking Animals," is even



more unclassifiably provocative than his five previous recordings. Drawing on various talents and featuring musical styles ranging from the Lennoesque to Parisian folk, "The Talking Animals" is arguably T Bone's best yet. April marks its CD release.

**NICK LOWE  
THINKS PINK**

**WYNTON  
MARSALIS  
GOES FOR  
BAROQUE**

**T-BONE  
BURNETT HAS  
EVEN ANIMALS  
TALKING**

**CD DISCS ON  
DISKETTE**



Thanks to Grammy Award-winning producer, Steve Epstein, WYNTON MARSALIS manages to be in more than one place at once on his latest recording, "Baroque Music For Trumpets," which includes multiple trumpet pieces by Telemann, Vivaldi, Michael Haydn and others. Using the latest digital recording technology, Epstein not only got Marsalis to play all the trumpet parts himself, he is also acoustically positioned differently for each part. It's a breakthrough in recording technology you have to hear to believe, and you can do just that on CD this month.



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## ZORN OF PLENTY



**Spillane:** John Zorn  
**Nonesuch 79172-2, CD**

Sound: A - Performance: A

John Zorn is the Pee-wee Herman of new music, foraging cultural artifacts and thrusting them into new sonic landscapes. *Spillane* picks up where his last album of Ennio Morricone compositions, *The Big Gundown*, left off. It's an audio blend of sounds and styles: Blues, jazz, rock, funk, soundtrack music, the avant-garde, and "found" sounds. But to call it a collage would be a misnomer, because the fractured logic of its organization and its lightning-fast juxtapositions carry you from one segment to the next as if you were on a trip through a Kafkaesque maze.

The long title track is an homage to the Mike Hammer detective-story writer, Mickey Spillane. Zorn evokes a film noir ambience with jazz passages and

Hammer-like dialog written by Arto Lindsay and spoken by John Lurie and Robert Quine. "I feel like I just smoked a deck of cigarettes and forgot to blow out the smoke," mumbles Lurie in a drink-sotted voice. "Spillane" opens with a woman's scream and careens through some 40 segments in 25 minutes. They're all linked by audio drop-ins and "turn-arounds," the avant-garde version of scratch music, with Bob James inserting bits and pieces of prerecorded tapes and Compact Discs into the mix (in real time) and David Weinstein playing sampling keyboards. Anything can drop in, from audience applause to film excerpts to cartoon sound effects. These sonic fragments provide the momentum that carries this cut from one sonic scene to the next. With the music leaping out at you the way it does, it's like travelling through a fun house, where you encounter everything from country and western

through barroom rave-ups to free-jazz squalls, all of which have an eerie authenticity. Movie jazz riffs are played with free abandon by Zorn on alto saxophone, keyboardist Anthony Coleman, guitarist Bill Frisell, drummer Bobby Previte, and trombonist Jim Staley.

Zorn applies some of the same techniques to "Two Lane Highway," which features blues guitarist Albert Collins. But this cut never quite jells until the players abandon the distended structures for a straight-ahead blues vamp. Even here, Collins doesn't play with quite as much heat as he does on his own records.

"Forbidden Fruit," a tribute to Japanese film star Ishihara Yujiro, fares better, with The Kronos Quartet swirling avant-garde tonalities amidst Christian Marclay's string-music turntable scratches. This cut doesn't have the kinetic drive of "Spillane," but Zorn's faster-than-the-speed-of-light changes carry you through the piece.

After years of laboring on the avant-garde fringes, playing his alto saxophone and bird calls on records of games and strategies, Zorn is working on an orchestral scale with small ensembles. He strives for a cinematic scope and it works, his fragments of sound coalescing into an overarching whole.

*John Diliberto*

**Body and Soul:** Coleman Hawkins  
**RCA Bluebird BB 5658-1-RB, LP**

Sound: A - Performance: A to B

In 1986, RCA Records, currently owned by Bertelsmann, a West German conglomerate, revived the Bluebird label—an event of particular interest to me, having been responsible for the label's reissues for eight years, starting in 1974. Those in charge of the revived Bluebird operation are some of the same people who ran the Savoy reissue program when that label was owned by Arista. There are at least three people now involved with Bluebird; I suppose this is some kind of progress, since I did the job single-handedly.

