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ISSUE ON  
CAR STEREO**

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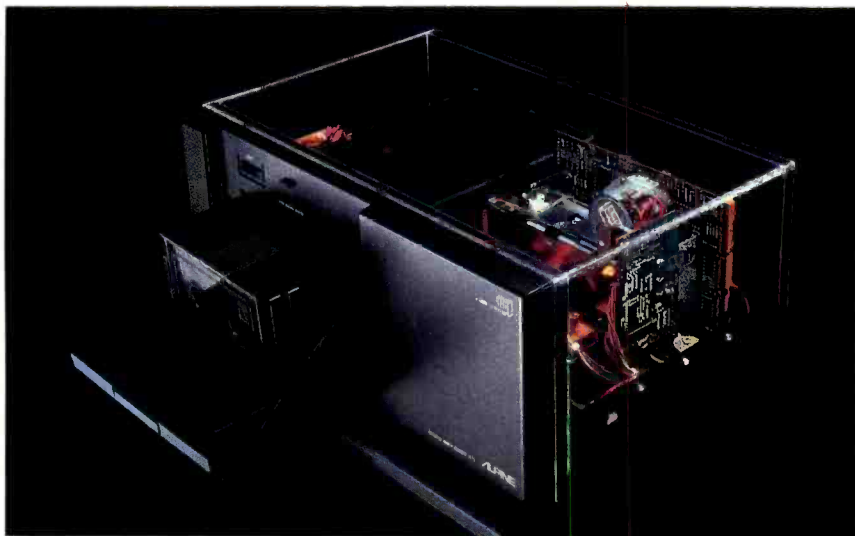
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APRIL 1986

VOL. 70, NO. 4



See page 34



See page 30

## FEATURES

<b>THE LIRPA TURBO STEAMTABLE</b> .....	Prof. I. Lirpa and I. Berger .....	42
<b>DETROIT STEERS COLLISION COURSE ON CAR STEREO</b> .....	David Lander .....	46

## EQUIPMENT PROFILES

<b>KENWOOD KRC-999 CAR STEREO</b> .....	L. Feldman and I. Berger .....	52
<b>ALPINE 7374 CAR STEREO</b> .....	L. Feldman and I. Berger .....	62
<b>DENON DCR-7600 CAR STEREO</b> .....	L. Feldman and I. Berger .....	70
<b>AURICLE: LIRPA DISTORTEK J-X33B RACK SYSTEM</b> .....	Tsrif Lirpa .....	80
<b>AURICLE: INFINITY RS 4B LOUDSPEAKER</b> .....	Anthony H. Cordesman .....	82

## MUSIC REVIEWS

<b>COMPACT DISCS</b> .....	.....	84
<b>ROCK/POP RECORDINGS</b> .....	Michael Tearson, Jon & Sally Tiven .....	93

## DEPARTMENTS

<b>TAPE GUIDE</b> .....	Herman Burstein .....	6
<b>AUDIOCLINIC</b> .....	Joseph Giovanelli .....	10
<b>WHAT'S NEW</b> .....	.....	12
<b>AUDIO ETC</b> .....	Edward Tatnall Canby .....	18
<b>BEHIND THE SCENES</b> .....	Bert Whyte .....	26
<b>DIGITAL PTOMAINÉ</b> .....	Neknaml Hop .....	30
<b>ROADSIGNS</b> .....	Ivan Berger .....	34
<b>SPECTRUM</b> .....	Ivan Berger .....	40
<b>CODA: HERB HOROWITZ</b> .....	.....	40

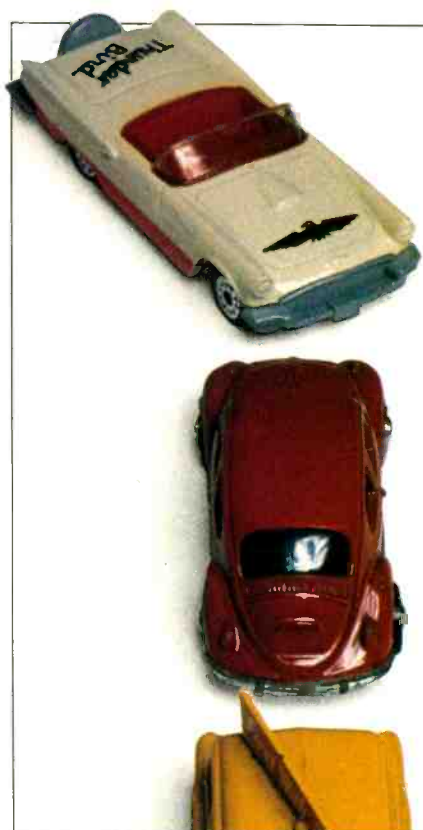
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See page 46



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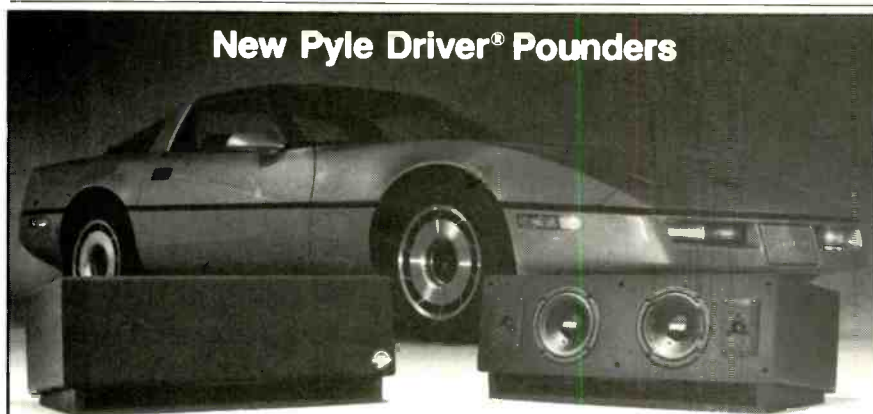


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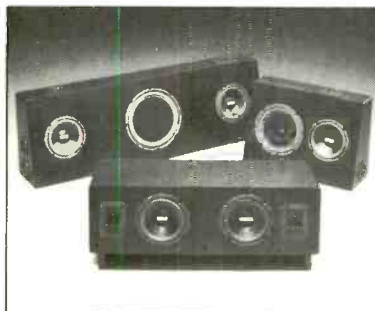
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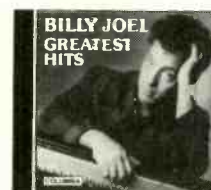
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## Leveling with the Reader

*Q. Every so often your column has a letter that goes something like this: "I recently played a Dolby tape and forgot to turn on my deck's Dolby switch. Have I ruined my machine or tape?" Or: "While recording a ferric tape, I accidentally set the switch for chrome tape. On playback, I thought the sound was quite dulled. Have I ruined my deck or tape?"*

*The Dolby NR system and chrome tape have been around for many years. If these readers haven't learned how to use them by now, they should have their tape decks confiscated. I can't understand why you would bother to print such letters in your column. Your regular readers already know the answers.—Francis Pivar, New Kensington, Pa.*

*A. Although our average readers are above average in intelligence, education, and knowledge of audio technology, overall they run quite a range in these respects, and a number of them are newcomers to audio. Hence the level of sophistication addressed by the "Tape Guide" must vary so that most readers will feel that at least parts of the column are addressed to them.*

*The decision as to what gets printed is not mine alone. From the material I submit, the Editor selects what he deems appropriate for the readership. He has at least some sense of what is suitable for the majority, and that is why he is Editor. (In addition, no one else is foolish enough to want the position.—E. P.)*

## Which Way to Go?

*Q. I am evaluating audio equipment for recording live performances of my music. I have narrowed the field to three possibilities. One is to get a Hi-Fi VCR now and add a PCM (pulse code modulation) unit eventually. The second is to get one of the new 8-mm VCRs with built-in PCM when the prices come down substantially. The third is to wait until the DAT (digital audio tape) format is settled and get one of those units. I am a bit concerned about the fact that 8-mm VCRs have 14-bit instead of 16-bit capacity. What do you recommend?—Charles B. Hammell, Moorestown, N.J.*

*A. I tend to incline toward the Hi-Fi VCR, particularly with a PCM unit. My*

*own choice would be not to wait for DAT, inasmuch as when it does arrive, it is unlikely to arrive full-blown and as good as it will eventually turn out to be.*

*As for the 8-mm format, it's actually an 8-bit system, though noise reduction (companding) brings its performance to about 80 dB S/N, equivalent to 13 bits. That might prove less than you want when dealing with the unpredictable sound levels of live performances. Also, the 8-mm PCM system uses a sampling frequency of only about 31 kHz, which would limit your upper frequency response to 15 kHz—again, less than you might want for live-performance work, especially if you have good mikes.*

*Bear in mind that none of the formats you mention can be easily edited. This will cause no problem if you will be treating the recording of each piece as a whole, but if you hope to edit together sections of different performances to eliminate performers' errors, you might be better off with an open-reel deck, preferably one using the two-track (half-track) format rather than the four-track (quarter-track).*

## Audio Career

*Q. I am planning to go to college to study audio engineering and music. One college that offers a combined degree in both is the Berklee College of Music in Boston. Can you make other suggestions?—Richard Spillane, Hackensack, N.J.*

*A. Possibilities include the College for Recording Arts, San Francisco, Cal.; the University of Bridgeport, Bridgeport, Conn.; Teccart Institute, Montreal, Que., Canada; Eastman School of Music, Rochester, N.Y.; Brigham Young University, Provo, Utah, and Loyola University, Montreal, Que., Canada. (Editor's Note: Contributing Editor Ken Pohlmann also suggests the University of Miami School of Music, Coral Gables, Fla., where he teaches, and mentions that similar programs are offered at the Peabody Conservatory of Music, Baltimore, Md., and Fredonia State University College, Fredonia, N.Y.)*

*You should also write to the Audio Engineering Society for its booklet, *Guide to Careers in Audio Engineering*; the address is 60 East 42nd St., New York, N.Y. 10017.*

## Track Formats

*Q. Please explain the differences among two-channel four-track, quarter-track, and half-track tape decks. Is there such a thing as a four-channel, four-track deck?—Edward Brown, Far Rockaway, N.Y.*

*A. Four-track and quarter-track usually mean the same thing, that the tape is divided into four tracks. In stereo (two-channel) decks, two of these tracks are used in one direction of tape travel and the other two are used in the opposite direction. On open-reel decks, the tracks are interleaved (tracks 1 and 3 recorded in one direction, tracks 2 and 4 recorded in the other); some open-reel decks allow independent monophonic recording on each of the four tracks. In cassette decks, the tracks are paired (tracks 1 and 2 recorded in one direction and tracks 3 and 4 recorded in the other), with a single erase-head gap covering the active track pair; with this arrangement, independent monophonic recording on each track is not possible.*

*Two-track and half-track also mean the same thing, that the tape is divided into two tracks. Since both halves of the tape are used at once during stereo recording, the tape is recorded in only one direction. This simplifies editing, since the recording can be cut without any concern for other material recorded in the opposite direction. When half-track decks are used in monophonic recording, each track is recorded in a different direction.*

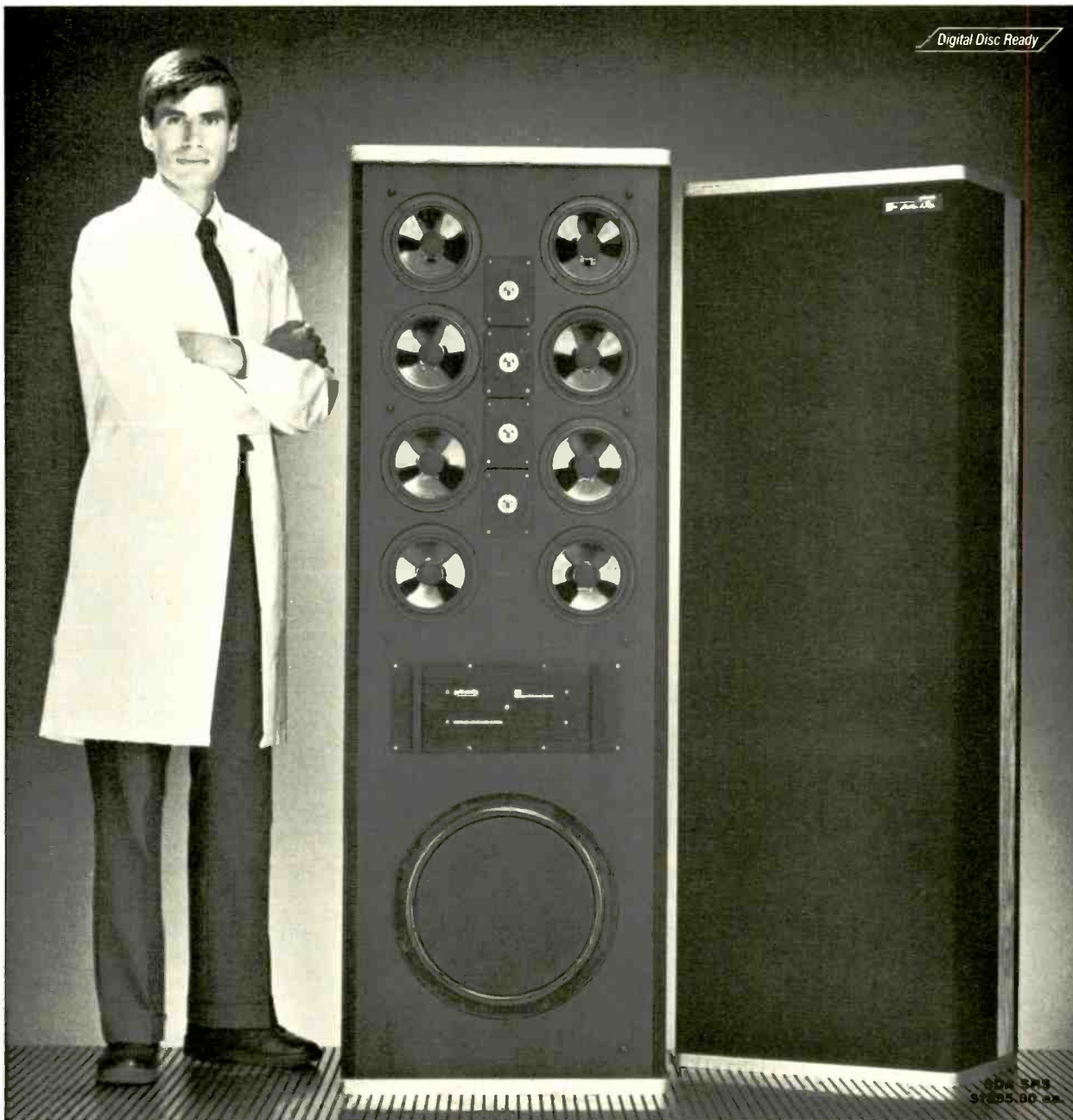
*Half-track recordings have slightly greater S/N than quarter-track recordings made on the same type of tape and at the same recording speed. All monophonic cassette decks use half-track formats; in stereo, half-track is restricted to open-reel decks.*

*Four-channel, four-track decks are available in both open-reel and cassette formats. These are usually directed at musicians who need to make multi-track recordings of their performances, and are sold through professional-sound equipment and musical-instrument dealers. 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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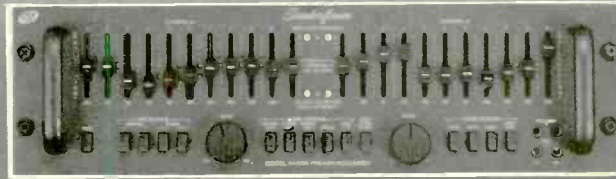
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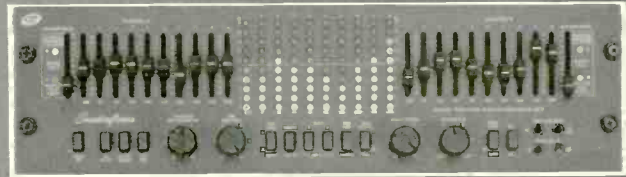
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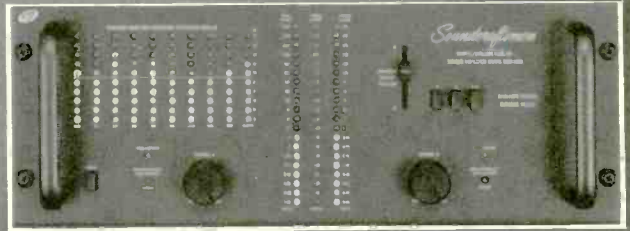
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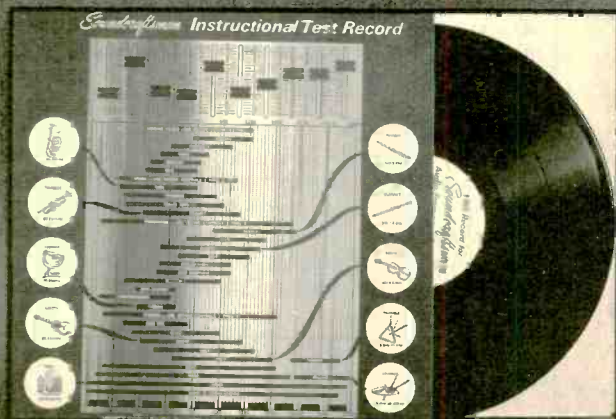
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## FM Translators

*Q. When signing off, a college station I listen to mentions the call letters of two "FM translators (10 watts each)." What, specifically, is a translator?—O. O. Callaway, Carlsbad, Cal.*

A. Sometimes an FM station does not cover a portion of its intended listening area. To fill in this hole, the station places a low-power transmitter in the area where reception is poor. This transmitter, known as a "translator," carries the broadcasts aired by the "master" station.

## Noisy Recorder Motor

*Q. In your answer to L. G. Paoletto's question about motor noise in portable recorders ("Audioclinic," September 1985), you suggest solutions to problems of electrical noise. I wonder if perhaps his problem is acoustical noise.*

I do a lot of on-location recording. I got tired of lugging an open-reel recorder and its trappings, so I investigated small cassette recorders. Every one I tried which used a built-in microphone was absolutely unacceptable because it picked up motor noise. This definitely was not electrical noise; it was mechanical noise, and it is incredible how little it takes to make a recording unusable.

I found that the only solution was to use a recorder which could accept external microphones, and to keep those microphones at least a foot or two from the recorder. So used, these small recorders all were able to produce good-quality recordings.—Linton H. Flocken, Chicago, Ill.

A. Assuming that the noise Mr. Paoletto referred to occurred only on tapes made with his recorder's built-in microphone, you are right. I didn't even think about acoustical noise. I might add, however, that much of the noise picked up by a built-in mike comes from the tape and hub moving in the cassette shell rather than from the motor.

## Digital AM Stereo

*Q. Although I am surely not the first to have this idea, I would like to know why all the disputes over AM stereo are not settled by broadcasting stereo digitally, with the signal ultimately decoded in the AM tuner.—Darrin Fangman, Denver, Iowa.*

A. The bandwidth needed to transmit stereophonic broadcasts digitally would be very wide—much wider than the permissible limits allowed by present international agreements. One broadcast station would likely occupy the spectrum reserved for the entire AM broadcast band.

Even if this were not a consideration, the lack of compatibility with present AM receivers would make such a system impossible to institute.

## Copying CDs vs. LPs

*Q. Will it be beneficial for me to re-tape, off CDs, music I have previously taped from analog discs? I used a "range expander" when I made my copies from LPs.—Darrin Fangman, Denver, Iowa.*

A. Assuming you like the CDs' sonic qualities at least as well as those of the analog discs, retaping from CDs has several points to recommend it. If the dynamic range on the CD is wider than on your phonograph records (which is not always the case), you may find the CD's dynamics more realistic than those which you re-created by using your expander. Depending on the S/N of your tape recorder, this greater dynamic range might make you more aware of the recorder's background noise. It probably would pay to record your tapes again if you plan on buying the CDs in any case. If not, buy just one or two at first, and tape them to see if it's worth it.

Naturally, if the analog discs had been played a lot, and are marred by ticks, pops, and background hiss, making copies from their CD equivalents will be well worth the extra effort.

## Stereo Noise Filter

*Q. My FM tuner has a stereo noise filter. When it is switched into the circuit, it appears that some musical instruments shift toward the center of the sound stage. How can this filter cancel noise and not music?—O. O. Callaway, Carlsbad, Cal.*

A. As you know, weak stereo signals are often accompanied by background noise. You have probably observed that if you switch your tuner to mono, the noise disappears. Switching to mono means that you are removing the difference signal—that is, all information which is not common to both

left and right channels. We can deduce from all of this that the difference signal contains most of the noise.


In most instances, audible noise is in the relatively high audio frequencies. So, to produce a quieter stereo signal, components' designers want the high-frequency response of the difference signal to be reduced. Thus, when your stereo filter is switched in, you are actually inserting a low-pass filter in the difference signal.

When this filtered difference signal is combined with the monophonic signal, stereo is produced, but with less audible noise than if the filter were not used. Since some highs are now missing from the difference signal, stereo separation is reduced at these high frequencies; therefore, the apparent sources of these frequencies shift toward the center of the stereo sound stage. At the same time, separation is maintained in the middle frequencies to maintain a sense of stereo ambience and directionality, so instruments whose energy is mainly in the middle frequencies do not exhibit this shift.

## Static and Sonic Quality

*Q. In an attempt to obtain better sound from my stereo system, I discarded some of the carpeting near the speakers. This action did improve the sound quality. Could it be that the static charge built up on the carpeting was affecting the speaker cables which lay on it?—H. Colby, Elizabeth, N.J.*

A. The change you hear is not due to static but to the carpet's sound-absorbing properties. In most rooms, carpets usually improve the sound by reducing reflections from the floor. This effect is most audible in the mid- to high frequencies. If your room has many soft, sound-absorbing surfaces (wall hangings, drapes, upholstered furniture) in addition to the rug, it may be "dead," lacking in reverberation.

If you like the sound you now hear, by all means leave the carpeting as you now have it. Or, if decor permits, try removing a bit more, and see how you like the sound then. 

**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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*Anthony Cordesman*

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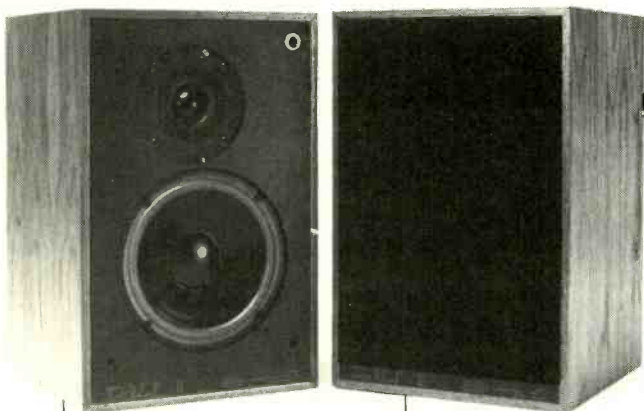
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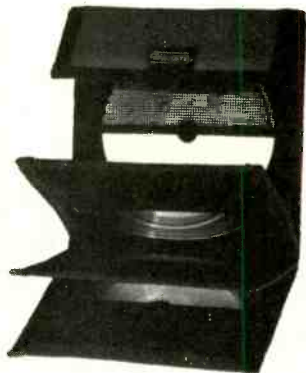
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## DALI Loudspeaker

The DALI/II, from Danish American Ltd. Inc, is a two-way bookshelf system with a 6½-inch woofer and 1-inch dome tweeter.

Sensitivity is rated at 89 dB for 1 watt at 1 meter, and distortion is rated at 0.6% or less above 100 Hz. The cabinet's back and front are finished in black lacquer, with walnut sides and top. Price: \$67.50 each, plus shipping. For literature, circle No. 100



## Shore CD Carrier

Those stiff, hard-to-open CD jewel boxes can be a nuisance to users of car CD players or portables. The Shore CD/Mate holds six discs in individual, velour-lined pockets with Velcro closures, in a package only 1 inch thick. The carrier is available in black, red or blue. Price: \$12.95, including shipping and handling. For literature, circle No. 102



## Parasound Turntable

The TTd820 is a semi-automatic direct-drive turntable whose arm accepts P-mount cartridges for easy installation. Wow and flutter is 0.03%, and rumble is -70 dB. The front-mounted controls include a speed adjustment of ±3%, and there is a stroboscope on the platter for restoration of exact nominal speed. Price: \$169.95.

For literature, circle No. 101



## Harman/Kardon CD Player

Using Harman/Kardon design hallmarks such as ultra-wide bandwidth, low negative feedback, and discrete analog circuitry, the company's first Compact Disc player, the HD500, also incorporates some unique concepts. By designing an ultra-wideband analog output

## Audio Control Signal Processor

The Phase Coupled Activator, from Audio Control, is a new type of bass-enhancement device.

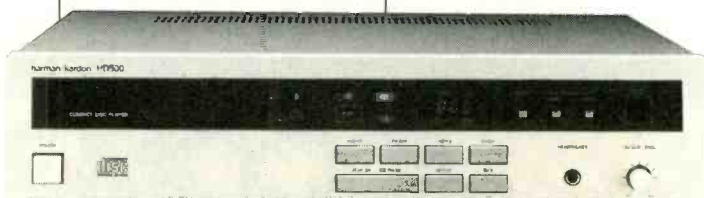


It uses logic gates to analyze the signal and detect evidence of rolled-off bass fundamentals, then digitally re-creates those frequencies. The effect can be adjusted or bypassed. Other features include a subsonic filter and a switchable subwoofer output with adjustable level. Price: \$259.

For literature, circle No. 103

section with low IM at frequencies up to 100 kHz, the company says, it was able to dispense with digital filtration yet use a gentle analog filter. The analog section is also direct-coupled. Circuit layout isolates the analog section from digital noise. Price: \$675, including wireless remote control.

For literature, circle No. 104







### Sanyo Car Speaker

Behind the FSP693's grille is a flat, metal honeycomb woofer driver, as well as a more conventional, angled midrange driver and tweeter. The system fits a 6 by 9-inch opening. Price: \$139.95 per pair.

For literature, circle No. 105



### H. H. Scott Receiver

A five-band graphic equalizer is built into the Scott 388RS receiver, which also features LED indicators on the input and monitor selection switches;

manual, auto-scan and 14-station preset tuning, and the same tuning circuitry as that of Scott's 559T tuner. Price: \$549.95.

For literature, circle No. 106



### Grundig Car Stereo

The tape facilities on Grundig's UC-435 include auto reverse, Dolby B NR, and music search. The tuner side features seek and scan tuning plus six AM and six FM presets, soft muting and stereo blend on weak signals, and

a local/distant switch. All controls and the tape-loading door are illuminated at night. The unit has both amplifier outputs (7 watts per channel) and preamp-level outputs for use with external amps. Price: \$369.95.

For literature, circle No. 107



### Lirpa Ear Plugs

Ear protectors are a necessity in today's noisy civilization, but it's too easy to lose plugs. The Lirpa EP III ear plugs solve that problem by borrowing a trick from children's mittens, with tiny posts that attach them firmly to the



earlobes. To be less conspicuous when not in use, two plugs can be clipped together, end to end, to serve as a ring, or left dangling from the ear as an earring. For pierced ears only. Price: \$8.95 each; \$20 per pair. For literature, read Proust

Foam: E•A•R Corp.

### Jensen Powered Car Speaker

Designed for use with low-powered receivers, Jensen's P/EQ speakers have built-in power amplifiers, rated at 20 watts at 10% distortion and 15 watts at 0.3% THD. The amplifiers include equalization networks matched to the single, full-range drivers, with three switch-selectable EQ curves. Input-level limiting and thermal overload circuits protect the amplifiers and speakers from overheating or electrical damage, and the cones are made from a patented material to resist

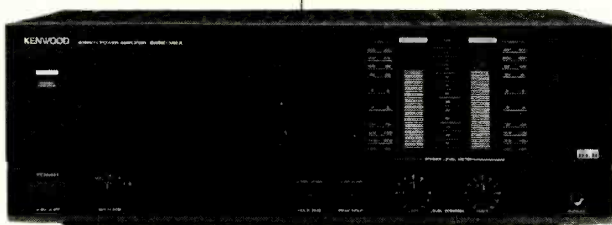


aging, heat, and humidity. Two sizes are available: The 4½-inch P/EQ-1, with response rated from 55 Hz to 20 kHz, and the 6½-inch P/EQ-2, rated at 45 Hz to 20 kHz. Prices: P/EQ-1, \$169.95 per pair; P/EQ-2, \$199.95 per pair. For literature, circle No. 108

## Kenwood Power Amplifier

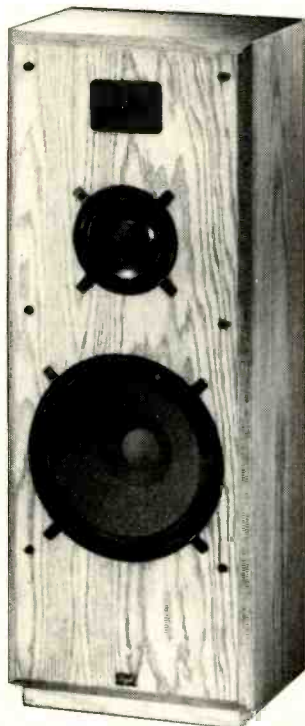
Oddly, Kenwood reserves the name "Basic" for its most prestigious equipment. The Basic M2A power amplifier, for instance, delivers 220 watts per channel at 0.004% THD, with power levels in each channel monitored by fluorescent displays with selectable peak-hold times. The Super Dynamic Linear Drive circuit works like two amplifiers in parallel, one

medium-power amp for normal material and a higher power one for transient peaks, both bridged together for still further headroom. The Sigma Drive B negative-feedback circuit gives the amplifier more precise control of speaker-cone movement, without requiring extra connections, as earlier Sigma Drive circuits did. Price: \$600. For literature, circle No. 110



## Bozak Loudspeaker

Starting from the top, the DMS-5500 has a 1-inch soft-dome tweeter, a 6-inch curvilinear midrange and a 12-inch woofer, in an infinite-baffle enclosure. The woofer has a variable-density cone, designed to dissipate vibrations at the outer edge so that they will not reflect back towards the center. Frequency response is rated as 30 Hz to 21 kHz,  $\pm 3$  dB; impedance is 8 ohms nominal, 6 ohms minimum; sensitivity is 94 dB SPL for a 1-watt,  $\frac{1}{3}$ -octave, 1-kHz pink-noise input, and power handling is 250 watts (program). The dark oak version shown has connections for bi-amplification; the vinyl version does not. Price: \$1,099 per pair in wood, \$839 per pair in vinyl. For literature, circle No. 109



## EPI Car Speakers

The EPI LS80X car-stereo speakers use the same woofer cone and tweeter diaphragm material as EPI's Time/Energy home stereo speakers; the two-layer material is designed to minimize energy storage, for cleaner transients. The  $\frac{5}{4}$ -inch woofers are a space-efficient design with an integrated basket/frame

only  $\frac{3}{4}$  inch wider than the cone, and with mounting depth reducible to only  $\frac{1}{8}$  inches with the extension ring supplied. The 1-inch dome tweeter is a surface-mount design, as is the separate crossover. Response is rated at 80 Hz to 20 kHz,  $\pm 3$  dB, and sensitivity is 88 dB. Price: \$250 per pair. For literature, circle No. 111



## dbx CD Player

In addition to the usual CD-player features (including digital filtration and access by index number), dbx's DX3 has three unique ones: A variable compressor which reduces dynamic range for easier taping or for background-music

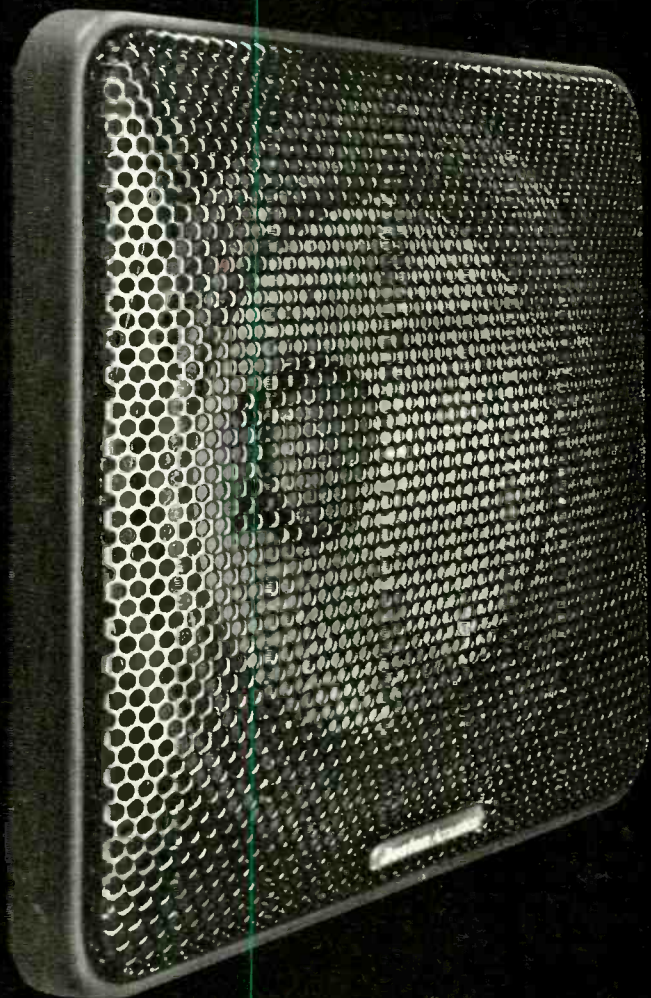
listening; a Digital Audio Impact Recovery circuit to add impact to transient attacks, and an ambience control to vary out-of-phase midrange information for a more airy quality or a tighter image. Price: \$599. For literature, circle No. 112



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### WHAT SONIC HOLOGRAPHY DOES.

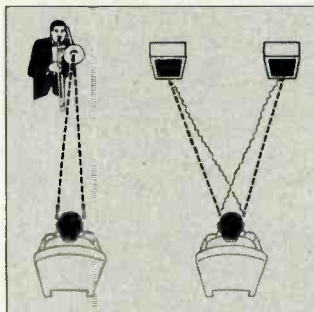
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Listen to your favorite musicians on a transistor radio. Now sit three rows back from the stage at a live concert.

These are not exaggerations of how much more dimensional and realistic Sonic Holography is than conventional stereo. The most experienced and knowledgeable experts in the audio industry have concurred. Julian Hirsch wrote in *Stereo Review*. "The effect strains credibility—had I not experienced it, I probably would not believe it." *High Fidelity* magazine noted that "...it seems to open a curtain and reveal a deployment of musical forces extending behind, between and beyond the speakers." According to Larry Klein of *Stereo Review*, "It brings the listener substantially closer to that elusive sonic illusion of being in the presence of a live performance."

### HOW SONIC HOLOGRAPHY WORKS.

When a musician plays a note, the sound occurrence arrives separately at your left and right ears. Your brain analyzes the difference in these sound arrivals and tells you exactly where the sound is.



- L. Real-life sonic event results in two sound arrivals: one at your left ear, one at your right ear.
- R. Stereo playback of that sonic event results in four sound arrivals. Two per speaker per ear = four.

Conventional stereo tries to duplicate this process by using two speakers to send a different version of the same sound occurrence to each ear. In theory, this should "trick" your brain's psychoacoustic center into placing the musician on a limited sound stage between your speakers. If — and only if — each speaker can be only heard by one ear.



Conventional stereo: The sound is heard, more or less, on a flat curtain of sound between the two speakers. Volume differences only. The timing cues are gone.



Sonic Holography: With SONIC HOLOGRAPHY, the sound is reproduced much like that of a concert performance, complete with timing, phase and amplitude cues. Three dimensional!

The problem is, these different versions of the same sound also cross in the middle of your listening room, so left and right ears get both left and right sound arrivals a split second apart. Stereo imaging and separation are reduced because both speakers are heard by both ears, confusing your spatial perception.

The Sonic Hologram Generator in the Carver 4000t, C-9, C-1 and Carver Receiver 2000



solve this muddling of sound arrivals by actually creating another "sound." This special impulse cancels the objectionable second sound arrival, leaving only the original sound from each loudspeaker.

The result is a vast sound field extending not only wider than your speakers, but higher than your speakers as well. Sounds will occasionally even seem to come from behind you! It is as if a dense fog has lifted and you suddenly find yourself in the midst of the musical experience. Or, as the Senior Editor of a major electronics magazine put it, "When the lights were turned out, we could almost have sworn we were in the presence of a live orchestra."

### CARVER CD AND TUNER INNOVATIONS EXTEND THE POSSIBILITIES.

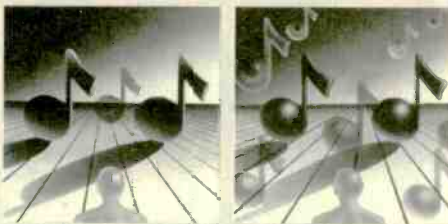
Any stereo source can be transformed from monochromatic flatness into vibrant three-dimensional reality with Sonic Holography.

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More and more people are discovering what theaters discovered some time ago: Audio makes a huge contribution to the realism of video. Still, it has taken the incredible, near-digital quality of VHS and Beta Hi-Fi to make the marriage of audio and video truly rewarding. Now even rental movies fairly explode with wide frequency range, dynamic impact and conventional stereo imaging.

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Unlike so-called "surround sound" a Sonic Hologram Generator puts you into the middle of any stereo soundtrack, (stereo, Hi-Fi stereo, broadcast stereo or even simulcasts). It psychoacoustically expands the visual experience with life-like sound that envelops you in the action.

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Before you purchase any component, consider just how much more Carver can enrich your audio and video enjoyment. And then visit your nearest Carver dealer soon.



The Carver Sonic Holography quartet. Pictured from left to right is the 4000t Preamplifier, the C-9 sonic Hologram Generator, the Receiver 2000 with remote control and the C-1 Preamplifier.

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# NIGH-FI

**E**arlier in my occasional audiobiography, I've written a good deal about what might best be summed up today as the Interim Hi-Fi Period—those long years before our big-time era of audio and hi-fi began, during which the entire basis for good sound reproduction was slowly laid down. A good name for a time that reaches all the way back to the '20s, to the beginning of electrical recording and commercial broadcast. I say "interim" simply because in all those years, a quarter century, there was good audio, there was fi, and of astonishing quality. But it existed in bits and pieces, waiting to be put together. The fi was there! We did not hear it. Too many faulty elements along the audio chain. Too many missing links.

My own first experiments in those years, as you may have read, were pretty naive, and mostly by hunch and happenstance—I've always had hunches. For a dozen or so years, I did my untutored best in every way, but I did not ever hear an actual hi-fi sound until earliest FM, in 1941. But this is looking back; how was I to know what I was missing? I just barged ahead. You may remember my ingenious reverb maker of 1930, two pickups in a single 78 groove. One was acoustic, the other "electric," but I thought the sound was wonderful. Ditto a lot later when, in 1953, I made a fancier reverb with two early three-head Ampexes. Crude but effective, you might say. My earliest componentry, in the age of the emphatically one-piece radio-phonograph, was perhaps ludicrous yet prophetic: A separate record player (two speeds), a speaker out in its own flat baffle, and a central "receiver"—what was left of my Midwest radio console. Then came elements of real hi-fi, the potent and unprecedented Carnegie phonograph of 1936 (and of 1939). It still lacked a modern pickup (and modern records to play), but the rest of it was phenomenal. So was my first homemade amp, ugly but full of push-pull. It could drive a good mono hi-fi system right now. So, you see, I had genuine fi at my very finger tips, in outward configuration and in the electronics, but never the sound. Typical of the Interim Hi-Fi Period.

Genuine, audible hi-fi—that is, the complete chain of elements—did exist



Illustration: Karen Barbour

right through that period, but it was confined to the lab. A number of famous labs and countless obscure or semi-private workshops, here and there, where vital experiments and R&D were carried on—radio circuits, pickups, microphones, many another crucial element. Brilliant work! Some of the dates are startling, if you have not run into them before. In very early 1931, *stereo sound on disc*, wide-range and still playable on today's equipment. That's 27 years before the stereo LP. Live, instantaneous, multi-channel sound transmission of symphonic music from hall to hall, Philadelphia to New York, wide-range. It had press coverage (I remember reading about it), but only a handful of souls heard the actual stereo music, coming out of a whole stagefull of speakers.

On a still smaller scale, there were individual experiments going on all over, hammering away at the details, link by link. Again, much of the result would now rate as hi-fi even if all such enterprises were plagued by the same old weakness—bottlenecks, restrictive links that kept us from reproducing a final hi-fi sound. A few brave pioneers—Avery Fisher, for example—even put their product on the market

back before WW II. But what did we have to play on it?

A curious time! For all the experiment, the actual sound of wide-range and clean hi-fi remained virtually unknown. During that period we did not ever achieve a chain of equal links, all the way, which could bring this sound out of the lab into public awareness.

The problem was not really in the quality of existing consumer equipment, limited as it was. What really mattered was that, outside of the lab and the experimental workshop, we had no signal of a grade that could activate a superior reproducing chain. The true "software"—that is, the actual material we heard on radio and records—was superb, of course. But the records themselves and radio were merely hardware, the first link in audio, and they were not good. Yet they were so extensively entrenched and widespread that change was difficult. No use having an improved consumer audio with nothing to play on it.

We had only the two sources: The good, old, familiar AM signal—noisy, often full of static and interference, limited in tonal range at best. And 78 records, also mostly noisy, full of scratch and hiss and ticks and worn-





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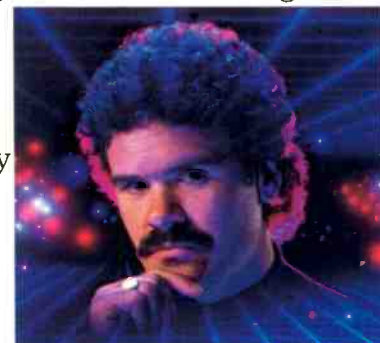
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The Interim Hi-Fi Period did produce genuine hi-fi, in the lab. But for all the experiment, the actual sound was virtually unknown to the public.

groove distortion, similarly limited in bandwidth. The rest of the chain simply fell in line. And we ourselves added the final link—"tone control."

Minus tone control, our sound was muffled. The useful top was perhaps 4 kHz, or less. But we automatically reached for the tone control knob, most of us, both for records and for radio, to get an even more mellifluous sound—the remaining highs extended perhaps to 2 kHz, at a guess! Peanut butter and molasses, a sound that was thick and unctuous with all the unpleasant noises removed. Very practical, indeed ingenious, under the circumstances. It served us well, just as soft cactus needles were practical in the Carnegie phonograph, which could reproduce a signal to 15 kHz with its pair of big tweeters. Needless to say, we never heard that 15 kHz. Purely idealistic—and typical of the Interim Hi-Fi Period.

We were told that we might enjoy reproduction up to 7,000 cycles or so, 7 kHz, from existing records, and on radio at its best—given, of course, the rest of the reproducing chain. I don't have exact figures. But this was talk. Some of the best records might have done even better, we now know. (At the end of the period, in 1946, London's frrr 78 shellac records were played on our New York FM station, full range.) Maybe the sound was there, domestic or imported, but we did not hear it. Until the very last years of the period, we were entirely accustomed to the Peanut Butter Standard: Not one person in millions knew there was anything else.

We liked it. We gave it our total respect. A whole communications complex was built upon it. We learned even to translate its garbled, sibilant-less speech into normal English, like learning a second language. When you came down to it we found the peanubuh-er found fuffifien for our fimple lif-fening need; for our well-rained earf, it made fenf, defidedly.

No wonder that any wider range reproduction sounded strange, and was instantly associated with all we hated—static, scratch, distortion. When we at last began to hear real hi-fi, we winced out of sheer habit, even though the nastiness wasn't there any more. It took a long time to calm our nerves

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We got so accustomed to muffled, sibilant-less sound that when we began to hear real, wide-range hi-fi, it sounded strange.

enough to accept good wide-range sound as pleasing.

And so one day in 1941, I came upon early FM and heard my first actual hi-fi sound. At last, just before war, there was the beginning of a genuine consumer hi-fi chain, complete, source to loudspeaker—at least in prototype.

You can understand why I rate this original low-band Armstrong FM, under the Major's direct supervision, as the first true consumer hi-fi. It was expanding, too, at a sensational rate. Then the war froze everything.

Earlier, when the famous Toscanini/NBC Symphony broadcasts were

launched (was it 1937?)—providing the Maestro with his own full orchestra, chorus, famous soloists, and a newly created super-studio in which to produce his music—we down in Princeton, a mere 60 miles away, had a thought: Why not play the concerts for our own university audience using that enormous Carnegie phonograph? It had power to overwhelm a live orchestra. We would bypass its weakest link, the old-style pickup.

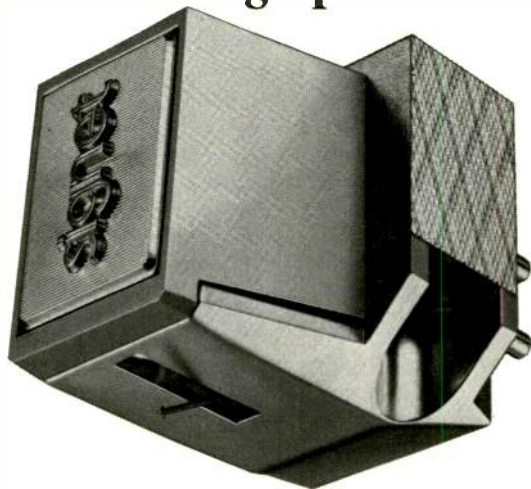
So we commissioned a radio tuner. It had to be custom-made; you could not easily buy such things. Was it TRF (tuned radio frequency)? Likely, though I did not then know the term. The TRF circuit could pass a nicely wide range of frequencies but it was not very selective. On a clear channel, such as NBC must have had for its New York "flagship" station, it looked to be good. And maybe NBC would send us their very best? If all went right, we might produce the hi-fi sensation of 1937.

But things did not go right. We were still deep in the Interim Hi-Fi Period. First, the NBC signal, when it came through, didn't seem very special though it was easily listenable. Why? Well, why not? Who needed wide range, for millions of listeners? Memory may be wrong here (ask a senior NBC engineer), but there was worse.

NBC, in its zeal, had spent fortunes on this series but, of course, within the thinking of the time. What Toscanini needed, they felt, was a modern, soundproof space instead of the (outdated) concert hall. I have no other explanation. It would be on a heroic scale, utterly dead in the current radio manner, just as close to an anechoic chamber as possible. No extraneous noise, it seems, was to be allowed to interfere with the pure sound of music—not even reverb, which blurs! An interesting concept. And that is exactly what they gave us in the revamped Studio 8H in New York's Radio City. So Toscanini's broadcast symphonies were symphonies in a closet full of blankets. An appalling sound, as we hear things now, though entirely well intentioned.

How little our people knew, back then, about "classical" music's most vital external ingredient, a mellowing, space-delineating sonic surround with

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We heard the Toscanini broadcast in a lecture hall lined with concrete, with no idea that the listening room is as important as the originating space.

the right reverberation. Miking for a large ensemble in a big space was still a new art and we tended to extremes of engineering enthusiasm. Acoustic deadness, beginning in the '20s, was the advanced wave of the time, if not of the future. Even in churches, designers were using fake "stonework" to swal-

low the sound. It took us many broadcast and recording years to learn better—that is, to reproduce "the best seat in the concert hall" complete with natural-sounding space.

Finally, down in Princeton, we made the ultimate goof. We projected our curious radio signal into the same con-

crete-lined tank of a lecture hall that we used for many of our music classes. Again, why not? We had not as yet any idea that the listening room is as important as the originating space for a good musical transmission. (Well, I was getting the idea, but the Music Department didn't give it a thought. They just wanted a convenient place with seats, to put people and equipment.) So what might have been epochal hi-fi in 1937 turned out to be very ordinary, if plenty loud. It was typical of the Interim Period.

Somewhere, I have one of the gilded program guides handed out to Toscanini's live audience in Studio 8H. It is printed on sheer silk—to reduce the noise of turning pages. Great idea! But what about a worse noise, audience coughs? They should have had sound-proof face masks, while they were at it. Let me tell you, an anechoic cough is extremely rude and intrusive, and for good reason: It sounds right next to your ear, spaceless, whereas a cough in a concert hall is out where it belongs, in the audience space, and so much less offensive.

One of the most excruciating of these Toscanini coughs came out on a recording, no doubt made during one of the live 8H concerts. (You can imagine the scene, a battery of four-minute disc recorders in relays, probably cutting wax.) This was the Beethoven "Eroica" Symphony, the one with the two big E-flat chords at the beginning, an impressive die-away after each. That is, in a proper concert hall. In Studio 8H, those chords had all the impact of two hefty strikes of a kitchen match on a matchbox. Zip. Zip. And wouldn't you guess, exactly in the dead silence between them a lady coughed.

That cough could not be removed. The records were released cough and all—and I had to play that cough for years, during the rest of my teaching career. Thus are the lessons of audio drilled in upon the suffering mind.

I should emphasize that the Toscanini broadcasts were indeed landmarks in radio history, and I do not mean to denigrate their importance. But we live with the times, and those times said *dead acoustics*. So that is what the Maestro got for his music. I doubt if he objected.

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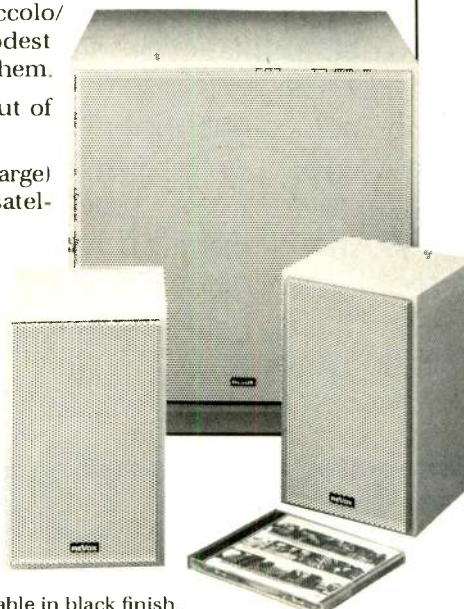
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## SHURE THINGS

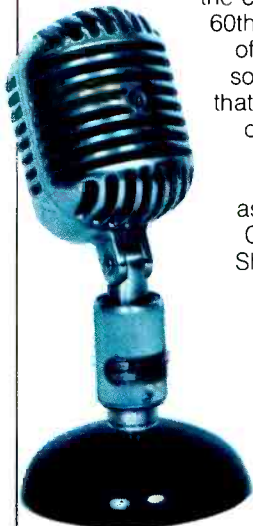
It is generally considered that the audio component industry became a substantial commercial entity in 1950. Even though that was only 36 years ago, few of the pioneering high-fidelity component manufacturers of that era have survived with their original corporate structures intact; McIntosh, Pickering, and Shure Brothers are three companies that immediately come to mind.

I thought I knew Shure Brothers quite well. So I was really quite surprised when I received a bulletin from them informing me that 1985 marked their 60th anniversary!

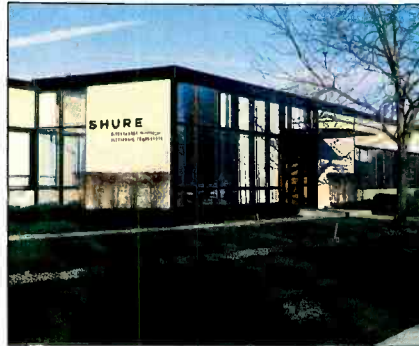
Some months before this bulletin arrived, I received a most interesting letter from Jim Kogen, long-time friend and president of Shure Brothers. In his letter, Jim noted the rapid expansion of the Compact Disc market and the threat this ultimately posed to the phonograph record. As a major producer of high-quality phono cartridges, he quite naturally was concerned about the future prospects of this important source of income for his company. Jim told me that while Shure would continue their research and development programs for phonograph cartridges, he thought it would be wise to diversify the company's manufacturing capabilities into emerging technologies, including Compact Disc hardware and specialized products for the blooming audio/video market. Recently, Jim invited me to visit the Shure plant in Evanston, Illinois in conjunction with the celebration of their

60th anniversary, and offered to show me some new products that are the first fruits of their diversification program.

Founded in 1925 as the Shure Radio Company by S. N. Shure, the firm was



*Shure's Unidyne, introduced in the late '30s, was the first single-element unidirectional microphone.*



*The corporate headquarters and main plant of Shure Brothers in Evanston, Ill.*



*Bert Whyte watching a Shure employee at a computer-controlled cartridge test station.*

at first a wholesale distributor of parts to the fledgling radio industry. In 1926, its name was changed to Shure Brothers after the founder's brother, S. J. Shure, joined the company. Then, after surviving the Wall Street crash and the lean times of the Depression era, Shure established itself as a microphone manufacturer with an innovative, two-button carbon microphone that outperformed the bulkier, heavier mikes then in vogue—and at less cost.

Ever since that first carbon mike, Shure has compiled a long list of firsts in the field of microphone design. Among the better known of these developments are the first modern noise-cancelling microphone (1937) and the world's first single-element unidirectional mike (1939). Shure had also developed a condenser microphone as far back as 1933—two years before introducing a crystal mike.

Shure has always been particularly proud of the testing and quality-control programs for its microphones. Because they built very rugged microphones and subjected them to severe environmental testing for extremes of temperature and humidity, the company was chosen to build special-purpose mikes for the armed services during World War II, and won three awards for excellence in fulfilling their military contracts.

Today, although most music lovers and audiophiles are familiar with Shure as a manufacturer of high-quality phonograph cartridges, few are aware that the company remains a major maker of many types of microphones for the broadcast, recording, and sound-rein-

forcement industries. Several models, notably the SM57 and SM58, have become the preeminent performing microphones for rock and pop concerts around the world, and also are widely used in recording. In an era when foreign-made condenser microphones are in vogue with many recording studios, new Shure condenser mikes are competing successfully and are developing a good reputation. Noted recording engineer Tom Jung, for one, often uses the Shure SM81 condenser microphone for his own Digital Music Productions CD recordings. Tom used the omni capsule of the SM81 to record the piano in his *Trio '83* recording, which has become renowned for the clarity, articulation, and natural quality of its sound. The success of the Shure condenser microphones has been very gratifying to the company. They are conducting ongoing research in this field, and I was shown prototypes of several new models.

It is only logical that, as a manufacturer of microphones, Shure would also produce a range of microphone preamplifiers and mixers. For quite some years now, Shure has advanced its circuit topology and manufacturing expertise in building microphone mixers whose sophistication parallels that of their microphone designs. A particular area of specialization is the manufacture of compact, rugged, portable mixers suitable for remote work and electronic news gathering.

The Shure plant, in a suburb of Chicago, is a large and modern building divided to accommodate administrative offices along with R&D laboratories





*Shure president Jim Kogen, who foresees diversification into emerging audio technologies.*

and production facilities. I was impressed by the fact that quality control—or, as they like to term it, “quality assurance”—seems to be of paramount importance, a goal pursued with almost missionary zeal. Each product department has a quality-control station outfitted with precision test instruments. Much of this is proprietary, purpose-built equipment specifically designed for special measurements. In recent years, computers have been introduced into the test program, saving time and achieving higher accuracy through simultaneous automated checking of selected parameters. Another way Shure maintains quality is by rigorously inspecting incoming parts from vendors and, where applicable, closely matching them for tolerances.

To ensure that all this quality control is not nullified by the often violent stresses of shipping, Shure subjects all of its shipping cartons and containers to a “torture test” on special vibrating shaker tables and tumbling platforms.

As you might expect, the Shure research laboratories are equipped with all of the expensive FFT analyzers, oscilloscopes, spectrum analyzers, signal generators, distortion analyzers, etc. that are such necessary tools for advanced audio technology. One laboratory, equipped with a Crown Tecron measuring computer, is devoted entirely to Time Delay Spectrometry.

With the more stringent demands of modern technology, Shure has made a heavy investment and commitment to the computerization of many of their activities. Thus, computer terminals are a common sight throughout the

plant. One department has an elaborate CAD (computer-assisted design) plotting board which greatly speeds up and facilitates the development of new designs.

Most audiophiles have been familiar with Shure Brothers' phonograph cartridges for many years. They have evolved from the early monophonic magnetic cartridges, to the famous M3D stereo cartridge, to the first of the legendary V15 series cartridges. Every few years since the inception of the V15 series, Shure's ongoing research has upgraded its performance capabilities. Thus, we have had the V15 Types II, III, and IV, and the current well-known V15 Type V-MR.

Shure's cartridge design objectives have emphasized high trackability with low tracking force for a minimum of record wear. They have always opted for a very flat frequency response and a very low level of distortion. In the area of trackability and record wear, Shure has done much original research, and several pieces, in fact, have benefited rival cartridge manufacturers. Most notable, perhaps, have been their studies of record warp frequencies and of maximum recorded velocities at various frequencies.

Virtually all of the Shure phonograph cartridges are based on the moving-magnet principle. Still, there is a certain segment of audiophiles who prefer moving-coil types and don't mind using step-up transformers or preamps to accommodate an MC cartridge's low output voltage. While this group of MC devotees is still large and quite vocal, Shure's latest development in moving-magnet cartridges has been converting some of its members.


Shure considers the new Ultra 500 phonograph cartridge their crowning achievement, the ultimate creation of all their years of research and development in moving-magnet technology. This cartridge is based on the design of the V15 Type V-MR, with some important modifications; the Ultra 500 is a “blueprinted” version of the Type V cartridge, created in a process somewhat akin to what is done with automobile engines in specialized, high-performance auto shops.

In Shure's phonograph-cartridge fabrication and assembly room, it was fascinating to observe the making of

the Ultra 500. Coils are wound with infinite care, with just the right number of wire turns. The thin-wall cantilever tubing, made of beryllium, is precisely fitted with the low-mass diamond MicroRidge stylus. All of this work is performed under high-powered stereoscopic microscopes. When the cartridge is fully assembled, it is fitted with Shure's carbon-fiber Stabilizer brush which acts as a sort of shock absorber, bleeds off static charges, and removes microscopic dust particles from the record grooves ahead of the stylus. The brush must contain the correct number of carbon fibers, which must be cut at a precise angle to achieve the desired performance.

The cartridge is next sent to the automated computer-testing station. Playing a special test record, each Ultra 500 must conform to a set of reference performance parameters or it is rejected. Automatic compensation is built into the computer to allow for wear of the test record. Finally, the Ultra 500 cartridge body is fitted to a precision-machined aluminum plate. This permits the use of Allen screws and wrench to afford ultra-rigid coupling to phonograph headshells.

The Shure Ultra 500 phonograph cartridge has caused quite a stir in audiophile circles. With its high output, its standard 47-kilohm load, and its ability to track the highest velocity record grooves while affording an ultra-flat frequency response, the Ultra 500 has made a fairly considerable impression upon moving-coil cartridge devotees. Because of its enthusiastic reception, the Ultra 500 has been in short supply. Shure is trying to increase production, but will not compromise its quality in order to make it more readily available.

*(Editor's Note: This is the first of a two-part column which will conclude next month.)* 

*The Model 40D, an early Shure condenser mike.*



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## MUSIC EX MACHINA



It is safe to say that all research and development in audio recording and reproduction since the 19th century has been a mistake—or at least an exercise in futility. The aim of that misguided science, simply stated, has been the encoding, storage or transmission, and decoding of audio information. Every technological advance (some valid, others dubious), from acoustical to electrical technology, from monaural to stereo, from analog to digital, has had the same goal: Reproducing sound with complete fidelity to the original signal. However, such a pursuit is doomed to failure, because such reproduction never exactly duplicates the original event.

Psychoacoustically, the impossibility is simple to explain. Aural information, even complex information such as that generated by musical stimuli, resides on a lower perceptual level than that resolvable by the ear. In other words, the limiting factor is the stimulus, not the ear. No matter how sophisticated the aural reproduction, its reproduced nature will always be evident to the listener in the same way that a photograph is never mistaken for its subject. Thus, the art of audio reproduction has attained the status of fine photography; we carefully compare and purchase

aural “photographs,” judging one to be more beautiful and lifelike than another, while never looking out the window to the reality beyond.

In purely historical terms, audio recording and reproduction are relatively recent phenomena. In the two millennia preceding the development of audio recording and reproduction, emphasis was on music *generating* devices, such as strings, lyre, bells, Aeolian harp, carillon, organ, Flottenuhr (flute-playing clock), Panharmonium, musical box, keyboard instruments and pianolas. Some richly complicated automata were widely used for music performances in lieu of human musicians. Programmed musical scores generated performances in real time, through purely machine methods. Bach, Handel, Mozart, Schubert, Haydn, Cherubini, and Beethoven composed works specially for such devices. Beethoven originally wrote his musically lean but financially plump “Wellington’s Victory” for Maelzel’s Panharmonium, a bellows-driven automaton instrument that sounded like a military band, complete with cannon and muskets. The notion of acoustically or electrically recording human musicians for playback never occurred to composers and music-lovers, as they

were content with directly generated, pure performances.

Seen in a charitable light, work in the audio field since Edison’s error has probably been a necessary and interesting endeavor, at the very least giving us something to listen to until more refined technology was developed. With recent advances, primarily in the computer field, we can now look forward to a return to audio’s birthright: Pure performance, unadulterated by recording and reproduction techniques. Using principles pioneered in cybernetics, artificial intelligence, digital electronics, and optics, the scientific community is developing pure-performance devices.

Maelzel’s Panharmonium, in fact, provides the prototypical model for new advances in pure-performance music machines. The workings of such systems are thus both classically simple and technically sophisticated. But most contemporary audio hardware must be discarded, because the laws of pure-performance machine theory are violated by encoding and decoding with acoustical transducers, and by informational storage (LP, CD, etc.).

In a pure-performance machine, the encoding and storage/transmission subsystems are consolidated. The only informational source—the only “recording”—required is the musical score itself. Using laser scanning devices, the musical notation is read into machine memory in real time as the performance takes place. The score itself can appear as coded information on CD-ROM or other storage media (including paper!), as long as no informational interpretation or condensation of the data is involved. A musical score already exists as an unusually concise form of storage, and laser scanning is a simple technology; the technical difficulties are small.

The decoding subsystem is more complex; because loudspeakers are to be shunned, original instruments themselves must be utilized for performance. Studies have shown that most listeners’ tastes in music are confined to one or a few idioms. Therefore, a pure-performance machine properly configured for a particular listener would require only that collection of instruments which suited his or her taste. Of course, software permits the



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## Principles of artificial intelligence have yielded robot players that can learn technique and develop proficiency, much as a human player does.

addition of other instruments. In the worst-case example, a listener would require all of the instruments of a Wagnerian orchestra.

Performance is accomplished by the playing of the instruments indicated by the score. Electromechanical units, not unlike the robots used in industrial applications, are the "musicians" that "play" the instruments, according to the musical directives of the interpretive software that acts as the "conductor." Special interpretive software could provide the idiosyncratic touches of great conductors, so important to the enjoyment of music.

To early researchers, a major limitation of a pure-performance machine was the human voice, in both solo and choral roles. It was first assumed that humans themselves would have to perform the roles, with robot accompaniment, but this severely limited the applications of a pure-performance machine. However, recent work in physiology laboratories has resulted in a mechanical throat/mouth, under computer control, that speaks and sings with accuracy and beauty rivaling that of human performers.

Similarly, the principles of artificial intelligence and so-called "expert systems" have been applied to the programming of the robot players. These devices are able to learn technique and develop proficiency in much the same way that a human musician improves through practice. The use of software based on the Suzuki Method has produced remarkable results, particularly in string-performing robots. Indeed, it has been suggested that the pure-performance machine of the future will uncover musical nuances never before heard from human players.

Early applied research into pure performance was fittingly accomplished with a solo piano. With sheet music input, a solenoid system operated the keyboard and pedals. Unlike early player pianos or pianocorder systems, the software could produce much more nuance: The system had interpretive powers, could learn from one piece to the next, and could apply newly acquired skills. The first robot performer without a keyboard was developed in the Music Engineering Department at the University of Miami. In 1984, a saxophone player named Iggy



Lirpa was constructed and programmed in both the classical and jazz idioms, complete with the ability to improvise riffs when appropriate.

Although the realization of a full pure-performance orchestra, with vocalists, is still several years away, recent work suggests that no insurmountable obstacles will be encountered. In Japan, a pure-performance chamber orchestra has already debuted, playing works by Brahms, Dvořák and Schönberg. Critics detected weaknesses in the technical abilities of the robots and compared their proficiency to that of a student ensemble—a not unfair or unperceptive observation. However, recently revised software has greatly improved the robots' proficiency. In all of these demonstrations, the advantage of pure performance has not been lost on critics or audience—again, music is being interpretively re-created without the veil of recording and reproduction.

The absence of the many distortions of recorded/reproduced music has encouraged entirely new perspectives on re-created music. For example, it has been pointed out that one significant (and overlooked) form of distortion is amplification itself. When music is reproduced louder than it originally was played, severe distortion has taken place. In a pure-performance machine, amplification is absent.

The future of pure-performance machines is exciting and filled with opportunities. Although the size and cost of such machines are currently formidable, projections have shown that a consumer model should be available by 1985. Further advances in miniaturization, including the utilization of new 32-bit microprocessors, and the acoustical reduction of the musical instruments themselves, suggest portable machines by 1984. In fact, some experts are predicting the obsolescence of conventional recording/reproduction systems by the year 1983. With an eye on the future, several Japanese audio manufacturing companies are already planning budget cutbacks in conventional audio research and development, and are putting together schedules to phase out the production of such equipment. Of course, they expect to expand research and production in the area of pure-performance machines.