Among the new Bluebird's first reissues were boxed sets by Benny Goodman (using the same tapes I had made a decade before) and Duke Ellington, and this twofer by saxist Coleman Hawkins. *Body and Soul* uses most of



what RCA Victor had recorded with him in 1939, 1940, 1946, 1947, and 1956, when he was given the full string treatment. Most of the early sides had been reissued 20 years earlier by Brad McCuen as part of Victor's Vintage series, and I thought it would be instructive to compare the engineering quality then and now. Despite digital remastering in the new version, there is really precious little difference in the sound. This is not to say that the sound on this release isn't good; it is, but it is only superficially better than the Vintage. I mention this to make the potential buyer aware that digital remastering does not, in my opinion, always enhance the sound, and that many older LP compilations still can stand favorably alongside the new.

Dan Morgenstern's liner notes show a love for Hawkins and his music, and prove again that Morgenstern may be the best in the business when it comes to telling the listener exactly what he or she is going to hear on each cut. He points out how Hawkins was a lifelong listener to every kind of classical music, including opera, and how he was among the first of his generation, during the war years, to listen to and dig the sounds of modern jazz.

*Body and Soul* has a lot of fine playing by Hawkins, particularly on the fabled title cut as well as on "When Day Is Done." On some cuts, he is backed up by his own band, on others by musical associates like Benny Carter and



J. C. Higginbotham. Oddly enough, when Hawkins formed his big band in 1940, RCA dropped him and made no further records with him until 1946, when Leonard Feather organized two different sessions featuring him and trumpeter Charlie Shavers on "Say It Isn't So" and "Spotlite." The former, a fine Irving Berlin ballad, is almost totally abstracted by Hawkins, who uses a smoother and more mellow tone. The 1947 dates feature Fats Navarro and

J. J. Johnson in superb form on "Half Step Down Please," which shows now well Hawkins, almost alone of his generation, had adapted to the drastic changes brought on by be-bop a few years before.

To record with strings seemed to be the ambition of every jazz singer and player, so on three different dates in 1956 Coleman Hawkins was given his shot, with versatile trombonist Billy Byers doing the writing and conducting. There is much fine Hawkins on these dates, including a wonderful new version of "Body and Soul," but overall the material and its treatment are not particularly inspired. Too much of this kind of thing was being done in the mid-'50s, and the results were not always impressive. One wonders why Hawkins' superb version of "Indian Summer" was not used in place of one of the string cuts.

One artistic aside: The cover of *Body and Soul* shows a tastefully rendered drawing of a bearded Hawkins by artist Michael Trossman. It should be noted that during the period of this RCA set, Hawkins had no beard. That was not added until the late '60s. *Frank Driggs*

**Edge of the City: The Kinsey Report Alligator AL 4758, LP.**

Sound: B+ Performance: A-

There's a new guitar star stalking the streets of Chicago, and his name is Donald Kinsey. Knowledgeable music



Roy Buchanan plays his guitar mostly in the upper registers, dominating the mix and coaxing amazing colors from his strings.



fans always knew that Kinsey was good, based on the company he kept: He's toured with Albert King, recorded and done road work with Bob Marley and Peter Tosh, and done studio dates with Roy Buchanan—all separated by stints with groups that never broke through commercially. It's unlikely that

even Kinsey's most ardent supporters, however, expected that his Alligator debut would prove as much of a success as *Edge of the City*.

From the first cutting guitar figures of the opening track, Kinsey leaves no doubt that, at 33, he's a mature stylist with firm roots in the blues and deep reserves of technique at his command. In simpler terms, he smokes, cut after cut. You can detect traces of Albert King's slashing bends and the sinuous, liquid guitar style of modern rock players, but the result is pure Kinsey. He's also a better singer than anybody who plays guitar this wonderfully has a right to be.