While Japan and Europe have shown tremendous advances, the U.S. is lagging behind in the pure-performance market. Amid projections of a market worth \$7.6 billion annually by the year 1982, a powerful lobbying group has introduced, to the U.S. House of Representatives, a bill designed to spur domestic development of pure-performance machines. If passed, this legislation would outlaw the manufacture of recording and reproduction devices, and prohibit use of such devices except at specially designated historical sites. Clearly, the financial prospect of re-equipping American music lovers with entirely new technology will provide great impetus for research and development in this country.

To increase public awareness of pure-performance machine technology, demonstrations were to be held in shopping malls across the U.S. on April 1, featuring, appropriately enough, "Wellington's Victory." For further information, interested parties are urged to write the Lirpa Foundation, a nonprofit organization devoted to pure-performance research. Anyone donating \$1,000 or more to the foundation will receive a prospectus for buying vacation homes on Mars, because they are apparently the kind of people who will believe anything. **A**



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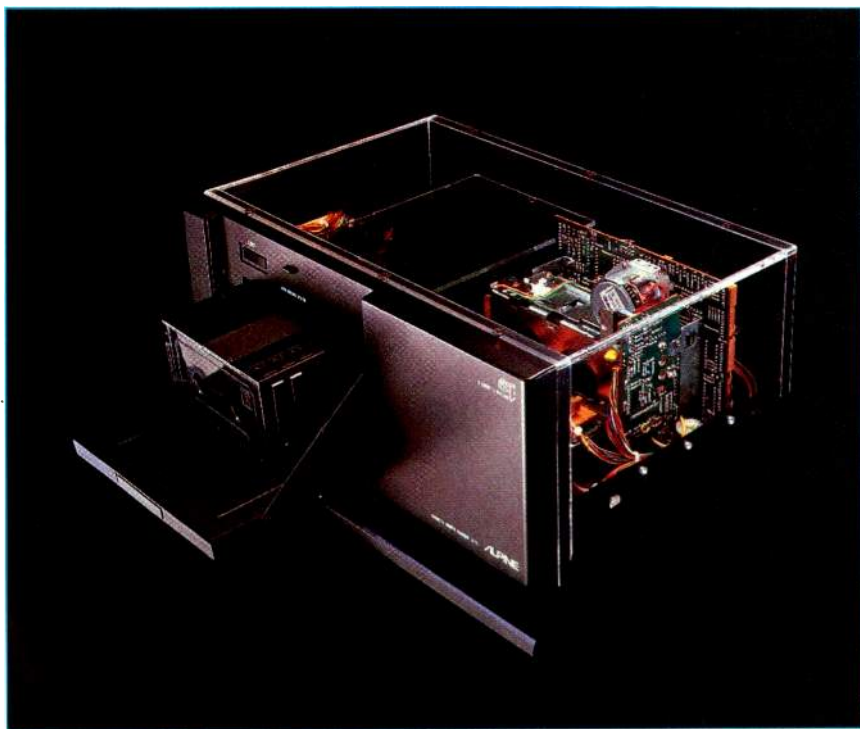
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## HEAD-UNIT TALES



*Time for a changer? Alpine's Model 7375 won't be the only one.*

**T**wo dominant car-stereo trends, the blossoming of in-car CD and a rash of theft-prevention measures, emerged at January's Winter Consumer Electronics Show. Neither was much of a surprise.

The more predictable trend was the wide recognition of CD. In-dash receivers with CD inputs were shown by Carver, Concord, Jensen, JVC, Mitsubishi, Proton, Sherwood, Soundstream, and Technics. Most have rear input terminals best suited for use with in-dash CD players; however, Proton's jack is in the front for use with portables. Jensen plans an adaptor to bring the input out to the dash for such use, and Parasound, Sparkomatic, and others offer such input modules as accessories. Since input jacks are both easy to engineer and cheap to incorporate, they may become universal on all but the least expensive head units.

More to the point, new players or prototypes were shown by Audiovox, Blaupunkt, Clarion, Denon, Fujitsu Ten, Hitachi (new to the U.S. car-sound market but well established elsewhere), JVC, Kraco, Mitsubishi, Philips, Sanyo, Sony, and Technics. These

come in addition to the previously announced models from Alpine, Kenwood, Pioneer, and Yamaha; nearly all fall into the \$500 to \$600 price range. Ford and Mazda have announced factory-installed players too (Ford's will debut on the Lincoln Town Car only).

The biggest news was Sony's CDX-A10 DiscJockey (\$1,000), the first CD changer for the car. Too bulky to fit inside the passenger compartment, the 10-disc changer mechanism and an optional \$130 tuner module mount in the trunk. The remote-control module for all this is the width and height of a DIN radio slot but only an inch or so deep. This makes it small enough to be stuck to the dash or other panels with Velcro and to be passed between front- and back-seat passengers. When the car is parked, the module can be hidden out of sight beneath a seat. If you want to integrate the system with your current receiver, Sony offers a switching box adaptor for \$30; extra magazines, holding 10 discs each, are \$20.

The CDX-A10 does not set trends as much as it proclaims them, uniting nearly all the interesting ideas found in

other car equipment at this WCES. (Even the idea of a rear-mounted changer appeared elsewhere, in Alpine and Kraco units—but more of them in a bit.) Combination CD/receiver units, for instance, aren't new—Sony introduced that idea a year or two ago. But the only combinations besides Sony's, so far, are the Denon and Kraco—both prototypes—the Technics CQ-PD5, and Sanyo's two new players, plus a model promised by Audiovox for later this year. (Kraco's, incidentally, will include a C-Quam AM stereo decoder.) Sanyo's two units pulled a switch on the CD-input idea described above, with input jacks for use with portable tape players.

Though the DiscJockey is the only car player to use multiple-disc cartridges, there are several players using single-disc ones. Clarion announced a player which would use the same disc magazine as Yamaha and JVC. ("This does not preclude other loading formats in future," said a Clarion spokesman.) Blaupunkt announced a magazine-load system too, but I could find no one who knew whether it was compatible with the system used by the other makers.

The DiscJockey is also among the first to offer that long-overdue car CD feature, a compressor. Sony's version offers two levels of compression (they call it "three-position," but one of the three is "Off"). Philips has one compression level in their DC085 (\$550), and Parasound announced the CDP-2 external compressor which is designed to match their CDS-1 front-panel input module.

Philips' other CD player, the CD10 (\$400), is actually a portable which teams up with a DIN-sized dash-mount drawer that holds it in place, hooks it to the car's sound system and battery, and adds fader, balance, bass, and treble controls plus a conveniently big volume knob. Once removed from the dash mount, the CD10 can be powered by a portable battery pack or a clip-on a.c. converter. The player's loading system (open the drawer, lift the lid, drop in the disc, lower the lid, and push the drawer in) is less convenient than the usual in-dash slot-load system, but for many users its ability to double as a portable should outweigh that drawback.



# If you can't afford it, spare yourself the heartache of listening to it.

We are all aware that money aside, it is an easy matter to upscale our quality of life, but difficult to lower it. In this regard, ignorance is bliss and strict abstinence is sometimes better than a taste of something finer that we can't have. So it is with Concord high-fidelity, high performance car audio. One listen, one taste, will significantly alter your demands for mobile high-fidelity.

Uncompromising performance; the Concord story begins and ends with it. Concord's performance engineering over the years has resulted in a list of mesmerizing characteristics that, as you become aware of them, will change your perception of car stereo.

For instance: A sound critics claim is the best they've ever heard in a car stereo—home high-fidelity sound. □ Superb stereo imaging, wide band frequency response, and very low distortion levels are just some of the qualities of Concord's exclusive Matched Phase Amorphous Core Tape Head.

□ Electronic DC Servo tape drive for extended life and accurate control of tape speed. □ A cleaner sounding FM than you ever believed possible, thanks to the exclusive Concord FNR FM noise reduction system. □ High powered inboard amplifiers—rated at 50 watts—and the ability to simply plug in external amplifiers for additional power.

A few of the features found in the HPL 540 shown here are: Dolby B and C noise reduction systems, tuner/tape switch, tape search, and the smooth convenience of full logic tape controls. The ergonomic design insures easy operation of all functions.

One listen to all of this and you will be exhilarated, and if you've read this far you are no longer blissfully unaware. Your taste has been improved. If you can afford it, you already *deserve*, and probably *demand* the best in design, engineering and of course—uncompromising performance.



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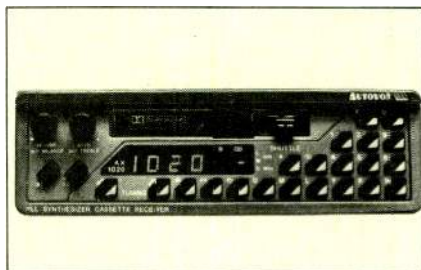
Many manufacturers have head units or housings that you can unplug from the dash and carry with you. Take that, thieves!



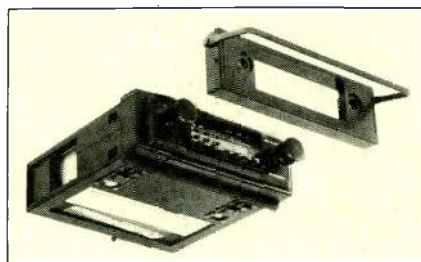
Sony's in-trunk CD changer uses this compact remote control.



Now you see it, now you don't. The Philips CD10 slides into the dash after loading—or comes out, for portable use.



Autovox's security special: Built-in removability, plus an optional alarm that protects the entire car.



The ultimate in security may be to take your stereo with you. This Stereoschuttle housing system adapts existing radios.

### Keeping It

With its portability, the Philips CD10 also fits in with the second major trend I mentioned earlier—theft-resistance. So, in a way, do the in-dash units with inputs for portable CD or tape players; the portables, at least, will usually exit the car when you do, leaving only the in-car portions vulnerable.

The most common way to get around that vulnerability is to make in-dash units removable too. Accessory boxes for this purpose have been around for several years, with Metrix and Caltex now joining Bensi and Stereoschuttle in this field. Using their head start wisely, the latter two showed interesting innovations: Bensi now has models with 20 circuit connections, for CD players that have both inputs and outputs (so they can be hooked between the head unit and amplifier); Stereoschuttle has a box that will fit into a DIN car-stereo slot without having to cut into the dashboard. All of these makers offer models with batteries to keep clocks, anti-theft circuits, and tuner-preset memories alive; most also offer carrying cases (some with battery packs for portable use) and a.c. power supplies so the head units can be used when you get them inside the house.

Removability has become so popular that a growing number of head-unit manufacturers are designing it into their new models. Autovox makes all its units this way. (Like Bensi, they're from Italy, where the car-stereo theft problem apparently surpasses even Boston's or New York's.) Kenwood, whose KRC-626 was one of the first removable car stereos in the U.S., has now replaced that with the KRC-636 (\$539) and added a still fancier pull-out, the KRC-838 (\$639). Denon's CD player and DCR-5420 receiver (\$430), Soundstream's two new head units, and a forthcoming Carver head unit are also removable. If head units will now be coming with removable sleeves, what will the sleeve-makers do? Stereoschuttle, for one, will be making its own removable head units, with a \$300, analog-tuned unit coming and possibly a \$400, digitally tuned unit as well. Pull-out handle assemblies and extra sleeves for use in other cars are optional for most makers' removable head units.

A less extensive trend is to make the thief's job harder by mounting the stereo in the trunk (see February "Road-signs"). In addition to Sony's CD changer, there were two trunk-mounted changers for cassettes shown at the WCES. Alpine's 7375 holds six cassettes and includes an AM/FM tuner, with the control head and changer linked by fiber optics. Kraco, who had previously shown a trunk-mounted cassette-changer prototype without a tuner, now showed an AM/FM version. Theoretically, single-cassette receivers with wired remotes (such as Sharp's RG-F870, whose infrared remote can either be used as a wireless unit or be "wired" by still more fiber optics) could be trunk-mounted too. But this would probably be done only in cars with fold-down rear seats that allow some access for changing tapes.

Equipment in the trunk is not invulnerable. But while the sight of speakers tells a thief that there's a stereo *somewhere* in the car, he must still figure where to strike. If the speakers are painted to match the car's interior or concealed altogether by a custom installer, the thief doesn't even have that much to go on. So, although a glance at the dash tells him whether it's worth breaking into the car itself or not, a thief who breaks into a trunk usually does so on a hunch. True, petty criminals often do just that, but when they do, they're mostly looking for *anything* that isn't tied down, not specifically for stereo gear.

Another approach is to make the stereo unusable if stolen, requiring the user to input a secret code on the station buttons any time the unit has been disconnected from its power source. The idea seems to have come from a U.S. company called Kaish, was first built into a car stereo by Nakamichi, has since been adopted by several car companies (BMW, Mercedes-Benz, and Saab), and showed up at the CES in units from Carver and Philips. As I've said before, this won't prevent theft until all thieves and their prospective customers know about it. Otherwise, it will only give people whose sets have been stolen the rueful knowledge that the ultimate purchaser wasted his money, even if the thief made out okay.

A better deterrent is to link the stereo



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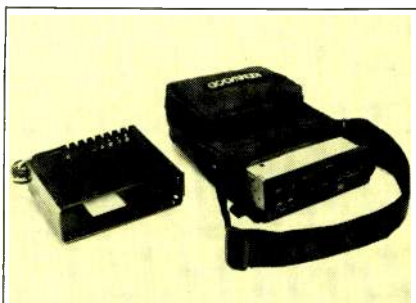
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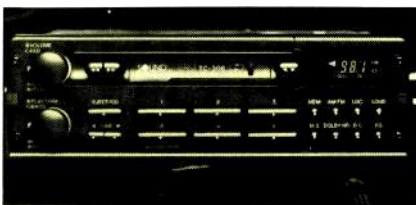
Nakamichi's emphasis on tape azimuth has inspired Kenwood, Fujitsu Ten, Philips and Soundstream, each with its own angle on the subject.



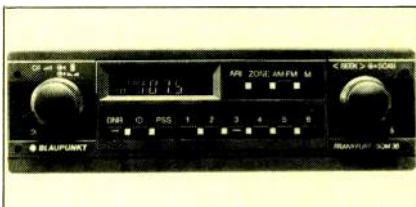
This Kenwood comes with its own slide-out housing (left), but the carry bag is optional.



With compression for all: Parasound's CDP-2 compressor matches its input module for portable CD players.



The jazzily styled Soundstream TC-308 allows users to compensate for tape azimuth problems by tweaking response. The unit also is removable, and has a CD input.



With loads of features, Blaupunkt's just plain radio (no tape) is still fancy.

to an alarm system. That idea started with JVC but has now spread to Hitachi, Autovox, and Sanyo. Hitachi's system simply causes the car's horn to blow if their CKS-350A head unit is removed from the dash. Sanyo's Viper system, introduced last year and now extended to more models, sounds the horn at 1-S intervals if the radio wires are cut and disables the car's ignition unless a security code is punched into the radio buttons. Autovox's "Untouchable" is the most elaborate system (just under \$700 for the alarm alone). It protects the whole car, with glass-break and impact sensors, hood and trunk switches, ignition kill, flashing LEDs, and an optional siren.

Just covering the stereo inconspicuously can discourage some thefts, and costs but little. Various models from Hitachi, Kenwood, and MGT take that tack, while Scosche and Incognito offer cover-up accessories.

Eventually, someone will come up with a total theft-prevention program, where the stereo will be trunk-mounted but removable, will remind you to take it when you leave, will require a security code if re-installed, and will be hooked to an ear-shattering alarm. If you then fill the car with water, stock it with piranhas, and park it in your living room, that should probably work . . . most of the time.

#### Mini-Trends

Nakamichi's emphasis on azimuth control seems to be rubbing off on other makers. Systems which adjust the head angle for each tape direction are included in several auto-reverse models from Kenwood, Fujitsu Ten, and Philips. Soundstream's TC-308 (\$579) and TC-305 (\$449) compensate for azimuth losses rather than correcting alignment; they use the Playtrim system, previously introduced in NAD home decks, which lets the user tweak response to offset the high-frequency roll-off resulting from an azimuth mismatch. Both Playtrim and the azimuth-adjustment systems not only improve overall frequency response, but, since their action precedes that of the Dolby NR decoder, improve Dolby NR tracking accuracy as well.

The number of station presets on car stereos has been growing over the years, from five (AM and FM, mixed) to

18 and even 24. Those high numbers involve three stations per preset button (two FM and one AM) and a switch to select which set of stations is on call. Travelers can therefore leave their local stations in one bank of FM memories and reset a second bank for each new area they visit—a bit of a nuisance for people who are only passing through. So Carver and Philips have a button which stashes the home stations in a second memory, then automatically reprograms the buttons for whatever stations are strongest in the car's current location.

Clarion and several other makers have expressed interest in the FMX system for FM broadcasting and transmission, which was developed by the CBS Technology Center. But so far, the only announced product to include it is an NAD home tuner. Stations using FMX transmit a companded L - R signal, 90° out of phase with the normal L - R signal. Ordinary tuners ignore this added signal, but tuners with FMX decoders use it to reconstruct a stereo signal that's as noise-free as a mono signal normally would be at that reception distance.

Blaupunkt introduced the first high-end radio (no tape) head unit that I've seen in years. The Frankfurt SQM 36 features bidirectional seek, all-station scan, scan of the stations in the 18 preset memories, and ARI traffic-information reception (now on all Blaupunkts). At first, I thought the Frankfurt might be aimed, in part, at users of tunerless CD players, but the absence of a CD input plus the presence of a 30-watt power-amp section (four channels, 7.5 watts each) suggest otherwise. There are, however, preamp outputs, so the Frankfurt can be used with an external CD player and a separate amplifier.

Head units from at least four companies (Denon, Fujitsu Ten, Kenwood, and Technics) now can be illuminated in different colors, to match the user's dashboard or tastes. The color is selectable from the front panel of the Fujitsu and Technics models, while Denon's color is set when the unit is installed.

Next month, if our Car Stereo Directory leaves room enough, I'll cover the new trends in amplifiers, equalizers, speakers and such.



RECORDING



## To hear why George Benson records on Sony Digital equipment, play him back on a Sony Compact Disc Player.

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That's why George Benson, creator of *Breezin'*, the best-selling jazz recording in history, has decided to invest in digital equipment.

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**Presenting the Sony Discman,<sup>™</sup> the world's smallest portable compact disc player.**

Hardly larger than the disc itself, the fully programmable Discman\* D-7DX comes complete with carrying case, headphones and a rechargeable battery. Everything you need for digital audio on the go.

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\*Headphones included with D-7DX only.

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## COUNTERPOINTERS



### Pointers from the Pointers

After the latest Las Vegas Consumer Electronics Show was over, and I didn't need my hearing anymore, my wife dragged me, kicking and screaming, to a rock show—The Pointer Sisters.

The show's sound seemed a bit distorted at first, until I stuck my fingers in my ears to lower the perceived level. Thereupon the sound became clean and the lyrics understandable, but the highs disappeared. Resting my fingers loosely over my ears cut the attenuation from about 20 dB (or so I've been told) to an estimated 10 dB, restored the treble, and still left the sound distortion-free. Obviously, my

ears were distorting and the sound system wasn't—pretty impressive performance on the latter's part.

This was by no means the loudest live music that I've heard. A performance by Flo and Eddie at a Long Island cafe, a few years ago, was so loud that blocking my ears loosely didn't help. And I'd estimate a performance by a Woody Herman band I heard a few years back was closer to Flo and Eddie's sound level than the Pointers'; the difference was that the Herman band only hit that volume level now and then. Flo and Eddie were more relentless.

The high bass levels from the Pointers' backup band didn't bother me, but the high treble levels from the

voices and synthesizers did. Unfortunately, cutting down the treble would have left the performance musically unbalanced, while cutting levels overall would have diminished the excitement, especially by cutting the gut impact of the bass. My personal solution, next time, will be to use earplugs to make the levels more tolerable to my ears without diminishing the bass impact sensed by my larger surfaces. I did start wondering, though, about the others in the audience (at Las Vegas hotel prices, they were mostly middle-aged, like me, not the impervious-eared young). Were my wife and I the only ones to feel discomfort?

And yes, there will be a next time for me. Rock concerts are fun, especially when they're short enough to leave me merely wincing, not reeling, from the sound levels. And besides, it would be too much to expect a Las Vegas hotel to present, say, the Fitzwilliam Quartet (or even the Modern Jazz Quartet) for my delectation.

Incidentally, I erred when I described rock performance mikes (February 1986 "Spectrum") as omnidirectional. They're quite directional, almost invariably cardioid or hypercardioid. I'd like to thank sharp-eyed readers Jim Rockford and Rick Chinn for noticing.

Illustration: Michael A. Donato

### Editor Auditions

Those of you who wonder what an *Audio* editor sounds like will get a chance on Sunday, April 13, when John Sunier's radio show, *Audiophile Audition*, airs an interview with me. Taped during the Winter Consumer Electronics Show, the interview is about the recently published book, *The New Sound of Stereo*, which I wrote with Hans Fantel. The show airs on Sundays at 2 p.m. Eastern time, though its broadcast is delayed on a few of the 115 or so stations that carry it (all public radio, save for commercial stations in Dallas, Phoenix and San Diego). Unfortunately, I probably won't have a chance to hear it myself, since none of those stations are located in the New York City area.

### Coda: Herb Horowitz

Industry pioneer Herb Horowitz died in his sleep on December 13, 1985. Horowitz, who served as president of the Institute of High Fidelity from 1969 to 1975, had recently celebrated his 30th year in audio by becoming vice president for special projects of Koss Corporation.

He began his audio career in 1954 as chief engineer for audio products at CBS Columbia, moving in 1956 as chief engineer to Electrosonic Sound Laboratories (ESL), then the U.S. marketer of Ortofon cartridges. In 1958, he helped to found Empire Scientific Corporation and served as its president from that date until 1975, when he left to become director for special projects at Harman International.

Based in London during that period, Horowitz became a familiar figure on the European audio scene and an expert on international marketing of hi-fi components. In 1977, he was named executive vice president of Teledyne's Acoustic Research subsidiary, a position which drew on his engineering and marketing talents.

In recent years, he was president of Rotel of America, a marketing consultant on international affairs for Cerwin-Vega, and executive vice president of Ortofon's U.S. company before joining Koss, first as a management consultant, later as vice president for special projects.

(Reprinted with permission from the January 12, 1986 issue of *Consumer Electronics Show Daily*.)



# This one works in the studio.



# This one plays at home.



Yamaha's newest high-end CD player has a split personality. In its CD-2000M version, with rack-mount adaptors and balanced line outputs with XLR connectors, it fits right into recording studios and broadcast applications.

In the CD-2000 version, we've taken away the adaptors and studio outputs. But none of the performance.

And performance is what the CD-2000M and CD-2000 are all about.

Both have unique vibration-dampening feet and special Vibration Damping Circuit Assembly to eliminate vibration-induced modulation which can degrade the audio signal. 3-beam laser pickup with Auto Laser Power Control circuit for precise tracking accuracy. And high-grade double-resolution digital output filters for reference standard reproduction purity.

In addition to all the expected fea-

tures, both have some unexpected ones. Like variable output level to correctly match the output level with other system components, and act as a remote volume control. Gold-plated connectors. And full-control wireless remotes.

But the most unexpected feature is one found only in Yamaha CD players. And that is our century of experience in making the finest acoustic and electronic musical instruments. It is our musical ears as well as our technological mind that give Yamaha audio equipment a musicality that goes beyond specs. It's a commitment you can hear.

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# The Lirpa Turbo

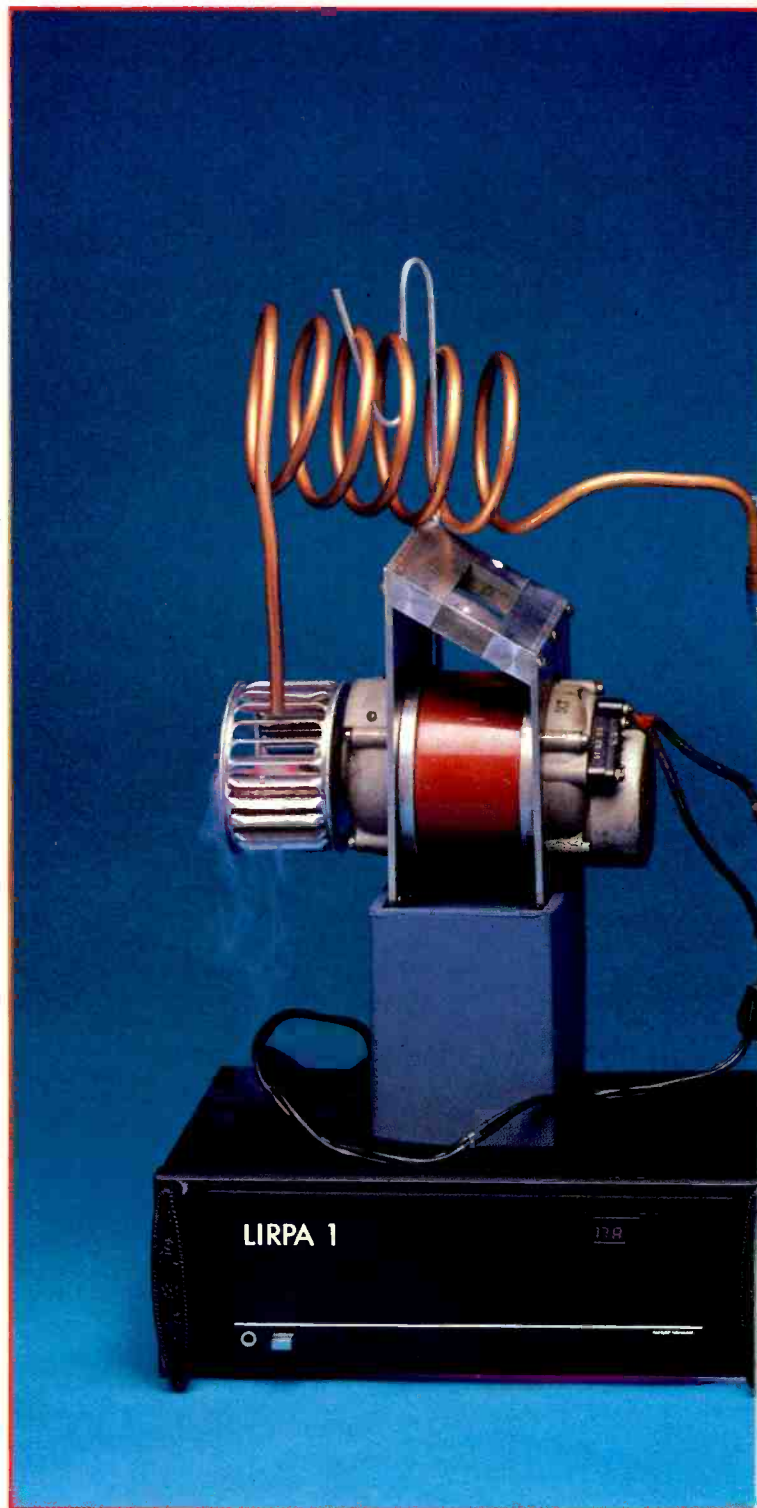
## Finally— A Turntable With No Rumble

**S**ince certain of my unique concepts may have suffered at the hands of commentators and testers less technically qualified than I, and because my latest project is still only in prototype form, I have chosen to describe this invention and its advantages myself, with *Audio's* Technical Editor acting as my translator. (I appreciate the difficulty of his task, as the technical terms available in my native tongue deal chiefly with the husbandry of goats and the fermentation and distillation of spirits. The latter, in fact, served as direct inspiration during the developmental stages.)

In technology, there are two main roads to advancement: One is to pioneer new areas, as has been my practice in previous Lirpa Labs projects. The other is to raise existing technology to hitherto-unknown peaks of refinement. While the latter approach does not hold open the door to the future as does the former, it builds on a more solid foundation, avoiding the crudeness common to new developments. Advancement of the tried and true yields less spectacular performance, but more reliable products. We at Lirpa Labs are renowned for our originality, but we never use more of it than necessary, as even our competitors attest.

A turntable's function is essentially mechanical, and mechanical systems have reached a high plateau of refinement from which to advance. Accordingly, as well as from a sense of historic appropriateness, I have chosen to drive my new Model LST turntable with a well-proven mechanical force, one which was available even to Edison (though his preoccupations blinded him to it). Next to clockwork, it is perhaps the most time-honored of technologies: Steam.

Consider the basic advantages. Unlike alternating cur-



Prof. I. Lirpa



# Steamtable



Diorama and Photograph: James Nazz

# MEMORANDUM

From: The Editor  
To: The Technical Editor  
Date: April 31, 1986

RE: The Lirpa LST

Please check this translation again. I believe that the portion dealing with Compact Discs has been left out. We had a call from a marketing associate of the good Herr Prof. Doktor (and you know how that Roumanian phone system is), but he seemed to be saying that the LST is a dual-porpoise machine in that it can play both CDs and LPs. Dr. Lirpa has developed a strain of miniature porpoises and trained them to do any one of 16 bits at a rate of 44,100 times per second. Now, as you know, porpoises breathe air but require a moist environment, so what better place than the 100% humidity, mini-clean tank of the LST? With their supersonic hearing, they can easily read the CDs' codes properly, and they have what is essentially a built-in error-correction mechanism. And, of course, not having arms, porpoises are not subject to the Deltoid Digital Dementia described by Dr. Diamond.

**AFICIONADOS OF TUBE electronics will like the steam turntable—not only its cheery warmth, but the fact that the boiler is itself a tube device.**

turntable base or mounted separately. A window below the boiler allows the glow from the heat source to shine through the water reservoir, so water levels can be checked easily; the glow also acts as a pilot light. A safety device, fairly standard on steam engines, shuts off power when the water level sinks too low. (Here is yet another advantage of refining earlier technology: For this I was able to use off-the-shelf hardware, cutting months off my development time!)

The heat source itself may be electricity or a fossil fuel. I would suggest alcohol, as it burns clean and is widely available, but the boiler may be modified for other fuels on special order. We do not recommend coal for home use, because of the dust problems. Nuclear sources, while raising sufficient heat, are not advisable for U.S. installations due to the red tape involved in clearing one's home plans with the Nuclear Regulatory Commission and because of the financial sacrifice involved in abandoning one's home, after 20 years of use, for a century of cooling off. People living in countries with little regulation of (and large amounts of trade in) isotopes may consider this semi-nomadic existence a small price to pay for a turntable that is truly rumble-free.

## The Drive System

Motive power is supplied by a turbine which is integrally cast with the bottom of the platter. To avoid "cogging," steam is fed to the turbine blades at many points around the periphery, while waste steam is collected at the center of the platter for re-use in various ways which I will shortly describe. To further stagger the power impulses and assure great smoothness, the number of steam-feed points must not be an integral factor of the

rent, steam is a continuous force, requiring very little in the way of smoothing out of power pulses to obtain even drive. There is no chance of hum pick-up by the cartridge, leads, or amplifier, since no electricity need be involved in the drive system.

The design is ideal for portable use too. No batteries are required; the LST can run on many types of fuel. At a picnic, for example, the boiler could be fired by the burning of twigs, used paper plates, and leftover tidbits which would otherwise litter the locality. And the boiler's excess capacity can be used with an optional generator to power a small amplifier.

Let me hasten to add that I am well aware of the pulse problems involved in reciprocating steam engines. That technology is, however, not so much well proven as obsolete. My turntable is driven directly by an integral turbine, a type of drive whose smoothness and efficiency have been proven since approximately 1894. But let us begin at the beginning.

## Power-Generation Stages

Aficionados of tube electronics will feel much at home with the steam turntable. Not only will they once again experience a cheery warmth, but they will discover that the boiler section is itself a tube device. It is, in fact, two such devices: The first section is a steam-tube boiler, allowing fast pickup from a dead stop to any desired speed. Once full speed is attained, the second or fire-tube boiler takes over to provide more steady power for long hours of play.

To ensure quick warm-up to operating temperatures, the boilers themselves are made of copper—oxygen-free copper, in fact, whose sonic virtues are well known. For safety, the boilers are wrapped in piano wire. We intend to provide them factory-wrapped with Bösendorfer wire, for extra bass, but Steinway, Baldwin, Yamaha, Bechstein, and Kawai wire wrappings will be available on special order for those who prefer their sound.

The boiler may be placed within the



number of turbine blades; in other words, the number of blades cannot be evenly divided by the number of feed points. (I have experimentally settled on a ratio of 3.141597:1.)

For speed regulation, the traditional ball governor is used. Separate governors are provided for each record speed, and they are mounted atop the spindle for easy interchangeability. In single-speed models, the governor is placed within the base.