To credit only Donald Kinsey with the triumph of *Edge of the City* is to slight his fine band. He achieves an easy rapport with his rhythm section—not surprising, since the bass player and the drummer are his brothers Kenneth and Ronald. All three learned the blues while backing their father, local Gary, Indiana legend Lester "Big Daddy" Kinsey. Add long-time associate Ron Prince on rhythm and second guitar, and the result is a versatile, rhythmically adept band. The original songs are several notches above average, but the center of each remains its guitar break.

This group's name doesn't betray the fact that it considers itself a blues band, a label that's long been a hindrance to Chicago musicians reaching out for wider audiences. Is this album blues? Let the folklorists fight that one out while the rest of us catch The Kinsey Report at their next gig. Highly recommended to fans of modern electric blues, guitar freaks, high-energy rock lovers, and just about everyone else.

Roy Greenberg

**Hot Wires:** Roy Buchanan  
**Alligator ALCD 4756, CD.**

Sound: A Performance: B+

Relentlessly pushing against the boundaries of blues, Roy Buchanan's back with more nasty, percussive, high-frequency guitar pickin' on *Hot Wires*.

Despite some classic blues bending ("The Blues Lover"), from a blues perspective this is not Buchanan's most consistent album. The instrumental lines often veer off into high-octane

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surf rock ("Sunset Over Broadway"), outer-space country ("High Wire"), chromatic jazz ("Ain't No Business"), or loping, syncopated rhythms ("25 Miles"). Buchanan shares vocal chores with Johnny Sales and Kanika Kress. He isn't a great blues singer, and the soulful country ballad he shares with Kress just doesn't fit.

But if you don't mind the genre-stretching, *Hot Wires* is a sonic treat. Buchanan plays his guitar mostly in the upper registers, dominating the mix and coaxing amazing colors from his strings. High point of the record is the hell-bent-for-leather instrumental "Flash Chordin'," where Buchanan's screeching solo races forward with the melody played in sextuplets. Roy Buchanan's on a roll these days, and without question his *Hot Wires* certainly is that—hot. *Michael Wright*

**I'm in the Wrong Business:** A. C. Reed  
**Alligator AL 4757, LP.**

Sound: B Performance: B

Most of today's senior bluesmen learned their trade by serving an apprenticeship as a sideman behind an established star. Years spent supporting a veteran bandleader give exposure, musical seasoning, and relative financial security to promising musicians without the headaches of maintaining a band.

Saxman A. C. Reed has bellowed and bleated on stage behind such Chicago luminaries as Son Seals, Albert Collins, and Buddy Guy and Junior Wells, while recording with countless others since storming the Windy City in 1942. Given the opportunity to record his own album, A. C. allows himself surprisingly little solo space and no showcase instrumentals at all. The result is a perfectly respectable but unexciting LP from a mainstay of the Chicago blues scene.

A. C. is an above-average lyricist but not enough of a singer or arranger to do his distinctive songs justice. Backing is provided by his own touring unit plus studio session men, none of whom provides enough spark to kick this set into overdrive. Luckily, guest guitarist Stevie Ray Vaughan provides an exciting solo on "These Blues Is Killing Me." The best cut, ironically



A. C. Reed, a mainstay of the Chicago blues scene, allows himself very little solo space and no showcase instrumentals at all.

enough, is the cautionary "Don't Drive Drunk," an anomaly in a tradition that's long promoted the idea that being sloppy drunk is a cure for just about everything.

In the wrong business or not, A. C. has been at it too long to turn back now. *Roy Greenberg*

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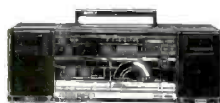
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## DON JUAN IN PORTLAND



**Bravura** (Respighi: Roman Festivals; R. Strauss: Don Juan; Lutoslawski: Concerto for Orchestra). The Oregon Symphony, James De Preist. **Delos D/CD 3070, CD.**

This is another blockbuster recording from John Eargle on the Delos label. Following on the heels of his magnificent recording of Prokofiev's "Romeo and Juliet" with the Seattle Symphony Orchestra, it makes clear that the Delos/Eargle team is a formidable factor in current high-tech recording, and that this label must be accorded the same respect given to Telarc and London/Decca for their superior digital recordings.