### Subsidiary Steam Uses

In the preceding section, I should have put the phrase "waste steam" in quotes. For, in the tradition of my revered ancestors, who used every part of the goat except the beard (which I myself use for a record brush), I have seen to it that the steam in this turntable does *not* go to waste after its first use as motive power for the platter.

To begin with, while the steam is still relatively fresh and at a fairly high temperature and pressure, it is injected into the turntable bearings, where it provides an "air-bearing" effect without the air. The turntable is, therefore, friction-free and self-supporting. Furthermore, the height of the platter can be regulated by adjusting the steam pressure, allowing cartridges of different heights to be used without having to reposition the arm. This bearing/suspension system is totally rumble-free, and the slight residual hiss it produces is quite pleasant, providing old analog listeners with a sound they may have come to miss in pressings from new digital masters. Since some tonearms have air bearings too, a steam outlet is provided near the tonearm base, allowing the use of such arms without auxiliary (and noisy) air compressors.

The cueing device is a steam-powered dashpot, actuated by two valves. One, a manual control on the front of the turntable plinth, is used for conventional raising and lowering. The second valve is controlled automatically by an arm-position sensor, to lift the arm automatically at the end of each record side—another advance for modern steam technology! The automatic arm-lift can also operate an optional steam whistle to signal when the side has ended, a great convenience if you leave the room while dubbing records onto tape.

A small steam jet in the tonearm rest automatically cleans the stylus whenever the arm returns after playing a record. As the arm is removed from its rest, the same steam is diverted through a small venturi, to create a vacuum which removes from the stylus any condensed steam and any stubborn dust that remains.

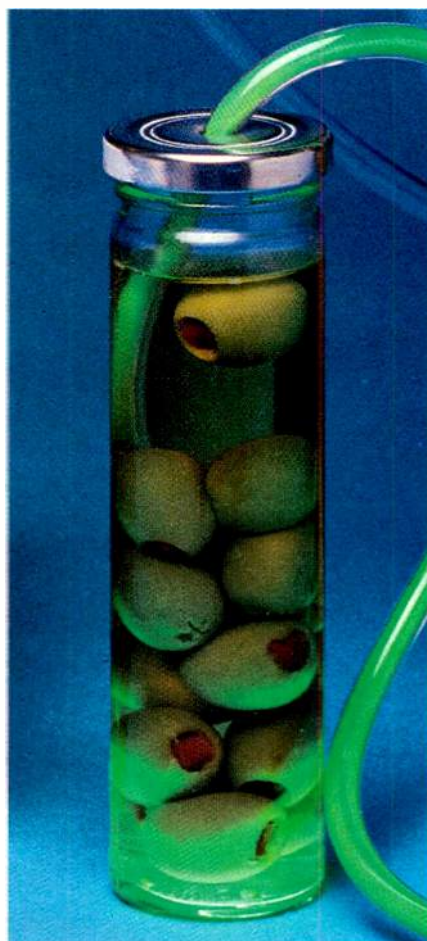
I considered constructing an arm with integral steam jets. This would discourage meddling with the arm during play by raising its temperature uncomfortably, thereby achieving the oft-cited but never-achieved goal of vicious damping. More important, it would allow the groove and stylus to be cleaned continually during play. This idea was quickly rejected, though, because of the well-known dangers to the record surface from "wet" play, and because we have rendered such continual cleaning provisions forever unnecessary.

This is because, after the subsidiary uses I've described, steam is vented into the dust cover. This has three sterling and unique advantages: First, the water vapor renders the atmosphere within the dust cover conductive, eliminating any possibility of static electricity. Hence, remarkably little dust is attracted to the record.

Second, there will be no dust in this enclosure for the record to attract. The steam—a distillation product, absolutely free of contaminants—is vented into the enclosure at slightly more than atmospheric pressure. As the steam flows in, normal contaminated air is forced out and the enclosure becomes a miniature clean room, similar to those used in the production of Compact Discs or ICs.

Finally, this steam pressure holds the record flat, in intimate, well-damped contact with the platter. The platter has air passages similar to those in vacuum turntables. These passages lead, however, not to a vacuum pump but directly to the outside air below the turntable base. The pressure differential which holds the record down is not caused by normal pressure above the disc and a vacuum below, but by high pressure above the disc and normal pressure under it. This eliminates all chance of plasticizers being leached from the disc by the vacuum. In addition, the amount of

**HEAT MAY COME FROM any type of fossil fuel, but I wouldn't recommend nuclear; you would require about a century to cool off, and that might not be worth it.**



hold-down pressure can be regulated by the user, thanks to a front-panel knob which controls the release of steam from above the record to the passages below.

Drain water from condensation goes into a gutter around the inside of the plinth, to be recycled, used for watering goats, etc. As this water is distilled, it can also be used in record cleaners and steam irons.

*Translated by Ivan Berger*



# Detroit Steers Collision Course ON CAR STEREO

David Lander

**F**reedom of choice is a principle as ingrained in the American fiber as any tenet of these times. Yet, when it comes to car audio equipment, the American consumer's freedom to choose from a wide variety of source units, speakers, amplifiers, and related gear may soon be curbed substantially. Those posing the threat, charge aftermarket auto-sound manufacturers, are the car makers.

In the past decade, the automotive audio aftermarket, that segment of the audio industry dedicated to hardware installed after a car leaves the factory (or, in the case of some imports, after it leaves a port-of-entry installation facility), has flourished. Increasing interest in home hi-fi has rubbed off on mobile sound, and better hardware can now be found in more cars, vans, and trucks than ever before.

Recent growth notwithstanding, all has not been rosy in the land of aftermarket auto sound. Competition from





within has increased overwhelmingly since the waning days of the previous decade, when home audio sales tumbled and one hi-fi manufacturer after another sought to improve its fortunes by rolling out car-stereo lines. Fred Deutsch, a former marketing vice president at Clarion, counted 26 aftermarket suppliers when he joined that firm in 1980. At the time he left last year, Deutsch, now an independent consultant, said that tally had risen to 88 brand names, produced by 75 manufacturers. "Those are the people who advertise," he was quick to add. "I'm not including those who don't."

In a marketplace where, as Deutsch puts it, "the competitive level has gone from fierce to deadly," leading suppliers of aftermarket auto sound are forced to spend an increasing amount of time watching their backs while trying to plan for the future. Yet the demons that really trouble the industry lurk elsewhere; the stuff the aftermar-

ket's collective bad dreams are made of can be found in the board rooms and engineering departments of automobile manufacturers from Detroit to Tokyo.


If the makers of cars have been slow to feed the growing American appetite for car hi-fi, the category's climb has hardly escaped them, and they're now moving to catch up. "It's become a serious business," Deutsch remarks. "They're not going to let the aftermarket steal it." Al Mattaliano, assistant general sales manager for field sales and marketing at Delco Electronics (the General Motors division that produces entertainment and comfort systems, car electronics, and semiconductors), confirms this. "Music systems help attract young buyers," he comments, "and we're all trying to get those young buyers into our cars."

Another factor underlying auto manufacturers' intensified assault on the car audio market is the high profits

auto-sound systems yield. Deutsch, who cut his marketing teeth at Ford before moving to the aftermarket camp, claims the two most profitable options for the car companies are air conditioning and entertainment systems. It is worth noting that, while a healthy (if not booming) aftermarket in car air conditioners once existed, it is now substantially diminished.

Sales estimates are often little more than guesswork in the auto-sound industry, which has no formal reporting system. However, the Electronic Industries Association last spring released results of the third in a series of biennial surveys which, when compared, are revealing. They show that the car audio aftermarket has begun losing share to the car manufacturers, and suggest this decline is accelerating. In 1980, according to the first of these surveys, 67.9% of purchasers bought AM/FM/cassette players separately from their vehicles. The results of the EIA's 1982





survey showed that percentage had dropped, but only slightly, to 66.3%. In 1984, however, a similar study found that number substantially diminished; it had slipped to 55.5%.

Kent Friedman, president of CMC Corporation, a multi-state retailer specializing in car audio, feels the increase in factory-system sales could be "attributable to the tremendous increase in new car purchases in the United States in that period." Friedman points out that there tends to be an inverse relationship between new car sales and auto-sound aftermarket purchases, many of which are made to upgrade vehicles people intend to keep longer than they had originally planned.

Friedman does not dismiss the threat which factory auto-sound systems pose to the aftermarket. Nor does he condone pricing practices which the aftermarket decries but which are commonplace among car makers. Under such policies, buyers may end up paying, at least in part, for radios that—at their request—were never installed. Buyers may also be paying more than the stated price for optional upgrades they have ordered.

While an increasing number of new cars include some form of radio as standard equipment, only some models are covered by a "delete" option. When exercised by consumers, this option allows them to order a vehicle without a radio and deduct a specified amount from the price. Few car buyers, however, actually sit down at dealerships, list desired colors and options, and then order cars from the factory. Most buy vehicles that are in stock, and, should these already have radios installed, dealers are reluctant to remove them. In only a few instances can a dealer return a radio to the factory for full credit; more often, he must swallow the cost and shelve the unit, or swap with the factory for an upgrade model, pay the difference, then add the unit to his parts inventory.

When cars with a delete option are ordered by people willing to wait for delivery, the discount these patient buyers reap can be less than expected. Often, the amount deducted comes to less than the same radio costs when bought as an option in another car model. While Ford's dealer

price sheets indicate that its delete credit does equal the selling price of its radios, this is not the case with GM or Chrysler. The radio included as standard equipment in the 1986 Chevrolet Corvette, for example, can be deleted by purchasers ordering cars from the factory; they get a \$256 credit. Yet company price sheets list this same radio as a \$319 option on the '86 Cavalier and Monte Carlo. Edward Lechtzin, Chevrolet's assistant director of public relations, speculates that there may be legitimate reasons for the \$63 difference, such as costs incurred when the unit is installed in a model that does not include it as standard. However, he could not state this as fact, and declined to put me in touch with any company official who could.

The delete credit has become little more than an academic consideration at Chrysler, since it is currently offered only on the Dodge Diplomat Salon, the Diplomat SE, and the Plymouth Gran Fury Salon. The radio that is standard on the two Diplomat models, an AM-only, electronically tuned receiver with digital clock, can be deleted for a credit of \$47.60 to the dealer and \$56 to the consumer. Yet what appears to be the same unit is available as an option on the Dodge Omni for \$98.60 dealer cost and \$116 retail. A Chrysler spokesman declined to comment on his firm's radio pricing policies.

Another pricing procedure espoused by car manufacturers and denounced by the aftermarket involves "baked-in" costs. Every vehicle that carries a radio as standard equipment includes it in the base price. Ordering an upgrade unit in its place means paying for the optional unit as well as the standard one. For instance, when a Corvette buyer trades up from the standard radio to the Delco-GM/Bose music system, the listed charge for the option is \$895—that is, \$895 in addition to the price of the entertainment system Chevrolet includes as standard equipment on the Corvette.

Even if a specific car model is covered by a delete option, it does not apply when a buyer upgrades. Moreover, just how much in baked-in charges the purchaser actually pays remains something of a mystery. This is due to the disparity noted earlier between delete credits, granted when

some sound systems are omitted, and list prices for similar units offered as options on other car models. When asked how much the baked-in cost of the Continental's standard radio adds to the price of the new Ford JBL audio system (tagged at \$506), a Ford official working on the project remarked that the exact amount "is so buried you would have to talk to the [top man] at Lincoln-Mercury" to get an answer.

In direct contrast to other factory sources queried, Delco's response to my questions on auto makers' radio pricing was forthright. "What we do when we make a standard option on a car is to make that part of the price of the vehicle," comments Mike Williams, Delco's sales promotion manager. "That's standard procedure throughout the industry, including the Japanese and the Germans. Now, that is understood, we believe, by the customer. There are certain tires that are standard equipment on the car. If you want a better set of steel belted [tires], it is an additional so much money. We see no difference between this and any other option where there is an upgrade possible." Moreover, Williams states, "We do a complete system design on these vehicles, and when we delete ... a lot of our engineering effort remains in the car. The amounts that we give on a delete credit are very substantial."

Nonetheless, the aftermarket finds Detroit's pricing policies less than aboveboard. "We put the actual retail price on every product we offer," comments CMC's Kent Friedman. "I do think it would be appropriate for the automobile industry to inform the consumer what the true price is that is being paid for the person's system."

Another problem with car makers' auto-sound pricing, aftermarket sources contend, is that consumers pay more than factory units are really worth and could buy far more performance per dollar by purchasing radios and associated equipment separately from their cars. "Some of these radios have all the features in the world, but they're not worth what the consumer pays for them," asserts Fred Deutsch.

Even opponents of Detroit, however, concede that its factory auto-sound systems are engineered for the long haul. To eliminate costly warranty re-



placements, car makers do not scrimp when it comes to building reliability into their mobile audio hardware. "We put a lot of time in, and take things fairly slowly in order to make them right," says Delco's Mike Williams, who points out that the Kokomo, Indiana-based company spent at least three years in researching and developing a Compact Disc player in conjunction with an undisclosed audio manufacturer. (The unit will not appear in General Motors cars until after the '86 model year, Williams adds.)

Pricing is only one of the aftermarket's grievances against car makers. Several others are articulated by the Car Audio Specialists Association (CASA), a trade group founded in 1978 that now includes among its membership aftermarket manufacturers as well as importers, distributors, retailers, and installers of auto-sound hardware.

CASA decries the inclusion of radios as standard equipment or installed options in an increasing number of cars. According to data supplied by the trade organization and attributed to Ward's Communications, a publishing company specializing in the automotive industry, 83.2% of domestic cars sold in 1978 were equipped with radios; by March 31, 1985, that figure had jumped to 93.4%. Although Ward's showed only 46.8% of the imports sold in 1978 had radios installed, by June 30, 1985, the number had climbed to 68.4%. Cheryl Hollins, CASA's executive director, notes that these figures do not include radios installed at importers' port-of-entry facilities or at dealerships. If taken into consideration, it's possible that these could raise the figures substantially.

CASA claims that dealers are often pressured to order cars with sound systems, or are allotted vehicles that already have them. Comments John Shalam, president of Audiovox, a CASA founder, "When certain models of cars are in short supply, in the past there have been instances where a dealer would order 100 of a particular model. If he'd order it without a radio, he wouldn't get delivery for quite a while." If he called his zone manager to inquire why, Shalam continues, "the answer would be, 'All the cars that we have available already have radios in them, and we have to wait for a special

production run without radios in order to take care of you.'"

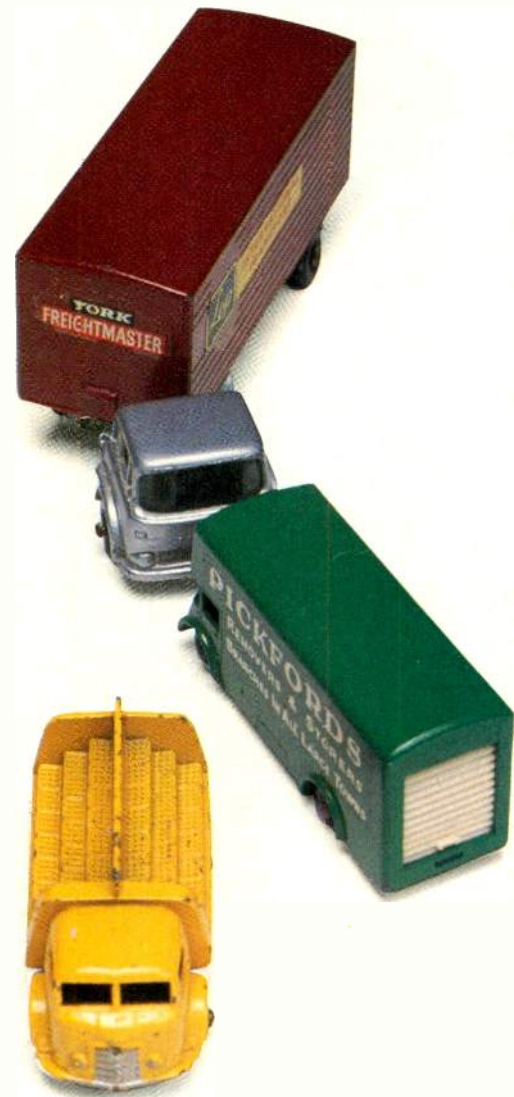
There is another auto-industry pricing practice which may be interpreted as a more subtle form of persuading dealers to accept cars with sound systems already installed: The radio is included as part of a group of options, sold as a package to the dealer, who buys it at a price sharply discounted from its sticker value.

In 1979, CASA filed suit against General Motors, contending that linking the sale of a radio with that of a car is a monopolistic practice in violation of existing antitrust laws. In an out-of-court settlement, GM agreed to provide a delete option on 13 of its car models; under the settlement's provisions, dealers were eligible for a previously unavailable credit for radios returned to the factory "at least through the 1981 model year." The car-making giant also agreed it would not, before the end of the 1983 model year, change the radio models it included as standard at the time of the settlement. CASA used the GM agreement as a model for pacts with a number of other manufacturers. Though these have all expired, delete policies are in some cases being continued on a voluntary basis.

CASA, founded by five auto-sound makers and distributors, now has more than 200 members, yet it is ironic that a mere 12 of these are manufacturers of car audio. Almost certainly, others have declined to join because virtually all aftermarket companies are—or would love to be—vendors of parts or finished products to the auto makers, and would rather not ruffle any feathers. This also explains the widespread unwillingness among aftermarket executives to talk openly with the press about their problems with car manufacturers.

While acting as a vendor to the auto makers is one way for a car-audio company to fatten its sales figures, the unprecedented collaboration of Delco and Bose (whose system is now available as an option on 13 of General Motors' 1986 models) showed aftermarket suppliers a very different roadmap to that end. Ford and JBL followed with an agreement to jointly produce a system that debuted in the 1986 Lincoln Continental. And Infinity

**C**ompetition in the auto-sound aftermarket has gone from fierce to deadly. But the industry's real demons lurk in the car makers' board rooms.



**M**icroprocessor-based integrated systems will complicate removing or bypassing components installed at the factory, but they're coming anyway.



Systems has, for some time, been discussing a collaborative effort with Chrysler, although no formal announcement had been made as of this writing. (Both JBL and Infinity are owned by Harman International.)

To those in the auto-sound industry who think of car manufacturers as mortal enemies, it may appear that an aftermarket supplier's joining forces with them is high treason. Jim Twerdahl, president of JBL (which markets its own aftermarket car audio line) and a former president of CASA, who still serves on that organization's board, contends otherwise. With car hi-fi still in its infancy, he argues, the medium needs all the promotion it can get, and, if a major auto maker is willing to dip into its substantial advertising coffers to pay for that promotion, so much the better from an aftermarket point of view. Twerdahl points to the extensive advertising that has been run for the Delco-GM/Bose system, and states that such collaborations, "as long as they are fair and not anti-competitive, are good for the industry, because they broaden the awareness of good sound. As long as the competition is fair," he remarks, "we should not fear these guys, but respect them."

Still, there is currently more than a mere tinge of fear in the auto-sound aftermarket, and it appears to be increasing. A principal reason transcends both the appeal of music systems to young car buyers and factory auto sound's high profit margins: There is a growing realization in Detroit, and in the auto manufacturing capitals of Asia and Europe, that advanced electronics has become a coveted commodity to today's consumers, just as size and status were to car buyers in the '60s and fuel economy became during the gasoline shortfall of the '70s.

"Our motivation is to make our automobiles more competitive," asserts Al Mattaliano of Delco. "If you're going to do that, I think the crude oil of the '80s will be electronics. If you're going to move for electronics, you're going to be dealing with computers. And once you've got a computer in the automobile, you are going to optimize various functions and have a total integrated system."

Integrated vehicle electronics systems: It's a phrase that echoes like an

alarm throughout the auto-sound aftermarket. Compared to the potential impact of such microprocessor-based networks, roadblocks which the car makers previously erected for rival car-stereo suppliers diminish to insignificance.

A case in point is the long-planned-for system now appearing in the new Buick Riviera. This ties the car's heater and air conditioner together with its radio, five-band graphic equalizer, trip computer, and clock. The heart of both radio and equalizer are integrated circuits, silicon chips housed in a black box rather than visible components packaged to fit a dashboard slot, and they are operated via images of touch controls called up on a built-in cathode ray tube.

Such optional electronics systems are sure to prove irresistibly alluring to some car buyers, but the real fear is that they will be installed as standard equipment, just as so many factory-supplied radios are today. And should these electronic infrastructures expand to include, say, a car's anti-lock braking or fuel injection system, removing them would be tantamount to crippling the vehicle. Even if such systems could be removed or bypassed by future aftermarket car entertainment products, where would the installation space for car audio units or their controls be found?

Mike Williams of Delco, though it is scarcely his problem, appears unimpressed by such concerns. "There is nothing that prevents the aftermarket from putting another unit in the car," he says of the CRT-equipped Riviera. "They can even utilize the existing wiring harness. From my perspective, there's as much opportunity for change as there is in any existing system."

Perhaps. Undoubtedly, engineers at aftermarket auto-sound companies have, for some while, been hard at work on systems that can be neatly integrated into vehicles with radio controls mounted on steering wheels, black-box electronics, and a conspicuous lack of dashboard space for mobile entertainment hardware. As things now stand, however, the fight against the auto makers appears to be, far and away, the car audio aftermarket's most difficult challenge. **A**





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1

## KENWOOD KRC-999 CAR STEREO

### Manufacturer's Specifications Tuner Section

**Usable Sensitivity:** Mono, 12.0 dBf.

**50-dB Quieting Sensitivity:** Mono, 18.0 dBf.

**FM Frequency Response:** 30 Hz to 15 kHz,  $\pm 1$  dB.

**S/N Ratio:** 73 dB.

**Alternate-Channel Selectivity:** 80 dB.

**Capture Ratio:** 1.5 dB.

**Image Rejection:** 70 dB.

**I.f. Rejection:** 75 dB.

**Stereo Separation at 1 kHz:** 40 dB.

**AM Usable Sensitivity:** 27 dB $\mu$ v. (22.4  $\mu$ v).

### Cassette Section

**Frequency Response:** 120- $\mu$ S tapes, 20 Hz to 20 kHz,  $\pm 3$  dB; 70- $\mu$ S tapes, to 22.5 kHz,  $\pm 3$  dB.

**S/N Ratio:** 62 dB; 71 dB with Dolby B NR; 76 dB with Dolby C NR; 86 dB with dbx NR.

**Wow and Flutter:** 0.06% wtd. rms.

**Stereo Separation:** 40 dB at 1 kHz.

### Graphic Equalizer Section

**Center Frequencies:** 60 Hz, 120 Hz, 250 Hz, 500 Hz, 1 kHz, 3.5 kHz, and 10 kHz.

**Range:**  $\pm 12$  dB.

**Frequency Response:** 20 Hz to 60 kHz,  $\pm 3$  dB.

**THD:** 0.01%.

### General Specifications

**Audio Output Level:** Normal, 300 mV; high, 1.0 V.

**Power Requirements:** 14.4 V (11.0 to 16.0 V allowable), 1.0 ampere.

**Dimensions:** Control unit, 7-1/16 in. W  $\times$  1-15/16 in. H  $\times$  5/8 in. D (18 cm  $\times$  5 cm  $\times$  15 cm).

**Weight:** Total, 4 lbs., 2 oz. (1.9 kg).

**Price:** \$1,499.

**Company Address:** 1315 East Watsoncenter Rd., Carson, Cal. 90745. For literature, circle No. 90



Kenwood's KRC-999 is an extremely versatile, computerized, three-in-one car stereo. It combines a synthesized tuner, a cassette deck, and a graphic equalizer in a single in-dash component that is no larger than most car tuners. This feat is accomplished by assigning multiple functions to the various pushbutton controls and by mounting some of the circuitry (such as the power-supply parts and a control module) on separate chassis that can be tucked under the dashboard.

The KRC-999 incorporates the Dolby B, Dolby C, and dbx noise-reduction systems. When using the cassette deck, it is possible to skip as many as eight selections forward or seven selections backward, providing there are pauses of 5 S or more between selections. If a pause longer than 15 S occurs, the tape is automatically fast-forwarded to the beginning of the next selection. I found this to be a very convenient feature—especially since so many prerecorded tapes do not have exactly equal amounts of recorded music



on each side, so that there's often a long blank period on one side or the other.

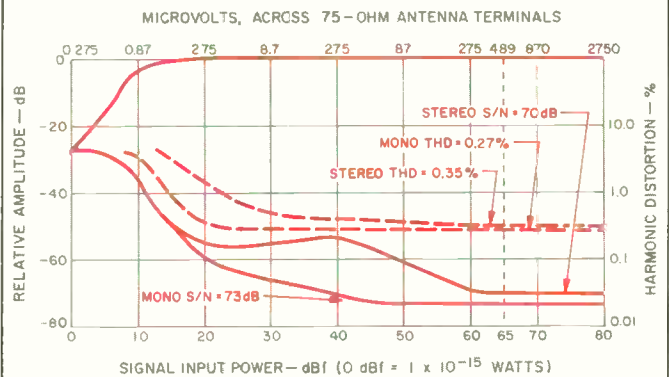
Another worthwhile feature, "Index Scan," auditions the first 10 S or so of each selection on a cassette so that you can stop and listen to just those tunes you prefer. This feature even continues to the other side of the tape, since the unit has auto reverse.

The KRC-999 is one of the first car stereos I've encountered that provides connections for an optional Compact Disc player. If that player is Kenwood's Model KDC-9, it takes priority over cassette and tuner operation; when the KDC-9 enters its play mode, the KRC-999's tuner and deck shut off (and if a tape is playing, it is ejected).

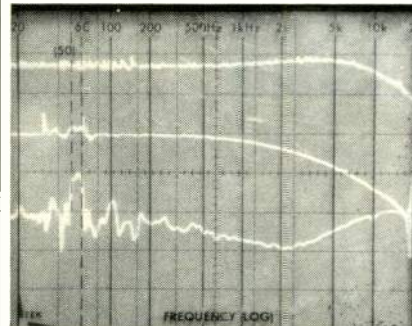
As for the tuner, it can be tuned manually or automatically (stopping only at strong signals if the "Local" mode is selected) or by means of the preset buttons. Although there are only five such buttons, you can store up to 15 FM (as well as the usual five AM) frequencies, since the FM band's selector switch cycles through three quintets of memory positions. A preset scan function samples each of the five preset stations in the currently selected band for 5 S each, illuminating each button as its memory is selected; touching the button locks that station frequency in, for continued listening. The memories can also be programmed automatically with the first five strong stations the tuner can find.

Two other interesting tuner features made possible by the incorporation of a microprocessor are called ABSS (Automatic Broadcast Sensor System) and ANRC (Automatic Noise Reduction Circuit). ABSS advances the tuner to the next strong signal on the dial if the signal to which you are tuned gets too weak. ANRC blends left and right signals to filter high-frequency noise when stereo signal strength falls below acceptable levels. Both ABSS and ANRC may be switched on and off.

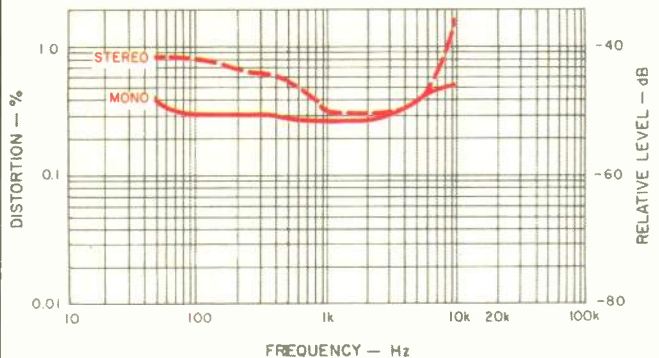
Perhaps the most innovative section of the KRC-999 is its graphic equalizer. Seven bands are provided, each of which can be controlled in 2-dB steps by means of momentary-contact toggle levers. An LED display "draws" the overall response curve as the equalizer settings are changed. However, since looking for too long at a display is not particularly safe while driving, there are pleasing tones that let you know what's happening when you touch and move one of the equalizer's levers. The tone's pitch depends upon the octave you are adjusting. A single tone is heard for each 2-dB step, but when you pass through the center of the range (the flat setting), you hear a double tone. This clever arrangement allows you to make equalizer adjustments without ever taking your eyes off the road. (Incidentally, all of the other buttons and controls also respond with a soft beep when they are touched or adjusted.) You can store and recall as many as three preferred response curves, and three more curves assigned by Kenwood can be recalled at the press of a button: One for typical low-level loudness compensation, another deemed suitable for listening to vocals, and the third for flat response. At the press of a button you can transform the graphic equalizer display into a real-time spectrum analyzer display, which shows program-source frequency levels, unaffected by the volume setting. Since such dancing lights can be distracting, I'd recommend using this feature only while parked.



**Fig. 1—Mono and stereo quieting and distortion characteristics, FM section.**

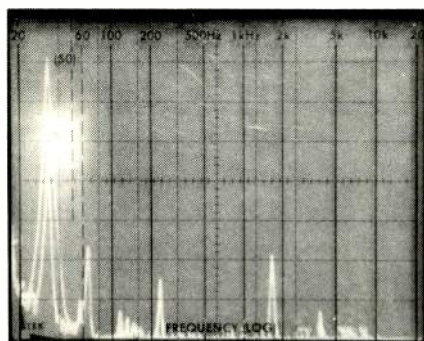


**Fig. 2—FM frequency response (top trace) and separation for weak (middle) and strong (bottom) signals.**

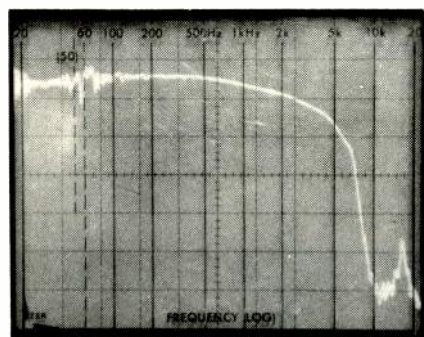


**Fig. 3—THD vs. frequency, FM section.**

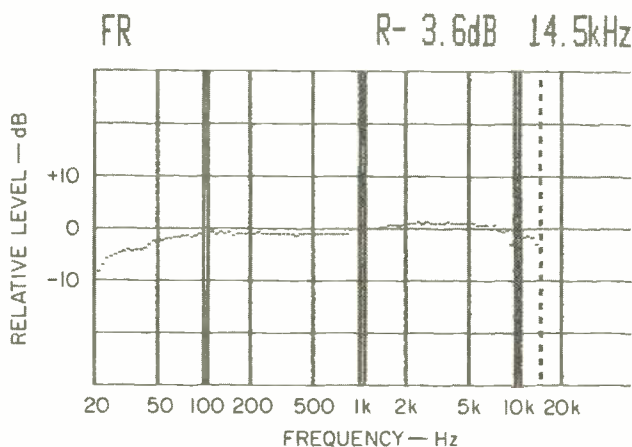
The most innovative part of the KRC-999 is its seven-band equalizer. Thanks to a clever system of tones, you can "read" its settings by ear.



**Fig. 4—** FM stereo crosstalk and distortion components for a 5-kHz signal applied to the opposite channel.



**Fig. 5—** AM frequency response.



**Fig. 6—** Frequency response, cassette section.

#### Control Layout

As I mentioned at the outset, Kenwood manages to cram all of these functions and controls onto a 2 × 6-inch panel by giving nearly all of the tiny pushbuttons dual roles. In the tuner mode, they do one thing, with the appropriate nomenclature illuminated. Pop a cassette into the tape loading slot at the upper left of the panel, and all the illuminations now indicate the alternate functions of each button. Further, if you push the "Open/Close" switch located at the lower center of the panel, a tiny drawer opens up to disclose additional, secondary controls and buttons. Most of these, too, perform dual functions, depending upon whether you are using the tuner or the cassette deck.

When in the cassette mode, buttons beneath the cassette slot control rewinding, fast forward, Index Scan, and tape play/program. When in the tuner mode, these same buttons select FM or AM band and control tuning direction ("Down" or "Up"). Below these dual-function keys are an LED display for volume-level indications, two triple-function pushbuttons, and three single-function pushbuttons. The triple-function buttons, labelled with arrows pointing down and up, adjust volume, balance and the fader (I'll explain how in a moment). One of the single-function buttons handles muting; the other two store and select fixed volume settings that can be memorized by the system.

To the right of the cassette slot are the five frequency preset buttons, arranged vertically. Still farther to the right is an elaborate LCD display which tells you tuned-to frequency, remaining tape time, signal strength, FM or AM band selection, which type of noise reduction system is in use, whether 120- or 70- $\mu$ S tape equalization has been selected, in which direction the tape is running, whether the tuner is in the local or distant reception mode, whether automatic tuning is in use, and whether the ABSS and ANRC systems are active. The lower part of the display houses 49 LEDs which trace the graphic equalizer's frequency response curve in use at a given time. Red LEDs are used for boost settings, green ones for cut settings, and orange ones for flat response settings of each band.

Inside the little slide-out drawer, mentioned above, are 19 more tiny pushbuttons arranged in two horizontal rows. Three individual memory keys store tuner frequencies, volume/balance/fader settings, and equalizer settings. Three numbered balance/fader preset keys come next, followed by a single key which is used in tandem with a trio of buttons, to its right, to select among Kenwood's three factory-set equalization curves or to memorize and select three user-set curves. Beneath this row of controls is yet another row. Here I found the button which is used to switch between the displays for the EQ curve and the real-time spectrum analyzer. Another button selects channel balance, and a third selects fader control. These two buttons are what makes possible the triple functioning of the front-panel arrow buttons alluded to earlier. Normally, the arrow buttons control volume levels, but they become left-right channel balance keys when the balance button is pressed, and adjust front-rear speaker balance in a four-speaker installation when the fader button is pressed.

That leaves six more buttons inside this tiny drawer, and a total of 12 more functions. The clock key toggles between tuner frequency display and clock-time display; used in conjunction with the tuning "Up" and "Down" keys on the front panel, it adjusts the clock time. A key labelled "MTL" or "LO" (depending on the mode) selects 70- $\mu$ S EQ when in the cassette mode or local reception when in the tuner mode. The next key, labelled "B/C" or "ANRC," chooses either of the two available Dolby noise-reduction systems during tape play, or engages the Automatic Noise Reduction Circuit when you are using the tuner. The key after that, labelled "dbx" or "AUTO," chooses dbx noise reduction during cassette play, or automatic tuning when using the tuner. A switch labelled "T.ADV" or "ABSS" will fast-forward the cassette tape or engage the Automatic Broadcast Sen-



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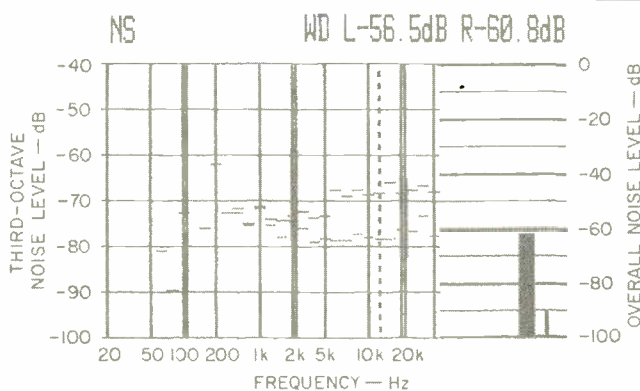
D E S I G N I N T E G R I T Y

\*Suggested retail price.

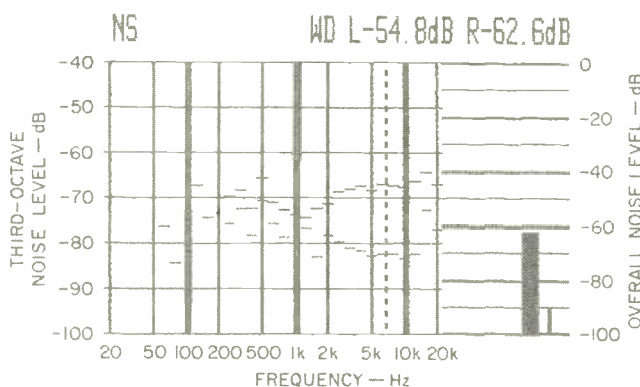
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Sensitivity was extremely good: Usable sensitivity in stereo was a very low 14.0 dBf, and mono 50-dB quieting was 15 dBf.



**Fig. 7A—Tape-section S/N, A-weighted, without noise reduction (upper trace and "L" readout at top) and with Dolby B noise reduction (lower trace and "R" readout).**



**Fig. 7B—Same as Fig. 7A but with Dolby C NR (lower trace and "R" readout).**

indicator lights, and the reassuring beeps all began to make me feel very comfortable with the unit. I couldn't help but admire the elegance of this component and the genius of the engineers who were able to cram all of the features into such a compact package. By the time I finished admiring the many functions and the microprocessor's role in making them all work so perfectly, I was more than a little anxious to see if the basic performance of the tuner and cassette deck lived up to the high-tech aspects of the control functions.

### Tuner Measurements

Figure 1 is a plot of the FM tuner section's quieting and distortion characteristics as a function of signal strength. Usable sensitivity was considerably better than claimed by Kenwood: I measured 10.3 dBf in mono and a very low 14.0 dBf in stereo. Mono 50-dB quieting was 15 dBf, also well below Kenwood's claim of 18 dBf. In stereo, 50-dB quieting sensitivity was difficult to measure because, by the time I got down to signal levels low enough to reduce quieting to 50 dB, the blending action typical of this and many other car-stereo tuners had reduced stereo separation to almost monophonic levels. This is not a criticism. On the contrary, Kenwood's blend circuit allows for a very smooth transition between full stereo and mono, always keeping background noise at acceptably low levels. At strong signal levels, signal-to-noise ratio was a very satisfactory 73 dB in mono and 70 dB in stereo. Harmonic distortion for a 1-kHz modulating signal was 0.27% in mono and 0.35% in stereo.

In Fig. 2 I plotted stereo frequency response as well as separation, using my spectrum analyzer in its log/sweep mode (from 20 Hz to 20 kHz). The top trace represents stereo frequency response. Over the useful FM audio range from 30 Hz to 15 kHz, response was flat to within +1.3 and -1.7 dB. The bottom trace in Fig. 2 shows separation, relative to the top trace, for a strong signal input. I measured separation at 46 dB for a 1-kHz signal, 36 dB at 100 Hz, and 32 dB at 10 kHz. (The vertical scale is 10 dB per division.) The middle trace shows the effect of the stereo blend. With signal strength reduced to around 45 dBf, separation was significantly lower but was still more than adequate (nearly 20 dB at mid-frequencies, even higher at treble frequencies) to maintain good stereo imaging in an automobile environment.

Figure 3 shows how harmonic distortion varies with modulating frequency for mono and stereo reception. At mid-frequencies, THD was almost as low in stereo as it was in mono, but at the frequency extremes it tended to rise.

Figure 4 shows a pair of plots made using the spectrum analyzer. This time, the sweep is linear, from 0 Hz to 50 kHz. The tall spike at the left represents a 5-kHz signal output from the modulated channel during stereo operation. The spike within the tall spike represents 5-kHz crosstalk appearing at the output of the opposite, unmodulated channel. Actual 5-kHz separation, according to the display, measures about 25 dB, but there are other unwanted components appearing at the output of the unmodulated channel, especially second- and third-order harmonics, as well as 19- and 38-kHz subcarrier components and sidebands around the 38-kHz residual output.

Alternate-channel selectivity measured a very high 80 dB,

sor System when listening to the tuner. Last but not least, a key labelled "M.S." (Music Set) or "P.S." (Preset Scan) is used to skip selections on a tape or to scan preset FM or AM stations.

In the side of the chassis is a switch that lets an installer select 300-mV or 1-V output levels.

By now you are probably wondering how a passenger—let alone a driver—can possibly be expected to operate such a multi-featured component while seated in an automobile. Let me assure you that after reading the 39-page owner's manual (it's actually twice that number of pages, but half are in French) and playing with the KRC-999 for a half hour or so, the logical arrangement of the controls, the



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S/N with dbx NR was too great for my usual measuring techniques. Using direct metering, I measured 82 dBA, outstanding for any deck.

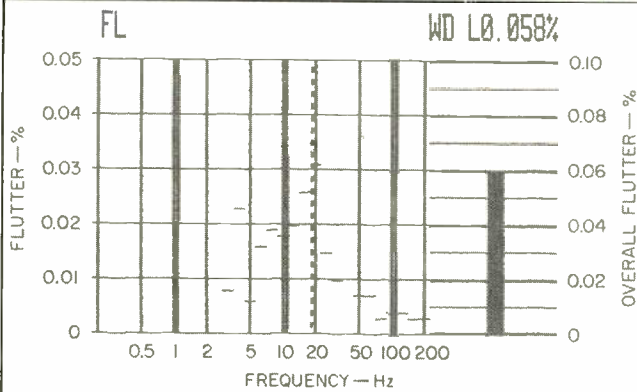


Fig. 8—Wow and flutter, wtd. rms.

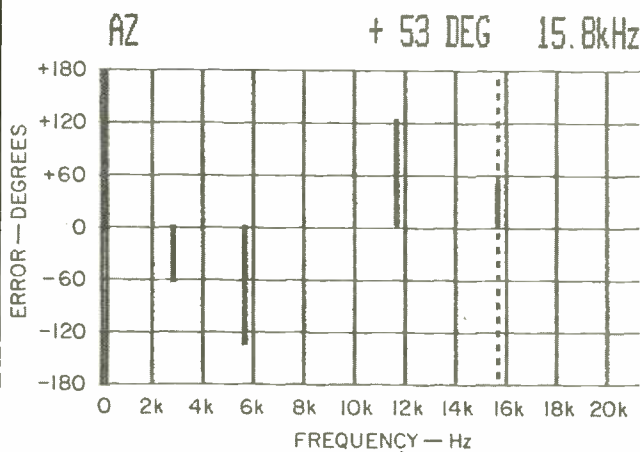


Fig. 9—Azimuth error of playback head.

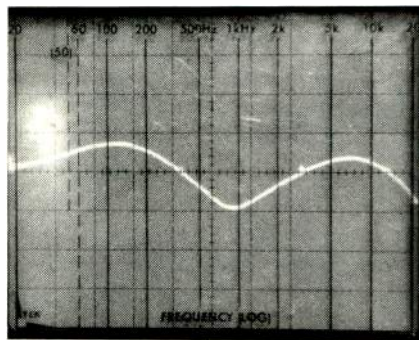


Fig. 10—Typical response curve possible with built-in seven-band equalizer.

as claimed by Kenwood. Capture ratio measured a very good 1.5 dB, and image rejection was greater than 75 dB. I.f. rejection also measured 75 dB. The AM frequency response was better than expected. If you allow a tolerance of  $\pm 6$  dB, the plot of Fig. 5 shows response that is usable from 20 Hz all the way out to beyond 5 kHz.

#### Cassette Player Measurements

Figure 6 shows the playback response of the tape deck using a Type I tape on which is recorded a sweep frequency from 40 kHz downward to 20 Hz. Despite some doubt that I have regarding the azimuth alignment of this test tape, response extended out to 14.5 kHz. I suspect that if the tape head of the KRC-999 were precisely aligned with respect to my test tape, response would have extended even farther out, to the 20 kHz claimed by Kenwood. When I used my Type II test tape—which contains only spot frequencies out to 18 kHz, instead of a continuous sweep—response was still flat (actually up a bit, by +1.3 dB) at 18 kHz, indicating that it certainly would have gone out at least to the claimed 22.5 kHz before the -3 dB roll-off point was reached.

I analyzed signal-to-noise ratio with and without Dolby B NR, and with and without Dolby C NR; A-weighted results are shown in Figs. 7A and 7B. The upper plot in each figure represents conditions without noise reduction, where S/N measured 56.5 dB on my first measurement run and 54.8 dB on my second run. These measurements are considerably less than claimed, but I suspect that Kenwood has based their figure of 62 dB upon some higher reference point than the 250 nWb/m that I use. With Dolby B noise reduction, S/N increased to 60.8 dB, again less than claimed by Kenwood and probably for the same reason. Dolby C NR added another few dB to the S/N reading. I attempted to plot S/N using dbx NR, but the signal-to-noise ratio was then so great that, with the addition of A-weighting, my Sound Technology automatic tape tester and plotter got hung up and refused to plot the results. I resorted to direct meter measurement, using a separate A-weighting filter, and came up with a reading of 82 dB—again short of Kenwood's claimed 86 dB, but an outstanding S/N figure for any cassette deck, no matter what reference level one uses to make the measurement.

Wow and flutter, shown in Fig. 8, was just slightly better than claimed, measuring 0.058% wtd. rms. as against 0.06% claimed. Azimuth error (Fig. 9) was only 53° for a 15.8-kHz signal recorded on both channels of the test tape. This is one of the lowest azimuth-error readings I have obtained for car cassette players recently. To my surprise, the azimuth error in the opposite direction was nearly identical, probably due to Kenwood's Bi-Azimuth system, which adjusts head alignment for each change in tape direction.

Figure 10 shows a response curve I created using the KRC-999's seven-band graphic equalizer. The vertical scale in this 'scope photo is 10 dB per division, and the sweep is logarithmic from 20 Hz to 20 kHz. To illustrate the wide range of the equalizer's controls, I purposely created a rather extreme EQ curve—one that neither you nor I would actually want memorized by the KRC-999. You could never achieve this kind of curve using simple bass and treble tone controls.



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In addition to the nearly two dozen pushbuttons on the outside of the front panel, a slide-out shelf houses 19 more, many of which control two functions.

### Use and Listening Tests

I've always had great respect for Kenwood home audio components, but this is, frankly, the first opportunity I've had to see what that company can come up with in a no-holds-barred, top-of-the-line car-stereo system. As I tested the KRC-999 on my lab bench and in my listening room (it was hooked up to my high-powered reference amplifier and speakers), I yearned to experience its many features while traveling in a moving vehicle. I envy Technical Editor Ivan Berger the fun I know he's going to have with this one. It is a superb performer in every way. Since Mr. Berger and I don't live all that far apart, perhaps he will be good enough to give me a ride in his car once the Kenwood is installed for his road tests. In return, I promise to submit future test reports and articles with more careful punctuation and with greater attention to technical details. Is it a deal, Ivan?

*Leonard Feldman*

### Behind the Wheel

Make no mistake, the KRC-999 is as good a performer in actual use as the lab tests show it to be, and is as jam-packed with features as anyone could wish. I feel that additional thought about how those features are presented could have made them even more useful to me than they already are.

One example of this is the night illumination, something I noticed first because I began testing the KRC-999 after work. Turn on the ignition, and the panel almost dazzles you with lights. This makes it tough to spot the three illuminated items which are useful before the KRC-999 is turned on—the clock display, the volume setting (so you'll know how loud the system will be when it's switched on), and the power switch. If you want to turn the KRC-999 on by simply loading a tape, you'll have to work in the dark; the cassette slot doesn't illuminate until the unit is switched on.

With the Kenwood's power on, the dual-function controls' legends change (both on the main panel and in the control drawer) to show which function is operative in the current mode; that's good. The tape-motion indicators are clear without taking up much space or being a distraction. In the tuner mode, however, I could not see the five closely spaced preset buttons in the dark.

The fast-forward and rewind buttons each perform their labelled functions, regardless of the tape's direction, so you don't have to know the direction of play to know in which direction to shuttle the tape. That's another nice touch.

Kenwood's ingenious single/double beep system makes

it possible to adjust the equalizer without looking, though I think it takes more concentration than a driver should devote to it. It's also too easy to brush into and accidentally readjust the EQ controls. I'd like to see them inside the drawer, where you can set them when the car is stationary and then shut them away. Similarly, I'd like the controls for the six preselected EQ settings and for NR selection to be outside, where I could reach them. The metal/normal tape EQ function should be automatic.

On FM, the preset scan feature would have been a bit more useful to me if it scanned all three "bands," not just the five presets in the current band. The feature that programs the currently selected station memories with the first five strong stations it finds in the area will prove very useful out where strong stations are few, but less useful in a signal-choked metropolitan area. The division of the pleasantly numerous FM station memories into three batches of five will appeal most to families where each driver has different tastes and to drivers who regularly travel between two or three different listening areas.

Aside from those niggles, the KRC-999's apparent complexity was not difficult to deal with. It helped that Kenwood didn't stint on the instructional materials. The hefty user's manual was clearly written (though it could have reminded the user more often which buttons were inside the drawer). In addition, there's a very well-done instructional cassette, an extra I'd like to see provided with other function-packed car stereos.

As to performance, the KRC-999 sounded clean and musical on FM. It gave me no fading or "picket-fencing" problems, and less multipath trouble than my reference set does. My usual stationary check of stations received in a suburban location did not show much—if any—difference between the Kenwood and my reference unit, but the Kenwood itself showed me why: As indicated on the LEDs of the KRC-999's signal-strength "meter," 33 of the 47 stations received were strong enough for any decent set to pick them up reasonably well. Had there been time to get farther out into the country, the Kenwood's superior sensitivity would have made a big difference.

On AM, the Kenwood was slightly better at picking up acceptable stations than my reference unit was, but the sound of those stations was much better. Part of the difference was better bass, but also, I suspect, a bit less distortion and some reduction in apparent noise caused by the Kenwood's gently sloping AM treble response.

Judging from its crisp, clean response on tapes from several sources, the KRC-999's head alignment must correspond better to my music tapes than to Leonard Feldman's alignment test tape. Whether azimuth or response itself was responsible, I heard more highs from the Kenwood than from my reference unit. The Dolby B and C NR circuits tracked well with my tapes, and the tape-EQ selector made more of a difference (especially in Dolby tracking) than I'm used to. My only cavil was a bit of mechanical noise during the fast-winding modes, which was audible even through the road noise.

The KRC-999 is a hot performer, plumb full of features. I like it. If its panel owed a bit less to *The Empire Strikes Back*, I would even crave it.

*Ivan Berger*



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2

## ALPINE 7374 CAR STEREO

### Manufacturer's Specifications

#### Tuner Section

**FM Usable Sensitivity:** Mono, 16.3 dBf.

**50-dB Quieting Sensitivity:** 20.7 dBf.

**S/N:** 60 dB.

**Alternate-Channel Selectivity:** 80 dB.

**Capture Ratio:** 2.0 dB.

**AM Suppression:** 45 dB.

**AM Sensitivity:** 12  $\mu$ V.

#### Cassette Section

**Frequency Response:** 20 Hz to 22 kHz.

**S/N:** 55 dB; 64 dB with Dolby B NR, 72 dB with Dolby C NR, 86 dB with dbx NR.

**Wow and Flutter:** 0.05% wtd. rms.

**Stereo Separation:** 40 dB.

### General Specifications

**Power Requirements:** 14.0 V d.c. (11.0 to 16.0 V allowable).

**Output Level:** 500 mV into 10-kilohm impedance.

**Bass Control Range:**  $\pm 10$  dB at 100 Hz.

**Treble Control Range:**  $\pm 10$  dB at 10 kHz.

**Dimensions:** Chassis, 7 in. W  $\times$  2 in. H  $\times$  6 $\frac{1}{8}$  in. D (17.8 cm  $\times$  5.1 cm  $\times$  15.6 cm); nosepiece, 6 $\frac{1}{4}$  in. W  $\times$  1 $\frac{7}{8}$  in. H  $\times$  5/16 in. D (17.2 cm  $\times$  4.8 cm  $\times$  0.8 cm).

**Weight:** 3 lbs., 12 oz. (1.7 kg).

**Price:** \$800.

**Company Address:** 19145 Gramercy Pl., Torrance, Cal. 90501.  
For literature, circle No. 91



Alpine has been established in this country for only a brief few years. However, in that time, the company has gained an excellent reputation for innovative products that cater to the car-audio buff's desire for flexibility and ease of use combined with good sound. The Model 7374 mates an electronically tuned AM/FM receiver with a sophisticated, multi-function auto-reverse cassette player, and is one of the latest examples of Alpine's innovative engineering.

When the 7374 is turned on, its volume rises gradually to

the level set at the last listening session, rather than immediately blaring out at full volume. The volume, bass, treble, balance, and front/rear fader controls are all electronically operated, and the digital, PLL frequency-synthesizer tuner provides for as many as 24 station presets, 16 FM and the remainder AM.

The tape section is especially loaded with features. An automatic tape-head demagnetizer operates each time you turn the car's ignition on. A programmable music sensor can



find not only the next (or immediately previous) selection, but any of the next or previous nine selections on the tape. A digital display shows what selection you've chosen, and counts down from there to zero as the transport homes in on the selection of your choice.

The 7374 can be commanded to repeat the current selection indefinitely, to scan through the first 10 S of each selection on the tape, to fast-forward past blank sections more than 15 S long, and to either play through both tape sides indefinitely or stop and eject after both sides have been played. That last option, called "Return Eject," can be set in any of three ways: If its button is pressed in play mode, play will continue through the current side and through the next before ejection. If it's pressed in conjunction with fast forward, play will begin at the start of the next side; if pressed in conjunction with rewind, playback will start from the beginning of the current side. When the ignition is turned off or the "Tape Pause" key is pressed, the heads and pinch roller will disengage from the tape, but the tape will not be ejected. Other features include automatic metal/normal tape sensing and all three popular noise-reduction systems—Dolby B, Dolby C, and dbx NR.

### Control Layout

No knobs protrude from the 7374's faceplate; all controls are soft-touch pushbuttons. The keyhole-shaped cassette slot accepts tapes loaded short side first. This conserves panel space to leave room for the many other controls, the elaborate and informative display area below the cassette slot, and the other "bells and whistles" which distinguish this car-stereo unit from its more conservative competition.

Another clever space-saving measure is the use of a single rocker-bar switch, conveniently placed at the upper left, to control volume, balance, bass, treble, and front/rear fader. Below the bar, five tiny buttons select which function it controls, with LEDs on the buttons showing which is activated. Additional LEDs on the rocker bar show the setting of the control in use.

The display area below the cassette slot, besides indicating tuned-to FM or AM radio frequencies, shows when a cassette has been loaded, which type of noise reduction has been selected, the type of tape equalization being used, and the radio band. Eight numbered buttons to the right of the display area do double duty. In radio mode they act as preset buttons; in tape mode they are used to select noise reduction and to initiate the "Repeat," "Tape Scan," "Blank Skip," programmed music search ("P.M.S."), and "Return Eject" features mentioned earlier. Tiny touch buttons above the eight numbered buttons are used to switch from stereo to mono and from "DX" to local reception, to memorize station presets, to adjust clock time, and to clear the programmable music-sensor memory. A station "Seek" switch for automatic tuning and a radio "Band" selector are located at the upper right of the panel.

The lower left corner houses "Eject," "Tape Pause," "Play/Prog" and "Power" on/off pushbuttons as well as a rocker-type pad which performs three functions: In radio mode it acts as a manual up/down tuning switch, in tape mode it activates fast forward or fast rewind, and it adjusts the minute and hour settings of the digital clock. The clock time

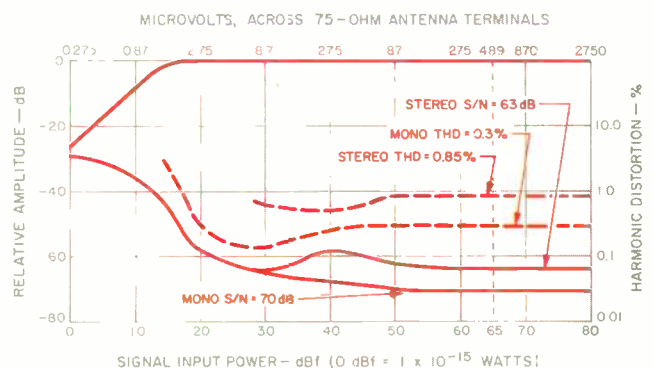


Fig. 1—Mono and stereo quieting and distortion characteristics, FM section.

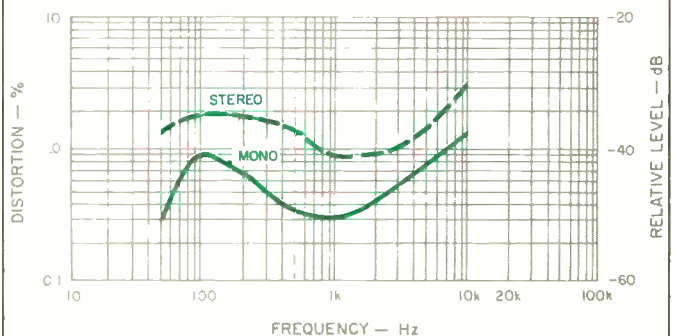


Fig. 2—THD vs. modulating frequency, FM tuner section.

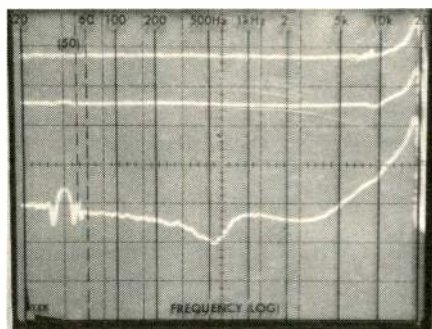
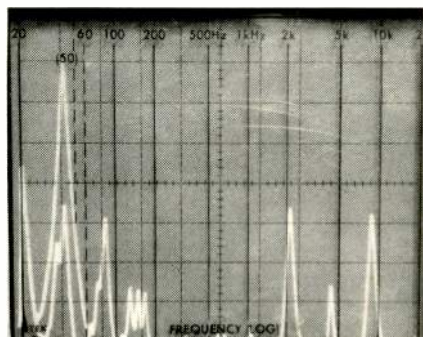
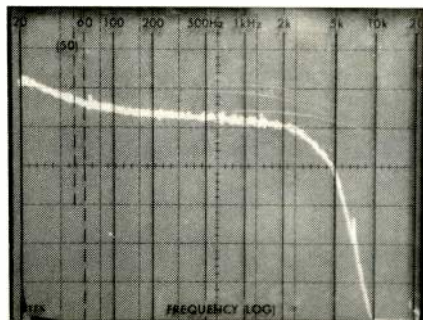


Fig. 3—FM frequency response (top trace) and separation with strong (65-dBf) signal (bottom trace) and reduced signal (middle trace). Note effect of automatic blending on reduced signal, as well as high-end response rise (see text).

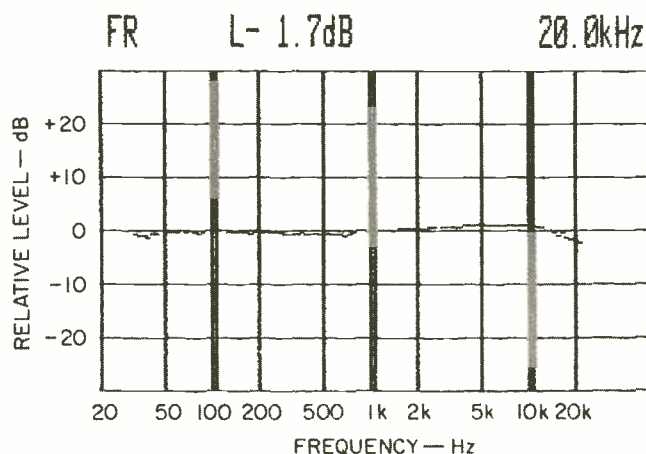
As stereo signals weaken, the tuner automatically blends the channels to lessen noise, while sacrificing separation.



**Fig. 4—FM stereo distortion and crosstalk products for 5-kHz modulating signal.**



**Fig. 5—AM frequency response.**



**Fig. 6—Frequency response, cassette section, with Type I tape.**

is always displayed when in the tape mode. During radio listening, the time will be displayed for a few seconds if one pushes a small "Clock" button; otherwise, the tuned-to frequency is shown.

The Alpine 7374 even has an automatic light sensor which dims or brightens the control panel according to external lighting conditions. Leads are provided to synchronize the panel brightness of other Alpine components with the 7374's. Other connections include a standard coaxial antenna connector, leads for a powered antenna, and separate, eight-pin DIN connectors for the front and rear amplifiers. These plug directly into other Alpine components (amplifiers, CD player, equalizers, etc.); for use with other components, Alpine sells adaptors which translate the connections to phono jacks and loose power leads. If you want to make your own adaptors, the owner's manual shows the pin layout of the DIN connectors.

#### Tuner Measurements

Usable mono sensitivity of the FM tuner section was 15 dBf, a bit higher than the 16.3 dBf claimed. Mono 50-dB quieting sensitivity was 18 dBf, again better than claimed, though not the best I have measured. Figure 1 shows the mono and stereo quieting characteristics for the FM tuner section, and the harmonic distortion for a 1-kHz modulating signal, as functions of signal strength. Notice how the S/N curves for stereo and mono tend to merge at lower signal strengths. This is typical of many car FM tuners. As signal strength decreases, the tuner automatically blends the two stereo channels together, thereby decreasing noise while sacrificing stereo separation. As a result of this blending, I am unable to provide a 50-dB quieting figure or a least usable sensitivity figure for stereo. At the low signal levels that would ordinarily be required to measure these specifications, the 7374 has blended the channels to the point where there is simply no stereo to speak of. At strong signal levels (65 dBf and up), maximum S/N for mono measured 70 dB, and stereo S/N was 63 dB.

While Alpine makes no THD claims for this FM tuner, the results I got were not as impressive as I'd hoped for from this otherwise high-end product. Mono THD for a 1-kHz modulating signal measured 0.3%, increasing to 0.85% for stereo. Figure 2 shows THD at various frequencies for both mono and stereo FM reception at strong signal levels.

Figure 3 shows the basic frequency response of the FM tuner as well as stereo separation, though measurements were made separately. The slight rise in response at the high end of the spectrum (top trace) signifies that the cutoff filter designed to attenuate 19-kHz pilot-signal products was probably slightly mismatched. As a result, the measured response was actually up by nearly 2.0 dB at 10 kHz, returning to flat or "0 dB" reference level at 15 kHz. Two plots of separation are shown in Fig. 3, for strong (65-dBf) signal inputs (bottom trace) and at reduced inputs (middle trace). The latter, showing reduced separation, illustrates what happens as the circuit blends outputs for reduced noise. For 65-dBf signal inputs, however, measured separation was 40 dB at 1 kHz, decreasing to 35 dB at 100 Hz and 30 dB at 10 kHz.

Figure 4 shows the distortion and crosstalk at the output





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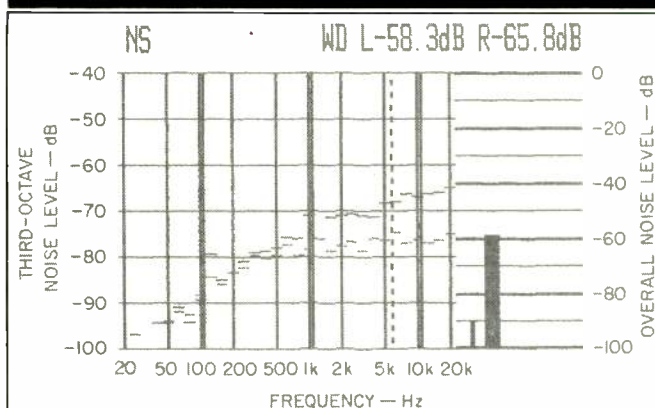
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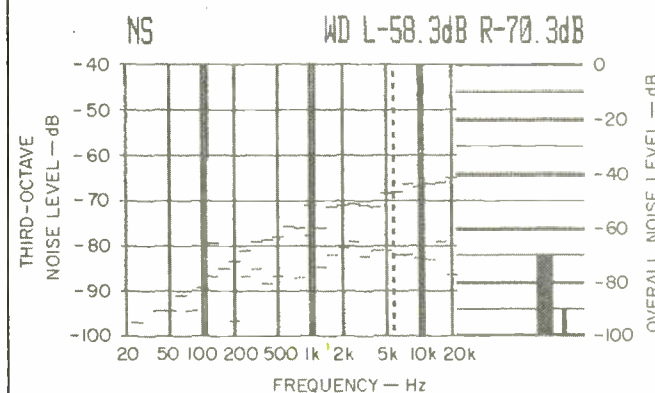
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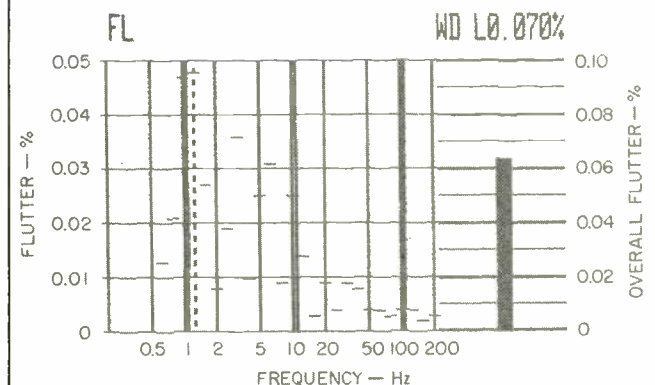
Frequency response of the tape player was excellent, extending out to beyond 20 kHz, and overall S/N with dbx noise reduction measured over 85 dB!



**Fig. 7A—Tape signal-to-noise analysis without NR (upper trace) and with Dolby B NR (lower trace).**



**Fig. 7B—Tape signal-to-noise analysis without NR (upper trace) and with Dolby C NR (lower trace).**



**Fig. 8—Wow-and-flutter analysis.**

of an unmodulated stereo channel when the opposite channel is fully modulated by a 5-kHz tone. The sweep is from 0 Hz to 50 kHz. The tall spike at the left represents the desired 5-kHz output; the spike contained within it is the undesired 5-kHz component at the opposite channel's output. Notice that in addition to the components of second- and third-harmonic distortion seen just to the right of the main 5-kHz spikes, there is also a well-defined 38-kHz (subcarrier) output near the right of the sweep as well as two sidebands 5 kHz to either side of that subcarrier. Certainly none of these components will be audible, especially in a car environment, but they do suggest that this tuner's stereo FM decoder circuitry has not been optimized as well as it might have been, and that it may produce other forms of crosstalk or "beats" within the audible frequency range.