Considering the orchestral showpieces this CD contains, its title is most apt. Although conductor James De Preist provides a fine idiomatic performance of "Don Juan," whose famous French horn theme soars resonantly in the hall, it is the musical and sonic values of the Respighi and Lutoslawski pieces that merit special accolades.

Ameilia Haygood, that gracious lady who owns Delos, has wisely given John Eargle a pretty free rein in his choice of recording techniques. John has had some interesting ideas on orchestral miking for years but never

really had a chance to translate theory into practice until recently. While there is a basic mike setup that John prefers, he is not dogmatic about it, and he is flexible enough to adapt to differing acoustic environments in various halls.

In this recording, made in the Arlene Schnitzer Concert Hall in Portland, Ore., John's main mikes were a pair of Sanken CU-41s in a quasi-coincident cardioid configuration, flanked by a pair of spaced Schoeps omnidirectional mikes and augmented by low-level sweetener mikes where necessary for accents and delineation. The hall is fairly warm in ambience, and the mike combination provides a sound that is well projected, with fine focus and imaging, good localization, good orchestral definition, and a natural, almost three-dimensional perspective.

The "Feste Romane" is a sonic tour de force. The opening brass fanfares and huge tam-tam crashes resound mightily, while the bass drum is positively visceral in its impact. A little later on, there are great organ pedal counterpoints. Dynamic range is extraordinary, ranging from very hushed pianissimo string pizzicatos to the tremendous triple-fortissimo outpourings in the orgiastic final section.

The Lutoslawski "Concerto for Orchestra" reminds me in many ways of Bartók's piece by the same name, with passages of extreme delicacy contrasting with passages of violent, crushing sonorities. The third movement opens with simply the "thrum" of a plucked contrabass played at extremely low level; before digital recording, such a passage would have been overwhelmed by noise. The finale of this concerto, with its insistent snare drum rolls, blazing brass, and massive bass drums, is nearly cataclysmic in its impact.

On the strength of these exciting performances and the refined playing elicited from the Oregon Symphony Orchestra, De Preist must be reckoned as a formidable conductor. His incandescent leadership and John Eargle's spectacular engineering blaze new trails in the musical and sonic firmament. *Bert Whyte*

**Copland: Sextet, Piano Variations, Piano Quartet.** Boston Symphony Chamber Players; Gilbert Kalish, piano. **Nonesuch 1-79168-1, LP.**

Sound: B+

Performance: A

The works on this disc are among the most beautiful in Copland's "other," nonpopulist idiom. And while they are of a more serious and economical nature than, for instance, "Billy the Kid," each bears the distinctive Copland stamp. Dissonances and gaping intervals never stray too far from triadic harmonies, buoyant rhythms, and occasional jazz colorings.

Performances are superb, particularly Gilbert Kalish's reading of the 1930 "Piano Variations," the composer's first large-scale work for piano. This is an intensely expressive piece, as wide ranging in mood as it is technically demanding. From its simple four-note theme, it blossoms into grand, even majestic proportions, yielding rich harmonic rewards. Kalish's attacks are clean and appropriately assertive, and his phrasing seems hand-in-glove with the composer's intentions, particularly on the inner voices. He draws some remarkably deep sonorities from the piano, and these resonate freely in the recording's airy spaciousness. The sound is clean and de-

void of gimmickry, enabling Copland's sometimes subtle harmonies to emerge uncluttered.

The other two works are the "Sextet" from 1937 and the "Piano Quartet," Copland's first foray into 12-tone music at the relatively late date of 1950. The "Sextet"—performed by Kalish, clarinetist Harold Wright, violinists Malcolm Lowe and Max Hobart, violist Burton Fine, and cellist Jules Eskin—is a transcription by the composer of his "Short Symphony." In its two outer movements, it abounds with jazz references and Stravinsky-like rhythms, which the players attack with a focused intensity. The slow inner movement emerges as a poignant, lyrical statement, and the ensemble sound throughout is first-rate.