Capture ratio for the FM tuner section measured very close to the 2.0 dB specified, while AM suppression and alternate-channel selectivity were both somewhat better than claimed by Alpine, with readings of 50 dB and 82 dB, respectively.

Sensitivity of the AM tuner section was excellent, measuring only 15  $\mu$ V for 20 dB of quieting, while AM frequency response (Fig. 5) was typical of most car radios. At 5 kHz, response was already off by some 10 dB. The bass response was unusual, too, in that there seemed to be a boost built in below about 100 Hz, even with the tone controls set to their nominally flat mid-points.


#### Cassette Player Measurements

Frequency response of the tape player, shown in Fig. 6, was excellent, extending out to beyond 20 kHz. Using a Type I (ferric oxide) test tape, response was down only 1.7 dB at the sweep's 20-kHz limit. Signal-to-noise measurements are shown in the graphs and readouts of Figs. 7A and 7B. The upper plots in each case represent noise distribution, in third octaves, without any noise reduction; overall S/N under those conditions measured 58.3 dB. With Dolby B NR (lower plot of Fig. 7A), S/N improved to 65.8 dB, and with Dolby C (lower curve of Fig. 7B) it improved still further, to 70.3 dB. A full third-octave analysis for operation with dbx NR was not made, but the overall S/N when dbx was used measured just over 85 dB! Wow and flutter was a bit poorer than claimed, at least on the sample I measured; as shown in Fig. 8, it measured 0.07% wtd. rms, with the chief wow component occurring at 1.25 Hz.

Although I recognize the convenience of auto reverse, especially in a car stereo, one of my chief objections to this feature shows up clearly in Figs. 9A and 9B. Figure 9A shows the azimuth error for various frequencies when a test cassette was played in the forward direction. Here, the error was extremely minimal, indicating excellent head alignment. However, when the same test tape was played back in the opposite direction, the angular azimuth errors for high-frequency test signals were substantial—as much as 154° for a 15.8-kHz test signal. This translates to poorer frequency response during playback in the reverse direction.

Figure 10 shows the range of the bass and treble controls. I measured maximum treble boost/cut as +9.9/-9.2 dB at 10 kHz, and measured maximum bass boost/cut as +8.7/-9.2 dB at 100 Hz.





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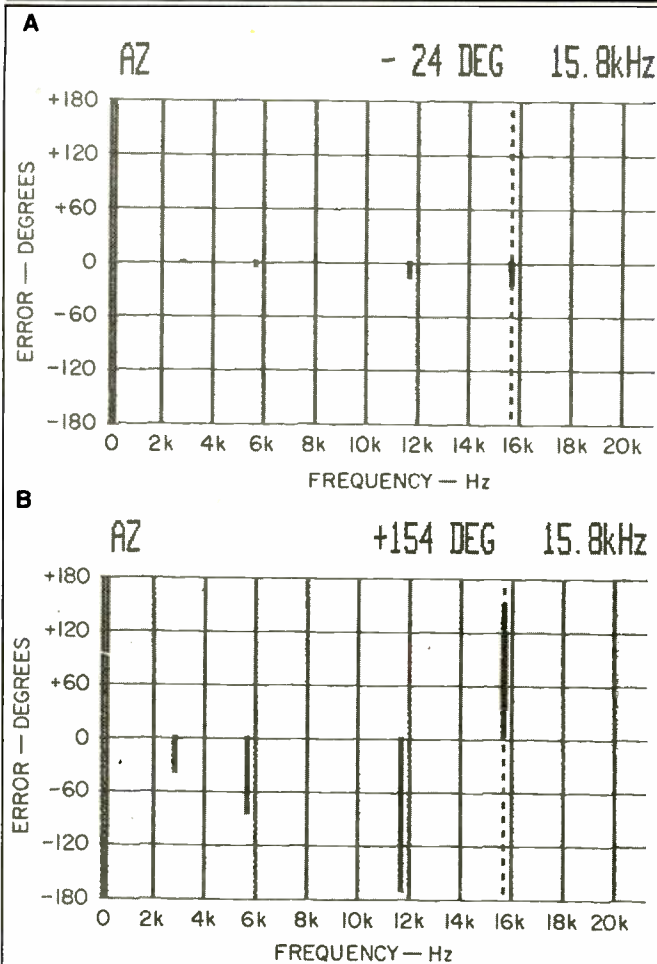


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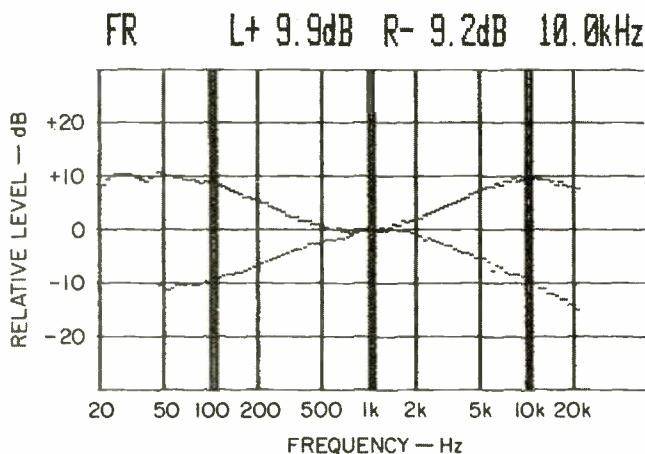
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If a station is just strong enough for the "Seek" circuit to find it in the local mode, the unit will switch itself to DX for better reception.



**Fig. 9—Azimuth error for forward direction (A) and reverse direction (B) of test tape.**



**Fig. 10—Bass and treble control ranges.**

### Use and Listening Tests

As usual, my listening tests were confined to the lab test bench. I did, however, vary the d.c. voltage powering the Alpine 7374 and encountered no change in performance when it was varied over the allowable range from 11.0 to 16.0 V d.c.

I was very pleased with this unit's front-panel layout, its illumination, and the clarity of its control designations. In my opinion, the Alpine 7374 has been engineered so that the user can take full advantage of all of its features without having to take his or her eyes off the road for more than a second or two. This, to me, is extremely important in car audio. I have to admit that although the technical measurements of the radio section were not quite up to what I've come to expect from Alpine, those of the cassette deck section were, on the whole, excellent. Whether those radio measurements will translate to audibly apparent deficiencies when this unit is actually used in a vehicle is something I'm going to let Technical Editor Ivan Berger tell you in his addendum to this report. As for myself, if I had to grade the 7374 on a scale of 1 to 10, I'd award it a 10 for human engineering and layout, an 8 or 9 for its cassette section, and perhaps a 7 for its FM and AM performance.

*Leonard Feldman*

### Behind the Wheel

The 7374's controls are a mixture of big hits and little misses. The five-function control bar was a hit, making far more sense in practice than I'd thought it would. True, it's difficult to run the bar through all its functions while you're driving, but you're more likely to set four of the functions before you set out, then use the bar as a convenient volume control thereafter. And I liked the way the volume faded in at turn-on.

The control illumination was great. All controls were easy to spot, and the settings of most of the often-used ones were easy to read.

The manual tuning rocker would be easier to use if it were indented in the middle, to help one's fingers tell which way to push it. But at least it was large and conveniently placed—and anyway, in practice, I mainly used the "Seek" and preset station selectors. The "Band" switch could be a little smaller—even in the station-studded New York area, I don't use the extra eight FM presets or the eight AM ones as often as I do the first eight FM presets and the station-seeker.

The tuner stereo/mono switch was a welcome addition (every car stereo could use one). The local/DX switch affects the sensitivity of the whole tuner, not just its station-seeking circuit. This is a nice touch carried over from previous Alpines, but with one good addition: If a station is just strong enough for the "Seek" circuit to find it when the sensitivity switch is in local mode, the 7374 will then switch itself to "DX" to receive that station better.

The tape functions that share the buttons used (in tuner mode) for station presets would be easier to use if their legends were bigger and darker. It's become common practice in car stereos to label grayish buttons with thin white lettering, but that often makes the letters hard to read by day and even less legible by night. I found this common



The main differences between the 7374 and its predecessor are better tape frequency response, some new functions, and controls for the knobless '80s.

problem particularly acute on the 7374, with its bright green night illumination. However, once a function had been selected, its button glowed orange, making the legends a bit easier to read. Luckily, these controls aren't used too often. I welcomed never having to set the tape EQ at all—I wish it were automatic on all car stereos.

The automatic head demagnetizer struck me as unnecessary. I liked the fact that turning the ignition off engages pause mode, rather than ejecting the tape. (In hot climates, though, I think I'd prefer key-off eject.) I used "Tape Scan" a lot, but since I know what's on my tapes better than what's on the air at any given moment, I'd have gladly swapped it for a station-scanning function.

If I have less to say about performance than I used to, it's because of the general rise in the industry's performance levels. It's been about two years, I think, since I've heard wow and flutter when playing tape on Belgian-block paving and average country roads, and about the same length of time since I've encountered "picket-fencing." The 7374's resistance to multipath seemed a bit better than average, even for today. I did not realize, at first, how much its extended high-frequency response on tape increased my listening enjoyment, until I switched to another unit with less exceptional response. The difference between forward and reverse-play response varied with the tape, demonstrating variation in the azimuth of my tapes.

I took a special interest in reception comparisons with my reference set, since that reference is Alpine's 7347, which the 7374 replaces. I was struck by the similarity in performance—so much so that I looked up our review of the older model (*Audio*, March 1984). I discovered that the tuner specs are identical for both Alpines, and Leonard Feldman's lab measurements nearly so. Nonetheless, on my FM tests, the new set did slightly—but unmistakably—better than the old, perhaps a sign of aging in the original. Capture ratio and sensitivity also seemed slightly better. But the main difference was the auto-blending, which is new: The new set opted unequivocally for mono on two or three weak stations where the old set wavered unpleasantly between mono and stereo.

On AM, the biggest difference was in the operation of the "Seek" function. On "DX" setting, the older set's station-seeker stopped at every AM frequency, occupied or not, whereas the new set mainly stopped just where there were signals to be heard.

The biggest differences between the 7374 and its predecessor are in wider frequency response on tape, the addition of new functions (chiefly auto reverse, a clock, and manual stereo/mono switching), and new, well-thought-out controls for the knobless '80s. The differences in performance are slight, but all to the new set's advantage.

*Ivan Berger*

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3

## DENON DCR-7600 CAR STEREO

### Manufacturer's Specifications

#### Tuner Section

**FM Usable Sensitivity:** Mono, 14.8 dBf.

**50-dB Quieting Sensitivity:** Mono, 20.3 dBf.

**S/N:** Mono, 60 dB.

**Alternate-Channel Selectivity:** 70 dB.

**Capture Ratio:** 2.0 dB.

**Image Rejection:** 50 dB.

**I.f. Rejection:** 100 dB.

**Stereo Separation:** 40 dB.

**AM Sensitivity:** 18  $\mu$ V.

#### Cassette Section

**Frequency Response:** Type I tape, 30 Hz to 16 kHz,  $\pm 3$  dB; Types II, III, and IV tape, 30 Hz to 18 kHz,  $\pm 3$  dB.

**S/N:** 72 dB with Dolby C NR.

**Wow and Flutter:** 0.09% wtd. rms.

**Stereo Separation:** 42 dB.

### General Specifications

**Output Voltage:** 500 mV.

**Bass Control Range:**  $\pm 10$  dB at 100 Hz.

**Treble Control Range:**  $\pm 10$  dB at 10 kHz.

**Loudness Compensation:** +8 dB at 100 Hz and at 10 kHz, for -30 dB volume setting.

**Dimensions:** Chassis, 7 $\frac{1}{16}$  in. W  $\times$  2 in. H  $\times$  6 $\frac{1}{2}$  in. D (17.9 cm  $\times$  5.1 cm  $\times$  16.5 cm); panel, 7 $\frac{3}{8}$  in. W  $\times$  2 $\frac{1}{8}$  in. H  $\times$  3 $\frac{1}{8}$  in. D (18.7 cm  $\times$  5.9 cm  $\times$  1 cm).

**Weight:** 4.2 lbs. (1.9 kg).

**Price:** \$625.

**Company Address:** 27 Law Dr., Fairfield, N.J. 07006.

For literature, circle No. 92



The trend is unmistakable. More and more car-stereo manufacturers are abandoning the all-in-one "car radio" chassis in favor of tuner/cassette decks designed to drive separate stereo power amplifiers. This approach enables makers like Denon to incorporate a host of worthwhile features in chassis that conform to the DIN dimensional standards, without sacrificing reliability or performance. In the case of the DCR-7600, outputs are configured to drive front and rear stereo amplifiers so that the usual configuration of speakers, front and rear, can be handled.

Among the noteworthy features found in this head unit are a dynamic expansion circuit, tape auto reverse, Dolby B

and C noise reduction, a five-selection music-sensor system for the tape player, presets for six AM and six FM stations, a noise filter and a local/distant switch for FM, and a tape equalization switch for normal or metal/chrome tape. Cassette loading is semi-automatic, and tapes are ejected when the ignition is turned off. If the tuner is switched on, you'll hear its output during tape rewind or fast forward (but not during music search), so you don't have to sit in silence. Once the tape is fully wound, play resumes automatically. In addition to the usual up/down manual tuning, the frequency-synthesized tuner also has a "Seek" mode which finds the next usable signal. What Denon calls "Keytone Confirma-



tion" is a beep that sounds when you touch any of the controls. The tone lets you know that you have indeed entered a command so that you need not take your eyes off the road when driving. Of course, you still have to know *which* button to touch for the desired result.

### Control Layout

As is often the case with car-stereo head units, the rotary volume-control shaft carries more functions than is at first apparent. The volume control itself, when pushed, turns the tuner on and off; when pulled, it becomes an adjustment control for the degree of dynamic-range expansion desired. Surrounding it are two control rings which handle front/rear and right/left balance adjustments. Smaller rotary controls for bass and treble are to the right of the volume control. Just below are Dolby B and C pushbuttons, the "MS" (Music Sensor) button, and a pushbutton which selects 70- $\mu$ S equalization (for metal or CrO<sub>2</sub> cassettes) when in tape mode or high-cut filter when in FM mode. Five pushbuttons, mounted in a vertical row, handle the tape-transport functions. The first four, starting at the top, control tape ejection, tape direction reversal, fast forward, and fast rewind; the fifth, labelled "Clear," stops fast tape spooling or cancels the Music Sensor system.

Below the cassette insertion slot is a display area which shows tuned-to frequency and indicates stereo reception. Up and down tuning rocker switches for both the "Seek" and manual modes are to the right of the display, and just below are touch buttons for "Loudness" compensation, "DE" (Dynamic Expansion), "Local" (for FM reception), "FM," "AM," and "Memory." The last-named switch is used in conjunction with the six numbered preset buttons, which are arranged in a vertical row at the extreme right of the front panel.

To make installation easier, Denon has equipped this head unit with familiar phono-tip jacks rather than DIN connectors. (While DIN connectors should simplify installation by combining many circuits into one plug, it sometimes seems as though no two manufacturers wire their DIN plugs—especially the 8-pin types—alike, and instruction manuals don't always tell which connection goes to which pin.) Other connections include a ground wire and terminal, plus individual wires to operate a power antenna and remote turn-on circuits for two amplifiers. The panel illumination lead is separate, so it can be hooked into your car's dashboard lighting and dimmer.

### Tuner Measurements

As usual, I measured the performance of the tuner section first, and then went on to evaluate the tape deck. My listening tests are conducted in my lab and merely verify that the measured results correspond closely with what I hear. I leave the unit's behavior on the road to Technical Editor Ivan Berger, who has the patience and stamina to swap head units in and out and drive around with them under difficult reception and tape-playback conditions. I'm always interested in his reactions to each set, especially to see if my lab results and sedentary listening tests correlate well with his more rigorous real-world evaluations.

Figure 1 shows how background noise and distortion vary

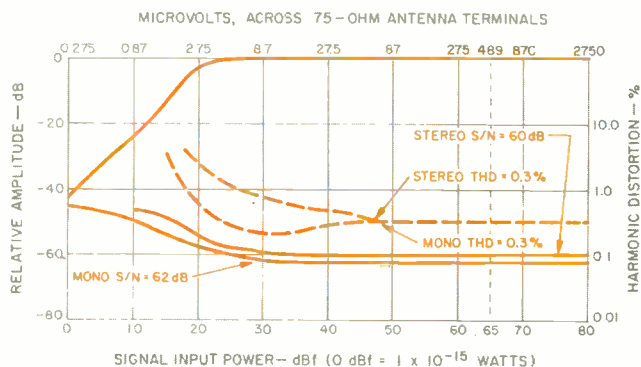


Fig. 1—Mono and stereo quieting and distortion characteristics, FM section.

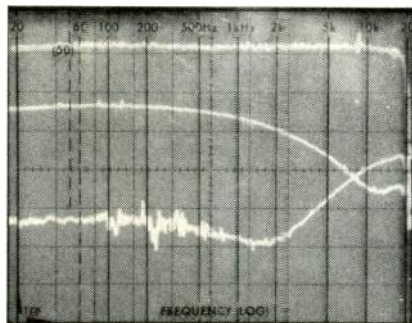


Fig. 2—FM frequency response (top trace), and separation for weak (middle trace) and strong (bottom trace) signals. See text.

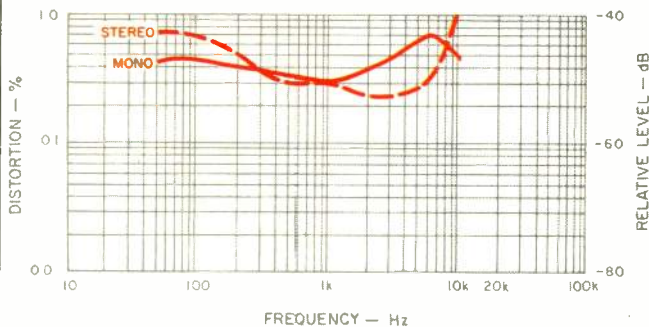
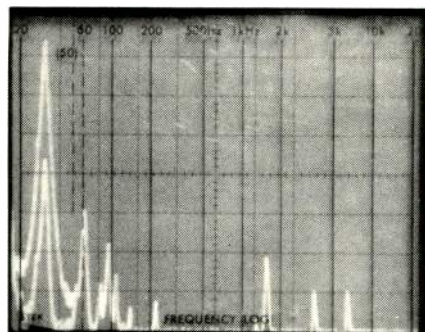
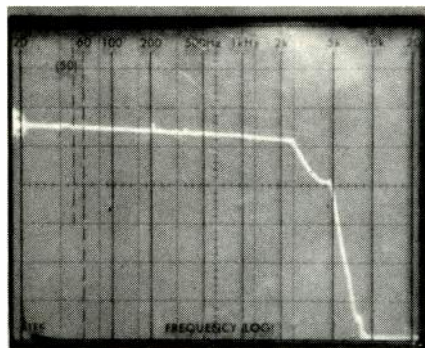


Fig. 3—THD vs. modulating frequency, FM section.

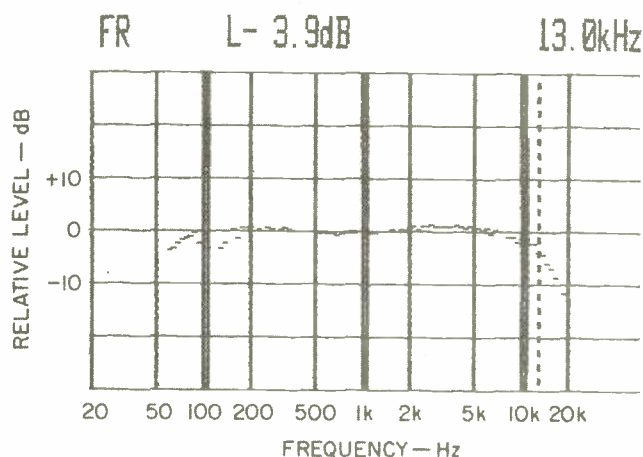
I liked the sensitivity of the tuner section, its signal-seeking feature, and the degree of mono blending provided.



**Fig. 4—FM stereo crosstalk and distortion components for a 5-kHz signal.**



**Fig. 5—AM frequency response.**



**Fig. 6—Frequency response, cassette section, with Type I tape.**

with signal strength for mono and stereo FM input signals. Usable mono sensitivity measured 15 dBf, and best mono signal-to-noise, for a 65-dBf input signal, was only 62 dB. At that same signal level, S/N in stereo measured 60 dB. As with most car FM tuners these days, there's not much point in talking about usable sensitivity in stereo or even 50-dB quieting sensitivity in stereo, for that matter. This is because, as signal strength decreases, the tuner circuitry blends the left and right channels until they are virtually monophonic.

THD in mono, for a 1-kHz signal, was 0.3%; I measured the same value of distortion in stereo. Figure 2 shows stereo frequency response (top trace) and separation for both strong and weak stereo signals. The middle trace shows the effects of the weak-signal blending. At strong signal levels (bottom trace), separation measured about 44 dB at mid-frequencies; when signal levels were reduced to about 40 or 45 dBf, separation at mid-frequencies decreased to well below 20 dB. Again at strong signal levels, separation at 100 Hz measured 45 dB and at 10 kHz was 28 dB. The crossing of the two separation curves is unusual but not significant. As long as separation is reduced in the region between 2 and 4 kHz, where stereo noise is most annoying, it does not matter much that separation increases above about 7 kHz.

Figure 3 shows how harmonic distortion varies with frequency for mono and stereo FM reception at strong signal levels. Often, the single distortion reading observed for a stereo FM tuner when it is receiving a high-frequency signal is not really a true indication of what's going on. For this reason, I always use a spectrum analyzer, linearly swept from 0 Hz to 50 kHz, to plot what happens at the output of the unmodulated channel when a 5-kHz signal modulates the opposite channel fully. The tall spike at the left in Fig. 4 represents the amplitude of the desired 5-kHz output, while the shorter spike inside it represents the 5-kHz output from the unmodulated channel. The other crosstalk components appearing at the unmodulated channel's output include both harmonic distortion components and subcarrier output products at 19 and 38 kHz, as well as sidebands.

FM frequency response was generally flat from 30 Hz to 15 kHz, with deviations never exceeding 1.0 dB at any frequency. Capture ratio measured exactly 2.0 dB, as claimed. Alternate-channel selectivity measured 73 dB, i.f. rejection was greater than 100 dB, and image rejection measured 53 dB. AM frequency response, shown in Fig. 5, exhibited a rather strange characteristic from about 2 to 5 kHz, but was otherwise typical of most car-stereo units' AM response.

#### Cassette Player Measurements

Figure 6 is a plot of playback response using Type I (normal bias) tape recorded with a sweep signal that could be read by a Sound Technology 1500A tape tester. Response was reasonably flat from about 45 Hz to around 13 kHz. For checking Type II tape response, I used a spot-frequency test tape supplied by BASF, and had to record results manually. Using this calibrated test tape, and with equalization correctly set, response improved somewhat, with the -3 dB points moving out to 40 Hz and 14.5 kHz.

Figures 7A and 7B each show two measurements of signal-to-noise. In Fig. 7A, S/N ratio values of 56.4 and 65.2



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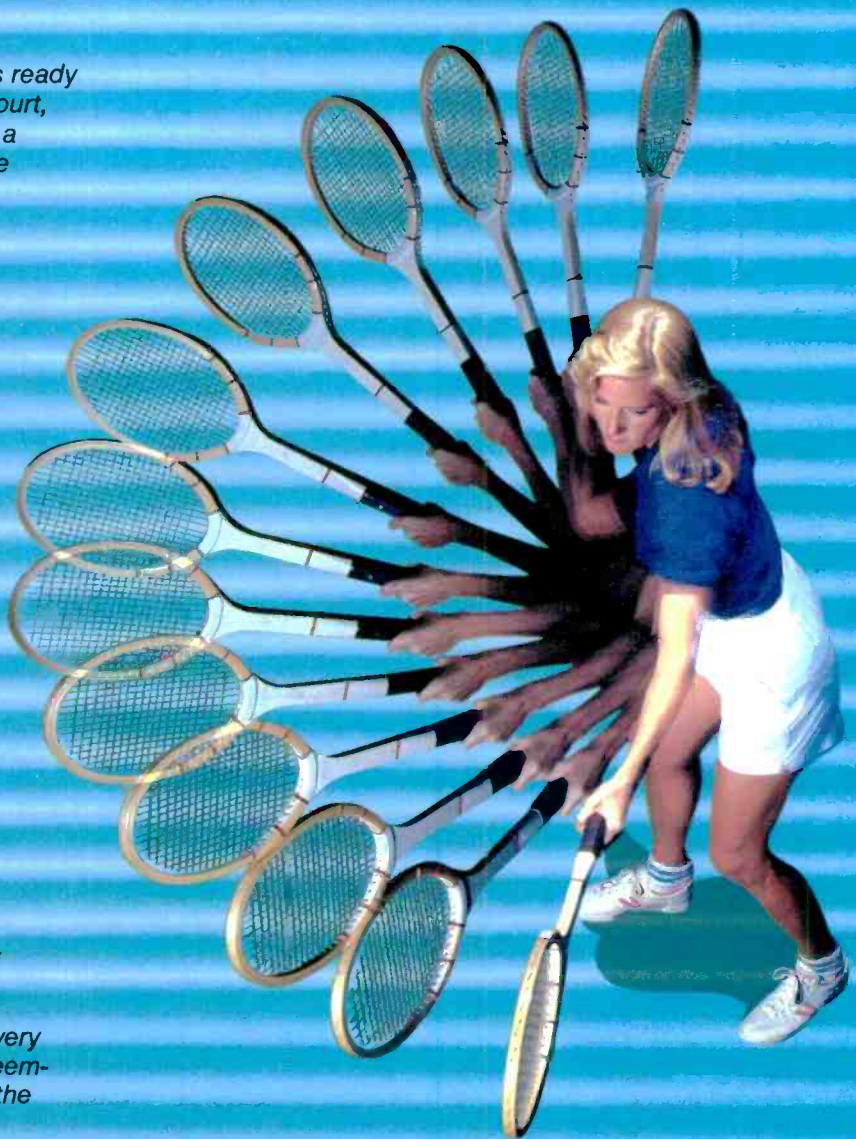
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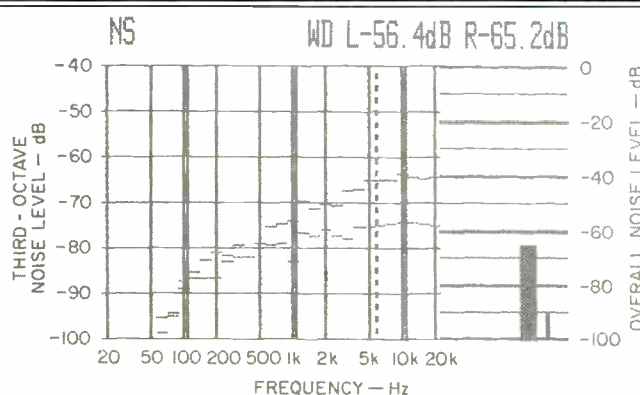


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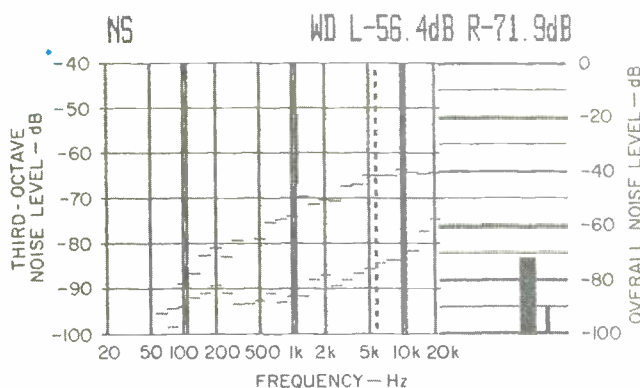
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The "Loudness" control and the Dynamic Expander were worthwhile on the road, and Denon was wise to make the latter feature adjustable.



**Fig. 7A—Tape S/N analysis without noise reduction (upper trace) and with Dolby B NR (lower trace).**



**Fig. 7B—Tape S/N analysis without noise reduction (upper trace) and with Dolby C NR (lower trace).**

dB were obtained without and with Dolby B NR, respectively. In Fig. 7B, results are shown for S/N without Dolby and with Dolby C NR. With Dolby C, I obtained an overall S/N reading of 71.9 dB, close enough to the 72 dB claimed by Denon.

Figure 8 is an analysis of wow and flutter. My tests resulted in an overall reading of 0.096% wtd. rms, slightly poorer than the 0.09% claimed.

Azimuth error, plotted in Fig. 9, amounted to 165° of phase for a 15.8-kHz test signal. That is to say, the azimuth angle of the playback differed enough from the orientation of the tracks on my azimuth test tape to cause a phase difference of 165° between the right and left channels when playing a 15.8-kHz signal. This may seem like a very large phase error, but it is fairly typical of cassette players that offer auto-reverse playback without any means for adjusting azimuth alignment.

Figure 10 shows the range of the bass control and that of the treble control. Both are very slightly greater than specified:  $\pm 10.1$  dB at 100 Hz, and  $+10.3$ ,  $-11.5$  dB at 10 kHz.

### Use and Listening Tests

I found the Denon DCR-7600 easy enough to operate and had no trouble interpreting the instruction manual or figuring out how each control was to be used. Despite the middling signal-to-noise showing of the FM tuner section, I was pleased with the sensitivity of the tuner and with the way its signal-seeking feature worked. I felt, too, that the degree of mono blending under weak-signal conditions was just right; enough separation is maintained at medium signal strengths while a good deal of noise is suppressed. The Music Sensor worked flawlessly, as long as I played tapes that had a sufficiently long pause between selections (at least 5 S). The required pause is a bit longer than it usually is on home decks that offer a music-search feature. So, if you've been recording tapes with 3- or 4-S pauses on your home machine, the DCR-7600's Music Sensor may not respond when you play those tapes in your car.

I was a bit surprised to see that Denon had included a Dynamic Expander in the DCR-7600. I know that some people are looking for effective compressors for use in cars, especially when playing CDs in a mobile environment. I certainly enjoyed the action of the DCR-7600's expander during my listening tests in the lab, with the head unit connected to a powerful home stereo amplifier and a pair of excellent speakers, but I wonder how practical such a feature is in an automobile. Perhaps a moderate amount of expansion could lend realism to the reproduced program when listening to cassettes in a car. I'll let Mr. Berger be the judge of that when he conducts his road tests. As for me, unless Ivan finds something drastically wrong with the unit during his tests, I'm prepared to say that Denon has done a competent job in designing this head unit. It should work well with almost any car-stereo amplifier of high quality.

Leonard Feldman

### Behind the Wheel

A year or so ago, I quoted Denon's Ken Furst as saying that most car stereos seemed to have been designed by people who took the bus to work. Well, Denon's designers definitely drive to the office. The DCR-7600's controls fall into logically related groups: Tape functions along the bottom left and to the left of the display and tape slot, tuner functions below the display and along the right edge of the panel, major sound controls grouped in the upper left corner. Only the loudness and expander switches seem a bit out of place, and you won't change their settings often. Other nice touches include *bidirectional* "Seek" tuning, protruding ribs on the station preset buttons, and exceptionally good night illumination.

If you connect the separate panel-illumination lead (not found on most car-stereo units) to your dashboard lighting circuit, the Denon's lights will come on when you turn your headlights on, whether the unit itself is on or off. This makes the unit easier to find and switch on in the dark. The lights dim with your dashboard dimmer too. And Denon dealers can change the color of the illumination to match your



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An interview with Anthony Federici,  
Director of Perreaux International

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**Q. Why do Perreaux components have such a high trade-in value?**

The trade-in value of Perreaux components have always been far higher than average. This is probably due to several factors: Engineering that is at the leading edge of technology... hand crafted, limited production... simple, elegant, non-trendy styling...

and exceptional value when new. To further increase trade-in value, Perreaux is now giving a one-year limited parts and labor warranty on pre-owned Series 2 that is traded toward Series 3.

---

**Q. How long do you anticipate that Perreaux will retain this exceptional trade-in value?**

Probably indefinitely, because the resale value is intrinsic to the product. Given Perreaux's reliability and longevity, a 1-year warranty on pre-owned equipment is not an expensive commitment for the

factory. In other words, the trade-in "deal" simply reflects the real world value of Perreaux. I would expect both new and used Perreaux's to continue to retain the world's highest trade-in value.