That continues in the pastoral "Piano Quartet," which, Michael Steinberg points out in his erudite liner notes, actually turned out to be 11-tone. The civil conversation between mostly unison strings and piano in the first movement grows a bit more heated in the second, as motifs are tossed about from one voice to the next. Ultimately they reach accord in the third movement, joining in a unison statement of the three-note theme.

Compared to its rich, ringing resonance in the solo "Variations," the pi-

ano seems muffled and unidimensional in the opening movement of the quartet. However, on two separate systems, its sound seemed to improve markedly as the piece progressed, possibly indicating that the ear needs time to adjust to the new timbral and acoustical context. Thus, while not as easily judged as the "Variations," the two chamber works sound well recorded, with only a minimum of cloudiness in the louder tutti passages.

Susan Elliott

**A Song from the East:** David Starobin Bridge BCD 9004, CD. (Available from Bridge Records, G.P.O. Box 1864, New York, N.Y. 10016.)

Sound: A Performance: A-

On a program of guitar works by little-known 20th-century Russian and Hungarian composers, one might expect just so many modal variations on "The Volga Boatman." Instead, *A Song from the East*—David Starobin's first CD on his own Bridge label—reveals startlingly accessible treasures mined from the vast untapped classical guitar repertoire.

Performing first-class works for solo guitar and small ensemble, Starobin introduces a Nemerovsky sounding like Villa-Lobos, a Sokolovsky sound-



David Starobin

ing like Carulli, Jemnitz like Schoenberg, and Kurtag like Stravinsky (check out the novel instrumentation of guitar, piccolo, and trombone on "A Kis Csava"), plus Sor's nostalgic "Souvenir de Russie." This is not to imply that these are strictly derivative, just that there is much good music in popular styles waiting to be enjoyed.

Starobin's precise playing reflects his sensitivity to the music, and he has chosen top-notch musicians for the ensembles. His tone is slightly on the cool side, but it is well captured. The program's transition from the romantic Sor to the dissonant Jemnitz is a bit abrupt, but otherwise *A Song from the East* offers delightfully pleasant new discoveries for those willing to venture beyond the Segovia canon.

Michael Wright

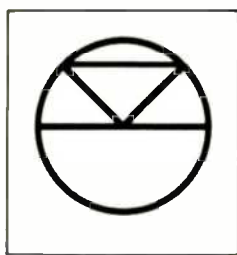


Aaron Copland

**Chavez Symphonies Nos. 1, 2, and 3.** The London Symphony Orchestra, Eduardo Mata.

**Moss Music Group MCD 10002, CD.**

Carlos Chavez, the great Mexican composer, wrote some highly original works, many of them based on or containing music derived from native folk sources and Mexican Indian tribes like the Yaqui. As such, his music is rather exotically scored and, as you might expect, makes liberal use of varied percussion instruments. All of it has a



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The sound of this Ravel CD is ultra-clean and highly detailed, with stunning dynamics, a warm ambience, and great depth.

rhythmic drive and vitality that reflect Chavez's native heritage.

Years ago, I recorded two of the works on this CD, the famous Symphonies Nos. 1 and 2 ("Sinfonia de Antigua" and "Sinfonia India," respectively), with Chavez himself conducting the New York Philharmonic Orchestra. This splendid CD also has Chavez's exciting Third Symphony. Well-known Mexican conductor Eduardo Mata guides the London Symphony Orchestra in brilliant performances of these works, which he obviously loves and respects. Mata's readings are rhythmically propulsive and exuberant, with very expressive dynamics.

Overall sound is well projected and clean, with the transient response of the percussion instruments particularly sharp and accurate. No engineering credits are provided, but whoever made the recording has a good ear for balances, and the orchestra is well placed in a fairly spacious ambience. I note that the producer was Harold Lawrence, once the manager of the London Symphony and, years back, a member of Bob Fine's Mercury recording team. This type of music is well served by digital recording, which can encompass the widest dynamic range. Would that I had had such a boon when I was recording with Chavez!