---

**Q. Why do you believe people will pay as much or more for a used Perreaux as for a new product from another manufacturer?**

Because they are already doing so with Perreaux. A used Porsche or Mercedes costs more than many

new cars. However, because essentially there are no mechanical parts, it won't deteriorate like a car.

---

**Q. Will this lead the way for audio components other than Perreaux to increase their trade-in value?**

I hope so. Because it will allow more people to enjoy quality audio. As an example: The new Perreaux Series 1 system, consisting of a tuner, preamp and power amp, retails for about \$2000. I would expect it to retain about a \$1500 trade-in

value toward a new Perreaux. This means that the consumer will have been enjoying Perreaux quality and performance for about \$500. That's only the cost of a moderate receiver.

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Despite my few quibbles, the DCR-7600 is definitely a good performer, and its human engineering is just about the best I have yet run across.

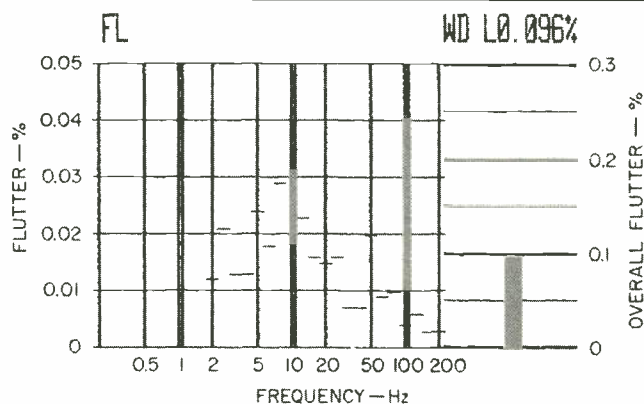


Fig. 8—Analysis of wow and flutter.

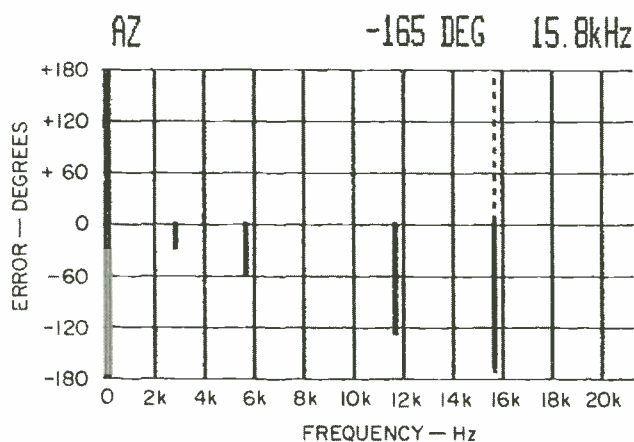


Fig. 9—Playback-head azimuth error.

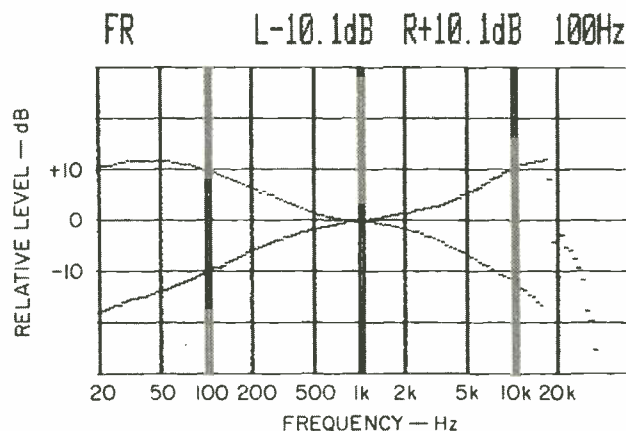


Fig. 10—Tone-control range.

dashboard's other lights (an option not mentioned in the instructions or sales literature); five colors are available for less than \$20 each, installed. When you slip a cassette into the illuminated tape slot, the tape-motion buttons light. An orange indicator on the tape-reverse button tells you the direction of tape travel, so you know which fast-wind button is for fast forward and which one is for rewind.

The "Seek" and manual tuning controls are easy to use, with the "Seek" button (which I use more often) closer to the driver. For some reason, I find a vertical row of preset tuning buttons, like those used here, easier to operate than the more common horizontal row. The tone controls' protruding ribs make it easy to tell their settings by touch. The keytone beep drove me nuts after a while, but the instruction manual explains how to shut it off.

I found both the "Loudness" control and Dynamic Expander worthwhile on the road. Denon's loudness contour seems a bit extreme, on paper (an 8-dB rise at both ends) but works out well against road noise. The expander *did* give compressed broadcast music more impact (and there's a lot of compressed music on the air); it also made some of my old Burns & Allen radio tapes sound far more lifelike and easier to understand. Denon wisely made the expansion adjustable; I'd have liked them to include a compressor position also, for tapes that have too much dynamic range for the road.

The cassette section's frequency response was about average, similar to what I've been accepting happily in my car for some time. But I'm becoming acutely aware that there are other (albeit usually more expensive) units whose response is more extended.

On FM, I noted a slight "edge" on weaker stations, audible only when the car was stationary and quiet. At first I thought this might be distortion, but, after referring to Leonard Feldman's measurements, I began to think it might be the residual high-frequency noise let through by the DCR-7600's unusually shaped blending curve. Nonetheless, the DCR-7600 brought in a few FM stations marginally better than my reference unit did and clearly brought in several AM stations that gave my reference set trouble.

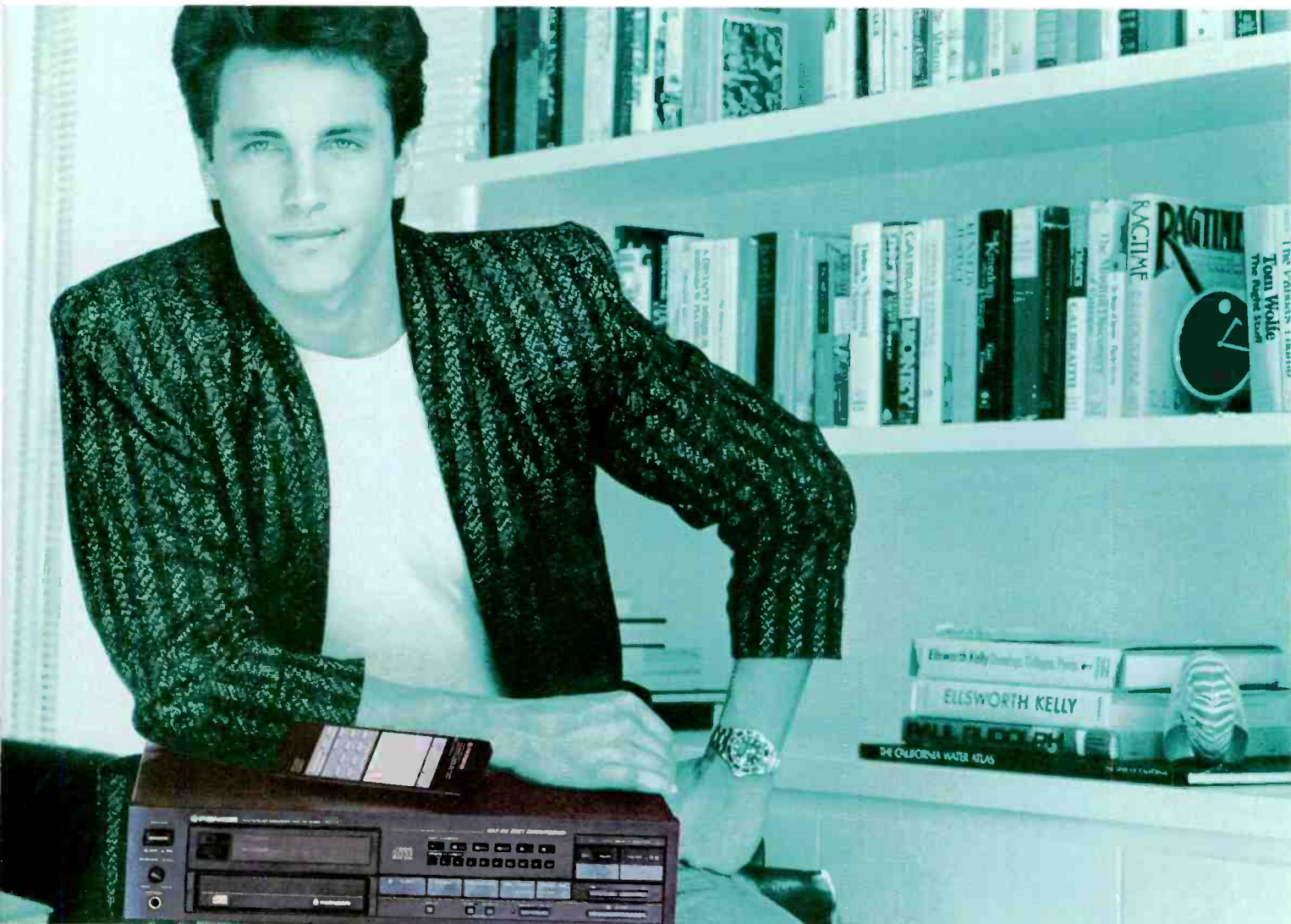
Like most car-stereo units today, the DCR-7600 turns on automatically if you insert a cassette, but the tuner must be turned on manually. Denon tells me that the power-antenna lead is energized only when the tuner is on, but the separate amplifier turn-on leads (not found on most car stereos) are energized when tuner or tape is playing. You can therefore safely listen to a tape while you go through a car wash, without losing your power-antenna shaft in the cleaning brushes. It's a minor but nice touch, one that shows Denon listens to its dealers and customers.

Despite my quibbles, the DCR-7600 is definitely a good performer, and its human engineering is about the best I have yet run across. Learning how to use it takes less than a minute—the only things you likely can't figure out without the instruction book are the expander, the beep on/off switch, and (if you haven't used electronically tuned radios before) the station memory. I would have liked a station-scan feature and about two more FM-station memories . . . but there I go, quibbling again. All in all, it's a very pleasant set to use and reasonably priced for what it offers.

Ivan Berger



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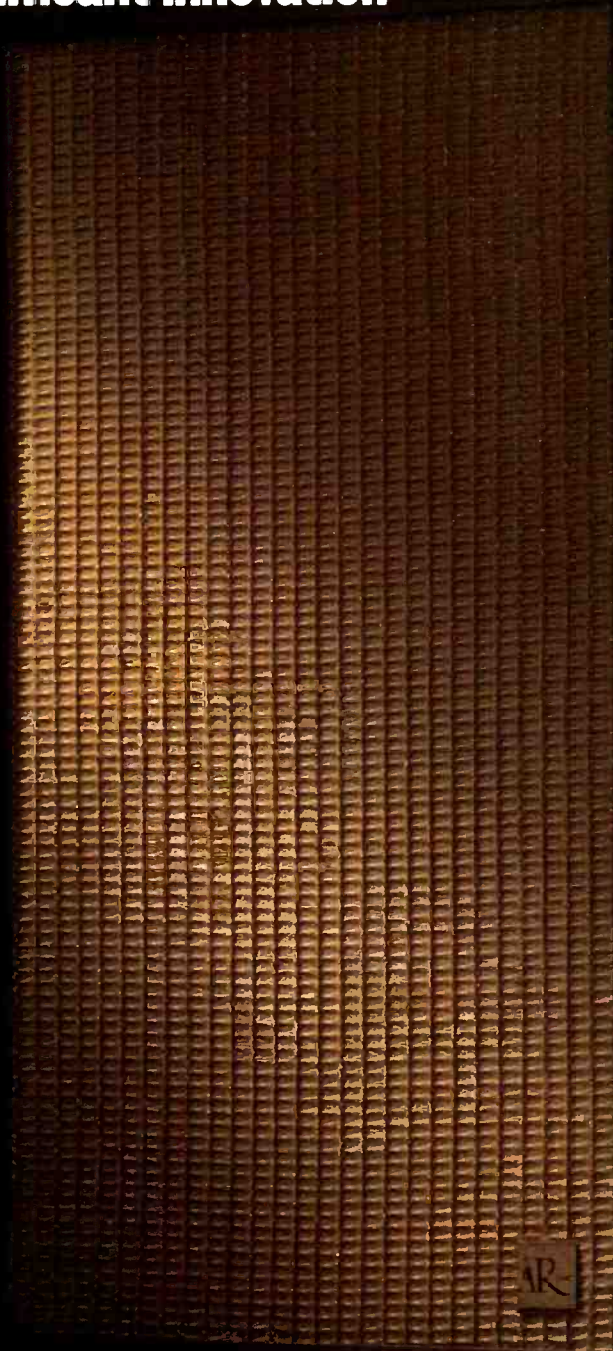
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If there's anything that'll keep you home from the drive-in, it's the new Lirpa Distortek J-X33B stereo rack system. Gettin' one good look at this 6-foot slab of knobs, lights, dials, and front-panel tattoos is like dunkin' your bean in a bucket of Bud. Make no mistake, pal, this is one suave way to impress your friends. Check it out: For \$99 you get two full pickup loads of gear, including digital tuner, suspender-drive turntable, 8½-track deck, Compact Disc player, preamp, equalizer, reverb, 200-watt power amp, TV tuner, timer, expander, spatial composer, time delay, aural rototiller, bugler alarm, remote control, triple cassette deck, electronic stylus cleaner, and Naugahyde rack with stained-glass doors—and we're not even up to the good part yet. It all drains into a pair of loudspeakers—that's *loudspeakers*—with 15-inch metal-flake woofers that'd vaporize Arnold "Conan" Schwarzenegger from 30 yards out, no lie. Sure, they got tweeters and midranges and horns and coaxial whizzer cones, too, just to keep the audiophiles happy, but don't worry, none of 'em come hooked up, so they can't slow down those amazing woofers.

So much for the high technology. You want to know what this baby'll do, right? Just put on a little Oingo Boingo and watch this rig pogo-stick itself around the room. I mean, the motion of the woofers is pure poetry. We're talkin' hi-fi. We're talkin' bass-fi. We're talkin' juke-fi. Nuke-fi. Puke-fi. First day I had it home, I put the pedal to the metal, and all the hair fell off the hippie's dog four houses down, and that dog was used to The Grateful Dead. The Lirpa folks could do a full-color ad campaign in all the big stereo rags with that hairless hound just to prove how awesome this Distortek system gets down.



I put Led Zep on the turntable, Elvis in the 8½-track, The Horizontal Mongolians in one cassette, Waylon & Willie in another, Dolly in the Compact Disc player, and then dialed in a classical station on the tuner, just to be kinky. Once you activate the patented new Sonic Bilge Pump circuitry (built into the preamp), you can switch from one source to another and never tell 'em apart. Can't tell Waylon from Elvis from Zep, and that's no idle boast. And it takes only a little fiddlin' around with the sliders to get the gospel channel on the TV to sound just like the Boingo Brains—somethin' I could never do with my old system, as advanced as I thought it was.

Watchin' this rig workin' out is an enlightening experience. In fact, you got enough lights here to illuminate half

of Las Vegas at midnight. They don't hold back on variety either: You got your horizontal red ones, your vertical banks of blue ones, your diagonal gash of greens, and a couple clumps of purple and orange that run around kitty-wumpus just to keep your interest up—and that's just the tuner. There's not one square inch on any component that isn't just forested with lights and knobs and displays and sliders. It's glorious.

Okay, you're impressed, but what about its innards, you say? I popped the hood on the power amp, which uses that new low-feedbag technology, just to check out the workmanship. It was a sight to behold: Pure empty space, save for a 1-ampule fuse and a little imported "chip" that rides herd on the light displays. I mean the



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layout is clean, friend. All that open real estate in there isn't just for looks, either: If you ever get dizzy from gawkin' at the panel, you can stick your bean inside and gulp some fresh air. Or just keep the top off and use the space to store records, tapes, ashtrays, fly swatters, whatever, because there's no circuitry to cramp ya'. Joe Bob, who's already put in his order, is gonna store his whole paperclip collection and two electronic stylus cleaners in there—gonna use one as a toothbrush. One other nice touch: If the fuse blows, the bugler alarm bugles and hollers at about 182 dB. It's a cryin' shame you can't activate the alarm while the whole system is up full tilt, just for atmosphere. I'd also like to equalize and expand the alarm to see if I can make it sound like that new sewer-rock group that just entertained at Tipper Gore's last party.

Okay, nothin's perfect, so let's pick some nits and lice: It took too long massagin' the equalizer, expander, bilge pump and psycho-holographics rejuvenator to get Wayne Newton to sound like that Albanian mud wrestler they got on cable TV. That's a real disappointment, and should be fixed in an updated model. (They promise me this one will be obsolete in a week or two, anyway.) Also, six knobs, five sliders, and eight switches all fell off the J-X33B the same day I hooked it up, which is a small thing, I admit, but one of 'em might've controlled a light display somewhere. Once, I thought I heard a melody rear its head and leak through the speakers, but the expander and equalizer put it out of its misery once I sic'ed 'em on the problem.

My scorecard: 725 lights, 558 knobs, 142 sliders, 317 switches, 112 buttons, 3 joysticks, and 2 optional biamped whoopee cushions—outstanding value at about 22¢ per gadget. Guitars come out like chain saws, drums like garbage cans, trombones like tortured cats, vocals like Nigerian wombats, tortured cats like Setay Htiak—impeccable performance, indeed. You can get the J-X33B at Honest Al's Knob City (all locations), select department stores, and assorted bagger-own supermarkets. Class like this never comes cheap, so you may have to roll a drunk to score this one. I give it four stars.

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## INFINITY RS 4B LOUDSPEAKER

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For literature, circle No. 93

Some readers of *Audio* may lack the space in their listening rooms, or the wherewithal, for the \$35,000 Infinity IRS Series III loudspeaker system. These readers will take special interest in the Infinity Reference Standard (RS) 4B speakers. They cost only \$1,078 per pair and measure only 42 x 15 x 11 inches each. Instead of weighing 1,200 pounds per system, a pair of RS 4Bs weighs only 110 pounds. They give excellent sound, whatever the considerations of size and weight.

The RS 4B is a three-way system using an EMIT tweeter, a polypropylene dome (Polydome) midrange, and two 8-inch polypropylene woofers in a sealed box enclosure. The crossover frequencies are at 600 Hz and 4 kHz, and frequency response is specified as  $\pm 3$  dB from 38 Hz to 32 kHz. The Infinity RS 4B has a wide frontal radiating pattern. To reduce diffraction interference between the drivers and the cabinet surfaces, the cabinet's corners are rounded and the grille frames are beveled. The cabinet has a number of other nice finishing details, including hand-rubbed oak veneers.

All this results in a very well-chosen set of sonic attributes and compromises. The EMIT tweeter provides very quick and transparent reproduction of the upper octaves with excellent musical life, transient information, and harmonic detail. The EMIT adds an overall grace to the sound, which is normally present only in much more costly speakers using ribbon or electrostatic drivers. At the same time, the EMIT crosses over to the midrange smoothly enough, and at a high enough frequency so that, despite the EMIT's different dispersion characteristics, attention is not called to any transition between the tweeter and the midrange.

In fact, the RS 4B is pleasantly (and unusually) free of any emphasis on the upper midrange and treble. At the same time, the EMIT provides exceptional upper-octave information in a musically convincing form. This combi-

nation of treble and midrange also makes the RS 4B sound musical over very long listening periods. (The kind of emphasis or sonic "punch" which it avoids in the upper midrange often sells speakers but rapidly loses its attraction in the home.)

The midrange is also dynamic and detailed. There are, for me, some slight hints of frequency irregularity, but these have to be expected in any speaker in this price range, and they don't prevent the RS 4B from having a more coherent and convincing midrange than most of its competition. The transient performance in the mid-frequencies is particularly good, and there is an excellent impression of musical life, throughout the midrange, that blends very well with the tweeter.

There also is good transition between woofer and midrange, with little of the "suck out" between the lower midrange and upper bass common in many competitively priced speakers. I

would, however, like to see some improvement in this area to cure some minor irregularities in the timbre. I do not find that these result in any dominant coloration, as is common in many less well-designed speakers, but male voices and the lower register of strings are not as musically convincing to me as on some of Infinity's upper range of speakers.

The bass remains relatively tight, even with complex percussion and full orchestral music. Bass performance is limited in depth and power compared to the best full-range monitor speakers, but the RS 4B can generate room-filling power down to around 40 or 42 Hz. It is not a super "rock" speaker that can deliver deafening bass, but the low frequencies remain musically natural at loud volumes. The RS 4B is capable of handling the dynamics of rock, jazz and full orchestral music at any reasonable listening level.

Although the RS 4B does not pro-





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duce a large sound stage, it does have good sound-stage proportions, depth and imaging. The general sound character is to me approximately fifth-row to mid-hall in terms of frequency balance, which suits the slightly "forward" sound common in the electronics I think likely to be used with this speaker. The imaging in percussion and strings is particularly good, as is the stability of the imaging. The instruments spread in a smooth curve across the sound stage, with no tendency to group around each speaker for a "hole in the middle" or "dual mono" effect.

The RS 4B does sound better with its grille cloth removed and with its front feet extended to maximum length to tilt it backward. Its bass and lower mid-range also improve if spiked feet—available at most audio dealers—are substituted for the smooth feet provided by the manufacturer.

The sound also improves if the speaker is kept at least 2 feet from any wall or furniture. A distance of 3 feet is audibly preferable, and furniture like coffee tables should not be placed between the speaker and the listening area if at all possible. The distance between the speakers should be slightly greater than the distance from each speaker to the listening position, and this can be done without a "hole in the middle" effect.

These recommendations apply to most closed-box speakers, but the RS 4B is of sufficiently high quality that the resulting benefits will be more dramatic. They will open up the sound and "float" the sonic image in a way that will greatly improve the illusion of being at a live performance. Note, however, that this ability to float the sound stage also makes proper adjustment of your balance control more critical. Even small changes in the balance, to center the overall performance for a given record or CD, will greatly improve the depth and width of the sound stage.

In short, if you want many of the virtues for which Infinity's most expensive speakers are famous, you can get them in the Infinity RS 4B. It may not have all the virtues of the IRS Series III, but it is extremely competitive in providing value for money and the illusion of a live musical performance.

*Anthony H. Cordesman*



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## GERSHWINERS



Photograph: Frank Driggs Collection

**George Gershwin: Rhapsodies.** Members of the Los Angeles Philharmonic; Michael Tilson Thomas, piano. **CBS MK 39699.**

A wonderful combination of repertoire, performance and recording makes this an exceptionally enjoyable disc featuring Michael Tilson Thomas, who has been exploring the works of George Gershwin for many years. On this recording he presents two familiar pieces in new forms—"Rhapsody in Blue" and "Second Prelude"—and several works never recorded before.

What he accomplishes is analogous to what early-instrument specialists are doing for Baroque and classical music. With the help of Ira Gershwin, Thomas restored the original scores and developed a style of performance that makes George Gershwin's music sound the way the composer played and heard it in his lifetime. Producer Steven Epstein and his engineers Bud Graham and Tim Geelan recorded the piano in a way that reveals subtle, slowly changing colors in the decay portions of its tone. The same quality is present in both the studio recordings of the solo piano pieces and the on-

site recordings with members of the Los Angeles Philharmonic.

"Rhapsody in Blue" sounds especially fresh and vigorous because of the return to the lean muscularity of Ferde Grofé's original arrangement for the Paul Whiteman band. But the recreation of the performance style is what is most noticeable. The slow, wide vibratos, the sliding tones, the phrasing, and the articulation all have an unfamiliar sound, but they seem exactly right for the music.

Thomas likes brisk tempos, and they are a breath of fresh air. For the famous "big tune" he takes it slow enough but without allowing the melody to become ponderous. In the solo part, he often uses rubato to give the effect of improvisation. This is true rubato, a kind of rubber-band effect with the tempo, as Thomas slows down and even hesitates on a note before dashing ahead to catch up with the music.

Thomas' performance of the "Second Prelude" conveys the atmosphere of a hot, lazy afternoon. It has a laid-back, introspectively amorous feeling, by turns passionate and lyrical. By comparison, Leonard Bernstein's interpretation (on Deutsche Grammophon

DG 410 025-2) is a smoldering torch song, filled with extroverted anxiety.

Among the premiere performances on this disc is a delicate, airy piece called "For Lily Pons." It's a fairly late work, written when Gershwin was reaching out for more subtle harmonic colorations and moods. Ira Gershwin discovered it shortly after George's death, and found the words "for Lily Pons" scribbled across the top of the incomplete manuscript. The musical effect is almost like Debussy, but the piece retains Gershwin's thoroughly American point of view.

Anyone who knows and loves Gershwin's music will want to have this recording. The newly discovered pieces are, alone, worth the price of the disc, and the sound is clean, clear and spacious. Thomas' authoritatively authentic performances make the music sparkle with the light of Gershwin's creativity.

Steve Birchall

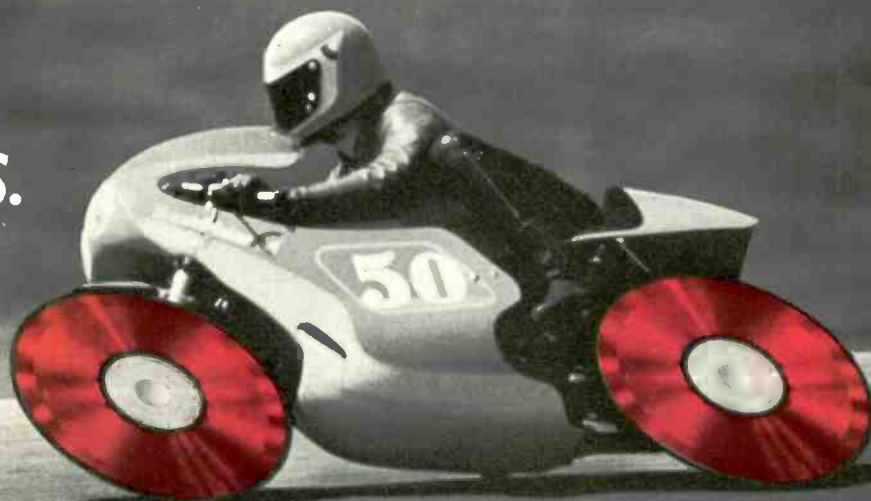
**Hot House Flowers:** Wynton Marsalis **CBS CK 39530.**

Listening to *Hot House Flowers* is like watching a bouquet of delicate tropical blossoms open up and reveal their intricate structures and subtle fragrances. Each track demonstrates the expressive control that Wynton Marsalis et al. have over every parameter of





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# APRIL

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**7**

**8**

**OZZY OSBOURNE**  
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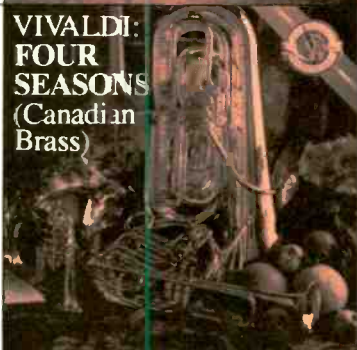
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HOW COULD IT BE



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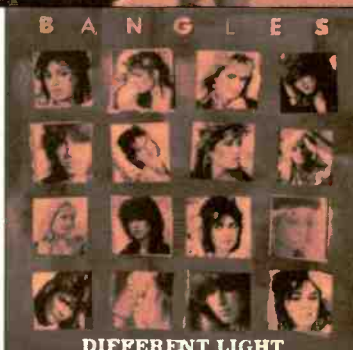
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André Previn furnishes a lush, unabashedly romantic reading of Rachmaninoff's melodious score.

sound—from dynamics, timbre, attacks and articulations to style.

At the same time, the musicians expand the range of these microscopically graduated scalings, taking every sound to the limits of their technique. Paradoxically, this intensely disciplined attention to detail brings a wide variety of sounds and precisely expressed emotions to the music. Producer Steven Epstein plays his instrument (the recording studio) with equal artistry, enhancing the communicative power of the album.

"Django" begins with ghostly, widely spaced sounds in the bass, plus trumpet and closely spaced chords in the high woodwinds. Listen for the continuously changing timbre Ron Carter gets on the sustained bass. He does it by slowly lessening the firmness of the string against the fingerboard to get a slight breakup of the tone.

The title track, composed by Marsalis, shows off the sonic subtlety of the CD in two wonderfully *musical* ways. In the introduction, a fast diminuendo and precisely terraced dynamic levels sound so naturally live that they almost pass by unnoticed. Later, in the series of solos on trumpet, flute, sax and acoustic bass, you can hear with unaccustomed clarity all the nuances of phrasing and attacks these musicians have at their disposal.

The pastel bouquets of sounds in Robert Freedman's arrangements explore the potentials of the CD medium still more effectively. In "Hot House Flowers" the accompaniment has a complex, multi-level texture. The bottom layer is a plucked pedal tone, plus an intricate acoustic bass figure of virtuosic difficulty played with ease by Carter. Over this, Jeffrey Watts adds a rhythmic figure played on hi-hat and suspended cymbals, extracting an astonishing variety of colors from his in-

struments. Finally, Kenny Kirkland on piano plays chords in ever-changing patterns—groups of two or three or one, staccato and sustained, with pedal and without.

Epstein gives each of these layers its own acoustic environment, a polyphony of ambiances that complements the arrangement's complexity. Sometimes he plays with these acoustic microworlds as if they were instrumental effects. At the end of the sax solo, the reverb on the drums gradually increases by imperceptible degrees. This opens up the sound, giving the effect of a movie camera receding for a long shot of the entire ensemble. It provides a moment of relaxation before the jump back to the close-up of the soloist. With all this going on, you still have to listen to the incredible solos, the main features of the song.

*Hot House Flowers* represents an intensely intellectual, tightly controlled approach to jazz. Within that structure, Marsalis and friends have the freedom to improvise and to explore its furthest reaches with emotion and depth. Epstein's production presents these tropical blooms in thoughtfully designed acoustic settings. *Steve Birchall*

**Rachmaninoff: Symphony No. 2.** The Royal Philharmonic Orchestra, André Previn.

**Telarc CD-80113.**

**Rachmaninoff: Symphony No. 2.** The Los Angeles Philharmonic, Simon Rattle.

**EMI CDC 7 47062-2.**

Telarc's recording of the glorious Rachmaninoff Second Symphony is the label's second venture with André Previn and the Royal Philharmonic Orchestra. In his first project with these same forces, recording Tchaikovsky's Fifth Symphony, engineer Jack Renner

didn't quite master the famous Walthamstow Town Hall in London. On this Rachmaninoff recording, however, Jack has gotten a lovely, natural sound from Walthamstow's vaunted acoustics. String sound is lustrous, clean and well defined without any wiriness. The woodwinds are vibrant and well projected, brass has wonderful bite and presence, and percussion is clean and articulate.

The music is to Previn's taste, and he furnishes a lush, unabashedly romantic reading of this melodious score. Under his steady baton, the Royal Philharmonic provides a very high quality of execution.

Young Simon Rattle's recording on the EMI CD has some good moments, but at this stage of his development he simply doesn't match the refinement and elegance of Previn's reading.

*Bert Whyte*

**Prokofiev: Cinderella.** The Saint Louis Symphony, Leonard Slatkin.  
**RCA RCD1-5321.**

This CD is an outstanding recording of Prokofiev's delightful Cinderella Ballet. It's also a rather more extensive suite than is usually performed; I recorded this work with Leopold Stokowski and the New York Philharmonic, and that version was quite a bit shorter than what we have here.

This has to be RCA engineer Paul Goodman's masterpiece; it's even better than his Grammy Award-winning recording of Prokofiev's Fifth Symphony with these same forces. Paul has caught the perfect balance between fine orchestral detail and the warm ambience of Powell Hall in Saint Louis. The sound is very clean, tonally rich and sumptuous, with splendid depth and instrumental localization.

There are many wonderful sections in the score, notably "Cinderella's Departure for the Ball," "Mazurka and Entrance of the Prince," "Entertainment of the Guests" (which has a direct quote from "Love for Three Oranges"), and "Duet of the Sisters with the Oranges," a boisterous dance with staccato accents of trumpet and much rollicking interplay between high strings and trumpet. The "Waltz Coda" is a rather sardonic waltz, with the high strings played with great vehemence. The stri-



# The Sound of Perfection.

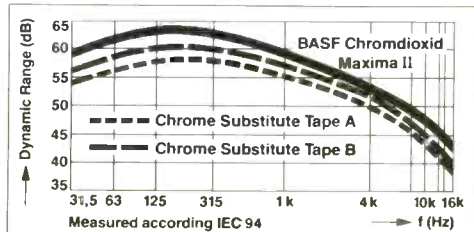


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The airy arrangements on Sade's new disc leave plenty of quiet spots where digital silence is a superb enhancement for the splendid, jazzy pop.

dency that is heard here is not a fault of the recording or digital processing, but it is a true reflection of how Prokofiev wanted the strings to sound in this particular section. This waltz leads directly to the fateful midnight strokes of the clock, with the ticktock of the clock represented by very loud wood blocks. In a great dynamic outburst, midnight is tolled by loud orchestral bells and a huge tam-tam of crushing sonority. You are hereby warned to watch your playback levels, as this section's dynamic range is a real speaker-blower!