It is good to have Carlos Chavez's unique music available on CD, in a recording whose excellent sound and performances honor this composer's work. *Bert Whyte*

**Ravel: Valses Nobles et Sentimentales, Rapsodie Espagnole, Le Tombeau de Couperin, Alborada del Gracioso, Pavane pour une Infante Défunte.** The Royal Philharmonic Orchestra, André Previn.  
**EMI CDC 7 47468 2, CD.**

Many CDs with Ravel programs are available, and a fair number of them offer good sound and performances. All of them, however, pale in comparison to this outstanding EMI recording of some of Ravel's most representative and popular works.

André Previn conducts the Royal Philharmonic Orchestra and displays once again his sensitivity for the music of this composer. Every strand of Ravel's complex and colorful orchestration

is totally delineated, its rhythmic qualities always maintained; at the same time, Previn brings great refinement to the scores' more sensual elements.

The recording is a sonic masterpiece. The sound is ultra-clean and highly detailed, with stunning dynamic range. This is especially true in "Alborada del Gracioso," which opens with low-level string pizzicatos and then, a few bars later, explodes as the full orchestra goes to the top of the dynamic scale. There is a wonderful, warm ambience with great depth—behind the up-front harp and strings, for instance, you can hear lower level snare drums and xylophones deep in the left rear of the sound stage.

This is a stellar effort in all areas and is highly recommended. *Bert Whyte*

**Elgar: Enigma Variations, Pomp and Circumstance Marches.** The Royal Philharmonic Orchestra, André Previn.  
**Philips 416 813-2, CD.**

Once again, André Previn shows his affinity for British music in these brilliant performances of some of Sir Edward Elgar's most ingratiating and popular works. The 15 variations of the "Enigma" run the gamut from tender lyricism and introspection to fierce outbursts from the full orchestra. It takes a virtuoso conductor like Previn and a superbly responsive orchestra like the Royal Philharmonic to cope with the musical complexities of this score.

Listen to the scurrying first and second violins and the huge, brazen fanfares from trombones and trumpets in variation number 8 ("Troyte"), and more of the same in number 12 and in the tumultuous, triumphant finale. You'll hear orchestral playing of the highest order.

As a bonus, Previn gives us rousing performances of those most quintessentially British works, Elgar's five "Pomp and Circumstance Marches." Heart-on-sleeve they may be, but one cannot deny that they are inspiring and thrilling music, especially with such vivid readings.

The sound is bright, clean, and gloriously sonorous, with a rather forward projection in a moderately spacious ambience. For music lover and Anglophile alike, an outstanding recording.

*Bert Whyte*

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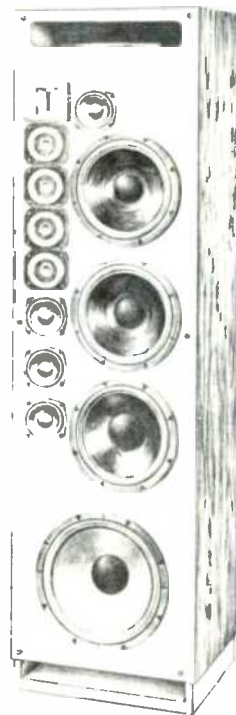
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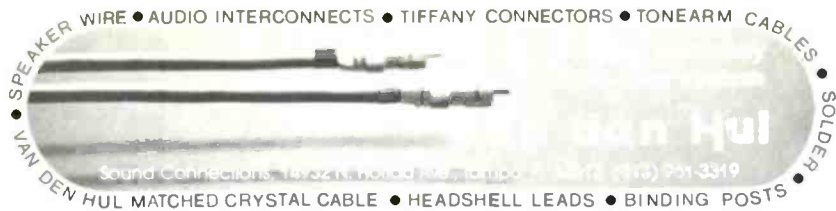
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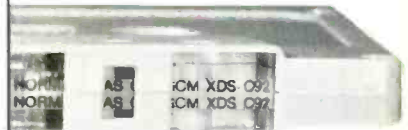
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