Slatkin seems to have a particular affinity for the music of Prokofiev. He gives us a superb performance of this work with orchestral playing of very high order. Don't miss this CD!

*Bert Whyte*

**Promise: Sade  
Portrait PK 40263.**

Sade glides—cool, sexy, and always in control—through this smoky supper club of an album. Although the atmosphere is hazy from the quiet fires lit by this ever-so-elegant lady, the digital recording is as clear as an icy martini in a classic, long-stemmed cocktail glass.

On *Promise*, the follow-up to *Diamond Life*, Sade (the group and the singer) trails their debut like a second set up on the stand after the midnight show. There are no surprises here, no departures from the signature Sade sound. Some may find these all-of-a-character cuts repetitious, others may appreciate the soothing, seamless flow of the music.

The recording is superior. These airy arrangements—based on the vocal, saxophone, guitar, keyboard, and bass lineup of the band (drums, percussion, horns, and strings are borrowed)—leave plenty of quiet spots where digital silences are a superb en-

hancement. The clarity of tonalities as dissimilar as bottom-end electric bass notes and high, delicate wind chimes is impressive. Instrumental location and definition are breathtaking. The sound of heavy rainfall in "The Sweetest Taboo" will have you looking out your window to check the weather, and, with eyes closed, you might swear that the solo acoustic piano in "Punch Drunk" was located in your own listening room.

This is splendid, jazzy pop for the sophisticated night bird, and a technically stunning Compact Disc. Sade has certainly fulfilled its *Promise*.

*Paulette Weiss*

**Schubert: Symphony No. 9 in C, "The Great." The Cleveland Orchestra, Christoph von Dohnányi. Telarc CD 80110.**

This new recording of the Schubert Ninth Symphony is, by all odds, the most satisfactory in terms of sound and performance to be issued thus far on CD. Christoph von Dohnányi has the right temperament for this music and provides a classically structured "middle-European" performance of great power and elegance. His Cleveland Orchestra responds with playing of exquisite refinement, especially the strings.

Schumann called the Schubert Ninth the "symphony of heavenly length," but if this version had included all the repeats in the score, it might have been a bit longer than heavenly! Dohnányi omits all of the redundancies and traverses this towering work in slightly over 49 minutes.

Jack Renner used Masonic Auditorium instead of his usual Severance Hall in Cleveland for this rather massively scored music, managing a superb balance between high orchestral definition and spacious acoustics. Jack gives this noble music a richly resonant sound, majestic in its proportions and visceral in its power. *Bert Whyte*

**Valotte: Julian Lennon  
Atlantic 7 80184-2.**

That Julian looks and sounds eerily like his father John Lennon has been said before; this Compact Disc reveals the resemblance in greater detail. Phil

Ramone has created a lush, complex cradle for the son of the late Beatle. It is a flawless production, heavily textured with layers of sound in which each individual instrument maintains its integrity. It is the aural equivalent of looking into sunlit, pristine waters to see tropical fish gliding below, individually or in schools, layer upon layer of them, each fish defined in color and form as far as the eye can see.

Clean CD silences have great effect here; the majestic acoustic piano chord that opens "Well I Don't Know" is all the more impressive for its appearance out of absolute silence, and the complete absence of sound in the moment following Julian's emphatic line "makes me wanna shout" on "OK for You" underlines the powerful emotion poured into the word "shout."

Strong emotion drives this disc throughout. Although they could be interpreted as love songs, most of the cuts are apparently belated son-to-father conversations. They are heartfelt expressions of love tempered by questions, a bittersweet probing for meaning, for explanations of past events.

Besides his distinctive nasal intonations, the younger Lennon has inherited his father's musical talents. Julian handles lead vocals, keyboards, bass guitar, Simmons drums, and percussion. His sophisticated lyrics and melo-





Each cut on *Sportin' Life*, Weather Report's latest album, uses a carefully defined group of sounds and has an identifiable acoustic ambience.

dies are brilliantly supported by the arrangements of Barry Becket and the Muscle Shoals Rhythm Section, and benefit as well from the perfect horn accents arranged by David Matthews.

A memorable album, an excellent Compact Disc. *Paulette Weiss*

**Sportin' Life: Weather Report  
CBS CK 39908.**

Weather Report never stops evolving and assimilating new styles into its repertoire. This time, Joe Zawinul's group has chosen a Central American/Caribbean style which is as eclectic as the culture of that part of the world. From the surprise vocal introduction of the opening track to the end of the disc, *Sportin' Life* is filled with fascinating sounds—traces of Indian flutes, for instance, and the sound of steel drums. But through it all, Weather Report retains its essential identity. No matter what the group does, their music is uniquely their own.



The Weather Report style is like chamber music—each song uses a carefully defined group of sounds, and the textures are basically clean and open. Mino Cinelu's complex percussion never obscures the exotic rhythms and colors.

Each song has its own identifiable acoustic ambience. Coproducers Zawinul and Wayne Shorter contrast the pastoral, outdoorsy sound of "Confians" with the extroverted, metallic sound of "Pearl on the Half Shell."

Even more striking is how Zawinul and Shorter retain the ambient character of "Pearl" for the introduction of the next track, "What's Going On," but quickly change to a quieter, more intimate feeling, complete with cocktail-party vocal effects. It's a wonderful blend of recording technology and musical imagination.

*Sportin' Life* sports subtleties of tone, dynamics, mixing, and ambience that are easy to hear and beautifully performed. *Steve Birchall*

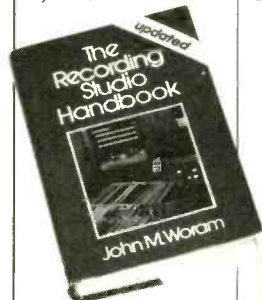
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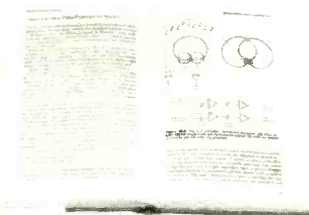
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On this disc of popular French confections, sound and performance meet the usual high standards of Neville Marriner and his Academy of St. Martin.

**Days Like These:** Jay Hoggard  
**GRP D-9516.**

Sound: C+ Performance: C-

Jay Hoggard is a skilled and under-recorded artist who polished his vibraphone with some of the seminal figures of New York's mid-'70s and early-'80s jazz scene. Chico Freeman, Anthony Davis and Clifford Thornton benefited from his colorations. He can exude the warmth of Milt Jackson, or the speed and complexity of Gary Burton, but also a tribal earthiness and power that is strictly his own. That presence can be heard on this 1979 recording, if you want to sift through producer Dave Grusin's clichéd funk arrangements.

"Samba Pa Negra" opens the disc with a pleasant Latin shuffle and a playful theme, with Hoggard's vibes doubled by Dave Valentin on flute. Hoggard breaks out of the head like he's champing at the bit and launches a fleet, melodic improvisation, a Herculean effort considering Grusin's wooden comping at the keyboard.

The string arrangements on most of the pieces were added as an afterthought, lifted from "String-Sweetening Book #1." Background choruses appear out of place. On the ballad "We Got By" they sound like they were sung through surgical masks. Chico Freeman, who can elevate the most mundane recordings, has trouble rising up to a slow burn on "Brown Lady with the Braids." Only percussionist Nana Vasconcelos seems oblivious to the mediocrity around him as he percolates and hums his talking drum solo on "West End Dancer."

Simply put, *Days Like These* is an atypical recording for Hoggard, who is heard to much better effect on his 1982 recording, *Mystic Winds, Tropic Breezes* (India Navigation). It's definitely an unsatisfying exercise for a CD

player. The analog master is brisk and clear and GRP did a fine job on the digital mastering transfer, but it's all mixed to the middle of the dynamic range. After all, this record wasn't meant to excite; it's only sophisticated background noise. *John Diliberto*

**Ravel: Le Tombeau de Couperin; Debussy: Danse Sacrée et Danse Profane; Fauré: Dolly Suite; Ibert: Divertissement.** The Academy of St. Martin-in-the-Fields, Neville Marriner.  
**Vanguard CD 25019.**

Neville Marriner and his Academy of St. Martin-in-the-Fields orchestra have established a great rapport in the many years they have worked together. They have made many recordings, mostly of what can be described as light classical music. Their performances are rarely less than good, quite often brilliant, and, on some works, near-definitive. Marriner and his orchestra have also fared very well in matters of sound, reaping the benefits of much fine engineering.

On this Vanguard CD of some well-known French confections, performances and sound quality are up to this group's usual standards. Ravel's popular "Le Tombeau de Couperin" and Debussy's "Danses Sacrée et Profane" receive carefully wrought, well-balanced performances, characterized by superb playing. The important harp in the Debussy work is beautifully recorded. The Fauré "Dolly Suite" is a tuneful trifle. The real treat is Ibert's wonderfully saucy, racy, irreverent "Divertissement." Marriner offers a brilliant reading, full of wit, with a nice handling of the satirical elements in the score. In "Cortege," the second section of the piece, he captures well Ibert's delicious burlesque of the "Wedding March." The closing "Pa-

rade" and "Finale" are rowdy and raucous, and the parody on "cancan" themes is played at a breathtaking tempo.

The sound is clean and well balanced, its high definition clothed in the warm ambience of EMI's Abbey Road Studio One. *Bert Whyte*

**1984: Van Halen**  
**Warner Bros. 9 23985-2.**

Van Halen got a lot of mileage out of the LP 1984, and the flamboyant David Lee Roth eventually used it as a springboard to his own solo recording career. 1984 features the familiar chart-toppers ("Jump," "Panama," and "I'll Wait") and just about as many pyrotechnic guitar solos from whiz-kid Eddie van Halen as my inner ear can handle in one sitting.

The problem with this CD lies in its heavy-metal portions; the digital medium cannot clarify material that was meant to impact as a massive glob of sound. Eddie van Halen is a fuzz-tone guitar freak, and most other instrumental elements on this album are slammed on top of each other with all the delicacy of a guacamole-filled balloon hitting the pavement from 10 stories up. Roth's vocals are generally recorded far back in the mix, and drums, bass, keyboards, and guitars plunge forward in an unholy alliance to test the aural pain threshold of American youth. The cymbals on "Drop Dead Legs" are a hissing smear of static, and "House of Pain" is a stew of instrumental noise with drums and vocals surfacing like lumps of steaming meat. The frantic pace of "Hot for Teacher" and "Girl Gone Bad" adds speed to injury.

Ted Templeman's production is calculated for this effect. When he likes, he can bring Roth's vocal forward, clear and intimate in a spoken monolog over the blazing instrumentals of "Panama," or place a lovely, clean guitar over the sharp metallic ping of cymbals in the "Top & Jimmy" intro. It's just that he rarely chooses to do so.

Even with so much built-in distortion, the album itself is fun. It's energetic, hard-hitting Van Halen at their best, and probably their last studio recording with dear David Lee up front.

*Paulette Weiss*



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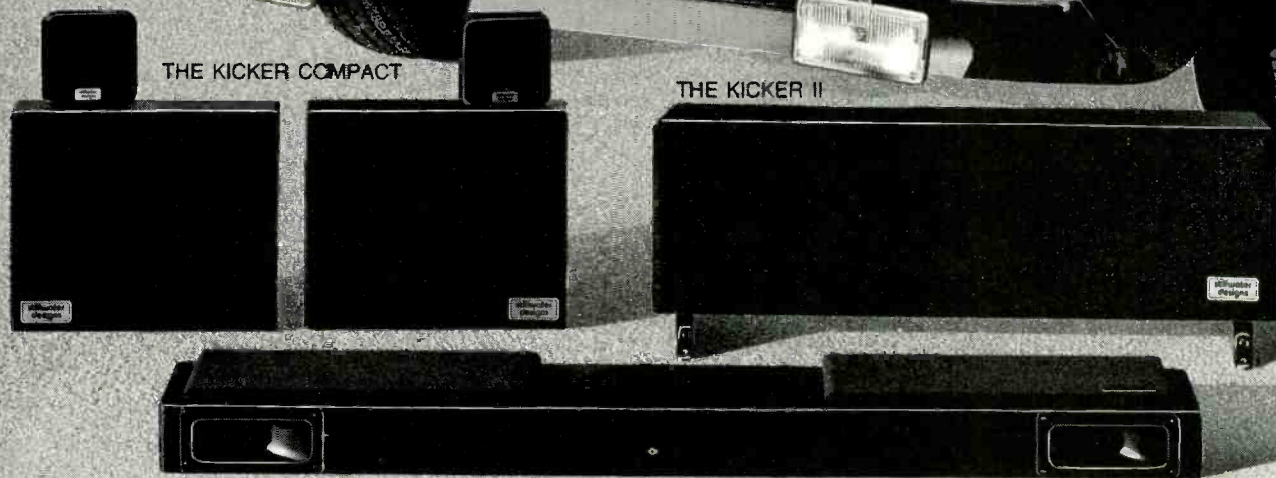
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## UNITED GREATS

**Sun City:** Artists United  
Against Apartheid  
**Manhattan ST-53019, \$8.98.**  
Sound: C+ Performance: B-

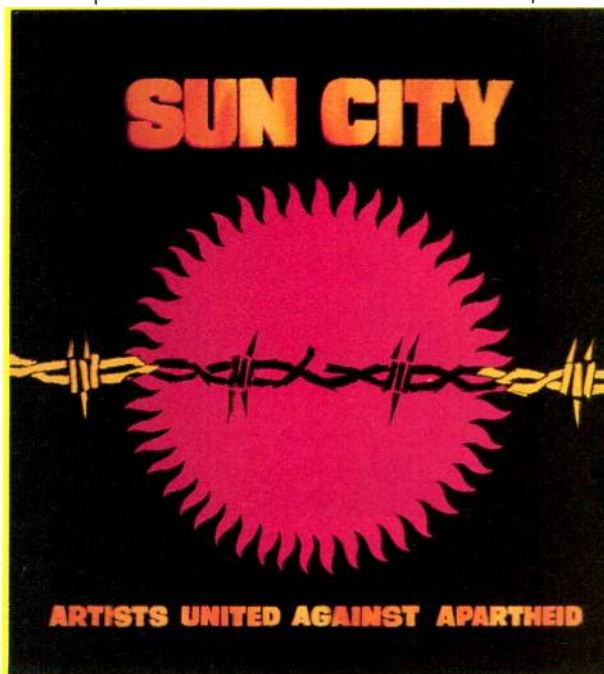
While it's impossible to measure the altruism of this project against that of any other "Aid," it's easy to argue that *Sun City* presents its anti-apartheid cause with the most interesting music. Its jazzy jams, funky anthems, stripped-down blues and experimental collages are miles away from the enervated, soda-commercial pop we've heard elsewhere; they evoke the very struggles that the participants are trying to relieve.

For instance, the title track takes aim at the South African casino resort which caters to rich whites and is located in the middle of a vast urban slum. Against a gutsy, driving background, irate singers jump in and out with fragments of the lyrics as if they're jabbing spears at some huge creature doomed to extinction. Indeed, that's the end which they hope to speed with this album's proceeds.

*Sun City* features a much more eclectic lineup than any similar project: Mainstream heavies such as Springsteen and Dylan join forces with Miles Davis, Herbie Hancock, Ron Carter, Jackson Browne, Joey Ramone, Lou Reed, Bono, Bonnie Raitt, and a host of other rockers, rappers, and distinguished funk and reggae artists. Peter Gabriel fans starving for new material will be delighted with "No More Apartheid," a long cut featuring Gabriel keening wordlessly over the kind of fluid yet percussive background he helped pioneer.

The project was organized, of course, to feature as many artists as possible, but instead of an unpalatable stew of styles, producers Little Steven and Arthur Baker have forged disparate musical attitudes into a set of strong, separately flavored songs. Despite the vast number of engineers and the use of 15 studios, *Sun City* is a cohesive recording unspoiled by so many cooks and kitchens.

Susan Borey



**Visions of Excess:** The Golden Palominos  
**Celluloid 6118, \$8.98.**

Sound: B Performance: B+

For sheer coolness of conception alone, The Golden Palominos should be applauded. Anton Fier, New York City downtown drummer of some repute, gets the go-ahead to do his own record, and he pulls in a load of very talented people to contribute their creative two cents. He manages one "name" singer (Michael Stipe of R.E.M.), one legendary guitarist (Richard Thompson), two greats from musical movements of days gone by (Jack Bruce of Cream and Johnny Rotten of The Sex Pistols), the hottest session guys in Manhattan (Bernie Worrell and Bill Laswell), a founding father of New Wave pop (Chris Stamey), and a really good singer who nobody knows about but who is definitely on the way up (Syd Straw). We're talking almost-all-star cast here, so expectations naturally run high.

About half of the time they triumph; Moby Grape's "Omaha" (the only cover tune), "Clustering Train," and "Silver Bullet" are certainly standouts. The performances on these cuts are confident and emotive, the songs somewhat jammy at times but basically co-

herent. A lot of the rest sounds like instrumental tracks with vocals grafted on, after the fact. It's okay to make records that way as long as they don't sound like they're made that way, and this is our only real bone to pick. They should have recorded more material, so they could have picked the cream of the crop.

The general musical direction is jangly-pop with modern rhythms supporting. It's a bit bluesy at times, but the tracks do fit each singer rather well. Johnny Rotten's "The Animal Speaks" could be mistaken for something by Public Image. Syd Straw's somewhat Chrissie Hynde-like vocals are given Pretenderish support from the group which Anton Fier has assembled here, and Michael Stipe is given a

track that seems rooted in the same traditions as R.E.M.

All things considered, this effort is valiant and is true to its hip ethic. Very few drummers can make solo albums that are interesting at all, and it only makes one eager for the next vinyl by this strange musical amalgamation.

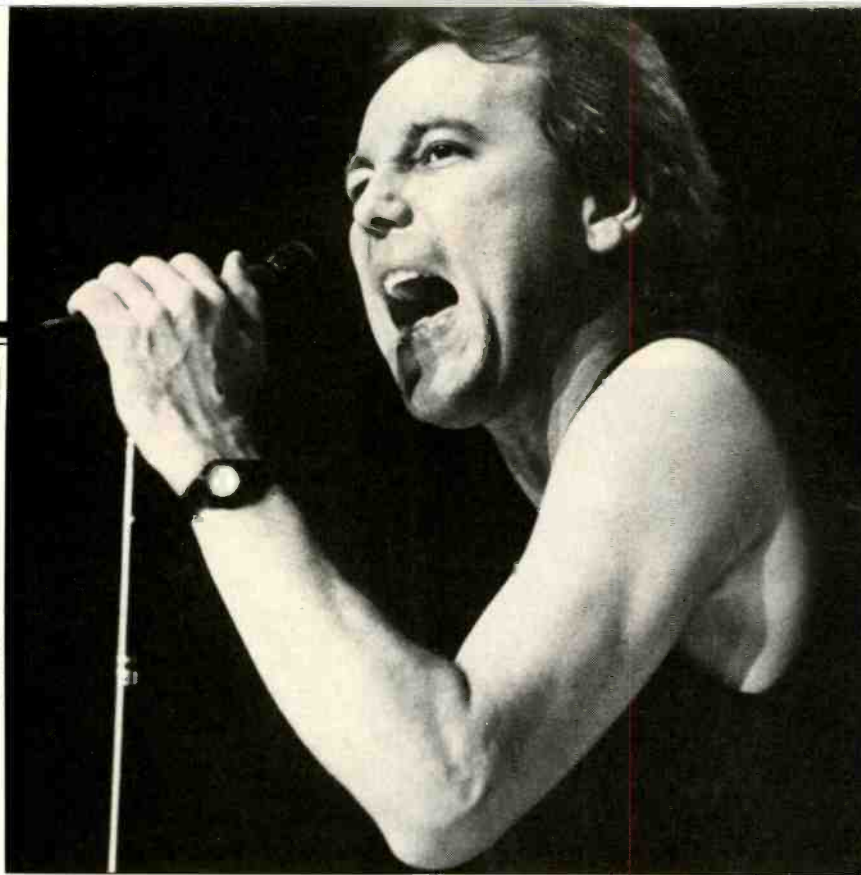
Jon & Sally Tiven

**Escenas:** Rubén Blades y Seis del Solar  
**Elektra 9 60432-1, \$8.98.**

Sound: B Performance: B+

If Rubén Blades wants to be a big star in American pop music, he'll have to look harder to find the right door to slip through. Though he's certainly energetic enough, his sound is too polished, too Latino for the rock mainstream and, on the surface, not spectacular enough for a more sophisticated crossover crowd.

To fully appreciate Blades, who some say is a bit obscure, you've got to make a few investments: Become attuned to the complex subtleties of salsa, and take time to read the translations of Blades' lyrics. A champion of Latino music, Blades has chosen to sing in Spanish about seven "escenas," or scenes. He treats each slice of life with a poetic touch comparable



Many instruments fuse into one galvanized body of dense and complex sound on Rubén Blades' fresh and colorful *Escenas*.

to that of Pablo Neruda; mundane scenes are portrayed without glitter, charged with emotion.

Blades is by no means a purist; as the best crossover artists do, he retains the root matter and then branches out with innovations. Funky bass helps balance pure salsa's usually top-heavy tone, and jazzy keyboard solos (including an understated one contributed by Joe Jackson) further widen the horizon. Synthesizers do double duty, subbing for horns as well as providing atmosphere. The music is always very busy, regardless of tempo, except for "Silences," a ballad on which Linda Ronstadt does a duet with Blades in a rather limp and saccharine arrangement.

Still, Blades has kept the most endearing and enduring attributes of salsa alive and kicking on *Escenas*. The album's passion and energy are enhanced by crisp rendering of the instruments, and the vocals are not watered down by too much processing. The percussion is placed up front in the mix, and the many instruments fuse into one galvanized body of dense and complex sound. Blades sticks to an overall conservative production style, serving up a fresh, colorful salsa blend.

Susan Borey

**So Many Rivers:** Bobby Womack  
MCA 5617, \$8.98.

Sound: B Performance: A-

Of all the singer/songwriters left from the golden era of soul music, Bobby

Womack is probably the most talented. Although many of his peers have died, and plenty peaked more than 10 years ago, Womack continues to prove himself in top form, or close to it, every time he ventures into the recording studio. His last album, *The Poet II*, was a brilliant piece of work—first-class songs, unbelievable singing, tasty arrangements, and classy production (courtesy of former Rolling Stones producer Andrew Loog Oldham). This album, produced by Bobby and his drummer James Gadson, is not quite as consistently mind-blowing as its



predecessor, but it certainly is in the same ballpark.

There is an urgency, a vibrancy and a conviction in Womack's vocal delivery that can put across even the most superficial lyric, and he puts himself to the test this time with songs like "Let Me Kiss It Where It Hurts" and "So Baby Don't Leave Home Without It." Early on, Bobby proved himself a master craftsman at songwriting, with "It's All Over Now" and "Looking for a Love," and every one of his albums has had at least a couple of gems. In fact, Womack pulls an old chestnut out of his catalog with "Check It Out" (from his *I Don't Know What the World Is Coming To* album), and the new version actually beats the original. Why he chooses to cover Curtis Mayfield's "Gypsy Woman" when he's got such great songs of his own is beyond us, but he can do little wrong even when he's slightly below par.

It would be a lie to say that this is the greatest Bobby Womack album ever, but even when this guy is cruising, he beats most of his contemporaries running full-throttle. When people like Paul Young and Mick Jagger line up to pay their dues, Bobby is there to collect—and rightly so. It'd be nice to get him together with a great producer, but we'd even take Womack's basement tapes over the polished masters of most artists.

Jon & Sally Tiven

**Pack Up the Plantation—Live!** Tom Petty and The Heartbreakers

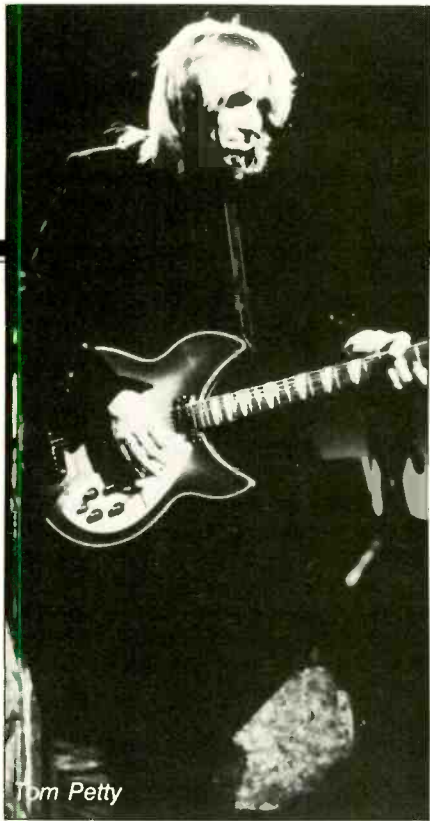
MCA 2-8021, two-record set, \$10.98.

Sound: B- Performance: A-

I lived in Miami during the mass immigration of the Cuban *Marielitos* refugees, back when Tom Petty's song "Refugee" was current. The Miami radio stations, as if by consensus, dropped the song from their playlists. They didn't really have to; most of the *Marielitos* didn't speak English well enough to understand the lyrics, and they and their relatives had other things to worry about. But "Refugee" was more than the sum of its music and words; like the best rock songs, it was a dangerous anthem. On this concert double album, Petty redefines the song through sensibilities changed over the last six years.

He accomplishes this partly by



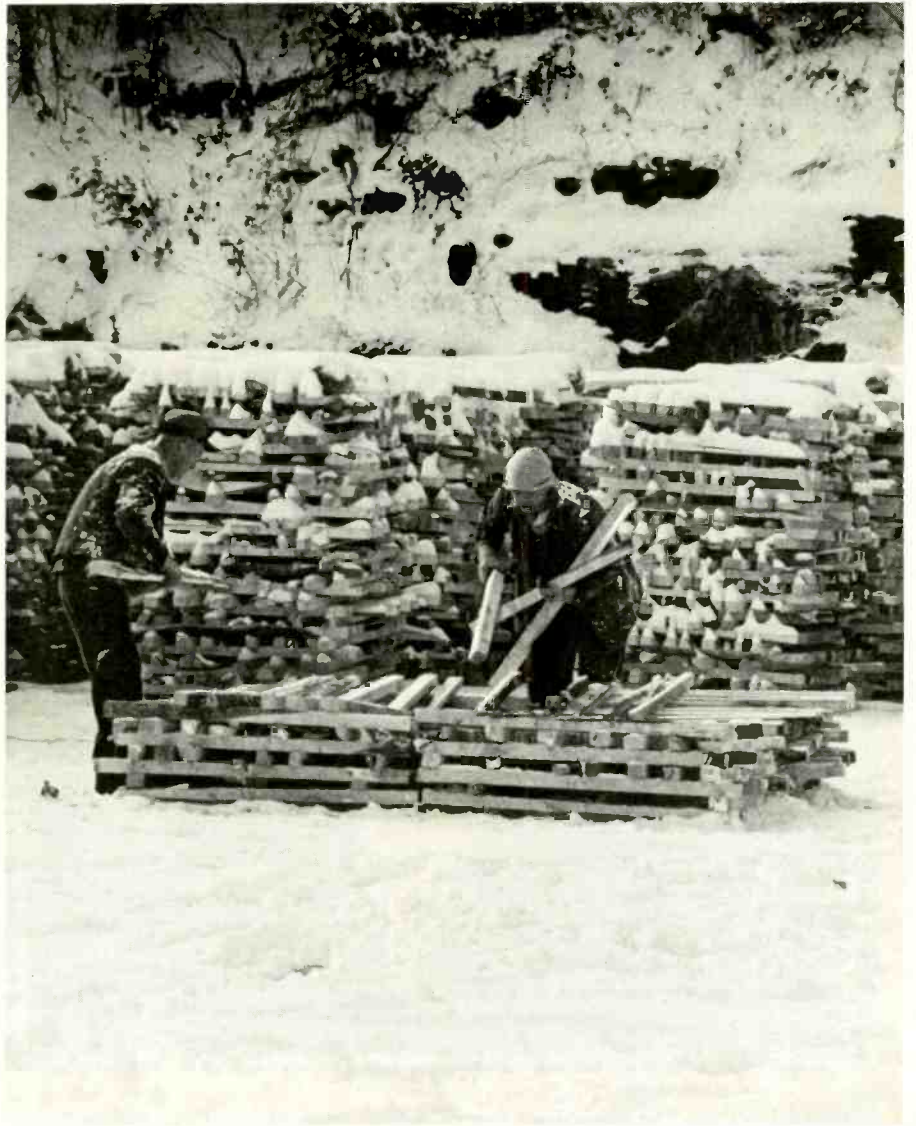


Tom Petty

beefed-up instrumentation—the five-piece Heartbreakers are joined by a horn trio, a backup vocal duo, and guest vocalist Stevie Nicks (on “Insider” and “Needles and Pins”). Nothing twangy about it—lead guitarist Mike Campbell fine-chops hard, nervous, jagged notes; drummer Stan Lynch slams and holds instead of tippy-tapping. The sound is cynical, almost angry; without calming vocal phrasings, it would be harsh. Fortunately, this retrospective is introspective.

The album opens with The Byrds’ “So You Want to Be a Rock & Roll Star,” climaxes with the defiance of “Southern Accents” and “Rebels,” and closes with the reminiscences of John Sebastian’s “Stories We Could Tell.” This is a personal album of the band’s career, and when they spit out “Refugee,” you can feel the weight of all the record-industry shenanigans they’ve had to face.

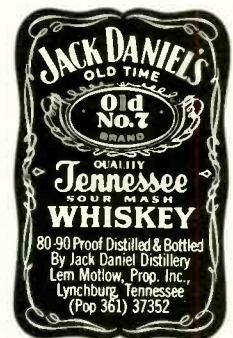
Coproducers Petty and Campbell wisely retained much of the hoarseness and popped p’s and other vocal and instrumental imperfections that too many makers of “live” albums contrive to erase. (Not that *Pack Up the Plantation* isn’t slicked-up, to some extent; the album is culled from six shows on two continents, and the audience sounds carefully sweetened, after the fact.) Yet, on the magnificently moving “Southern Accents,” for example, the imperfections work precisely to Petty’s advantage. Stripped down to the wood, the song has gone from the stu-



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Sandy Denny had a cool voice that radiated power and dignity, and it has been lovingly preserved on this retrospective.



dio to the street, and becomes a lament for all the outsiders who know more than they know how to say. This makes the song, of course, more universal than on the recent *Southern Accents* album from which it comes. Without the polish, it's less Petty's song than his and the crowd's together.

Frank Lovece

**Who Knows Where the Time Goes?:**

Sandy Denny

**Hannibal HNBX 5301**, four-record set, \$26.98. (Available from Carthage Records, P.O. Box 667, Rocky Hill, N.J. 08553.)

Sound: B Performance: A

Sandy Denny's is a voice I've really missed ever since her sudden death in 1978. She had a cool, sometimes icy sound that radiated dignity and power. She was a wonderfully instinctive singer who, with the flourishes and trills that punctuated her singing, would never do a song exactly the same way twice.

This boxed set includes 43 selections. Of these, 20 are from various albums Sandy made on her own, with her short-lived band, Fotheringay, and

with the seminal English folk-rock group Fairport Convention. The rest include original demos and alternate versions of songs issued elsewhere, artifacts of Sandy's late-'60s work with The Strawbs, rare BBC tapes of 1969 Fairport performances and 1972 solo work, and newly released, live recordings of tour performances of Fairport, Fotheringay, and Sandy alone.

Assembled by Sandy's husband and fellow musician Trevor Lucas and her former producer Joe Boyd, this really is a very well-thought-out and balanced collection that has been lovingly executed. The sound quality is generally fine, although it dips somewhat on some of the demos and the old BBC tapes, but the merits of these performances more than compensate. On the other live tracks, the sound is quite serviceable.

If you loved Sandy Denny's work, you will rejoice at *Who Knows Where the Time Goes?*, a very thorough and very satisfying summary of a voice stilled too soon. Even if you didn't love her, on its own merits this is a fine collection of English folk-rock's fullest flowering.

Michael Tearson

**When You're a Rebel: The Altar Boys Broken Records SPCN-7-100-30282-X.**

Sound: C+ Performance: B+

It takes a lot of chutzpah to form a born-again Christian punk band, and even more talent and security to pull it off with any credibility. The Altar Boys, spike-haired in torn denim, successfully blast new bedrock with this cluster of hard-core hymns.

Trading the blessedness of the meek for the adrenalin of the righteously wrathful, they replace the characteristic nihilism of most punk with positivism, hope, and even joy. There's still some tension; The Altar Boys are infantrymen, after all, in the celestial battle for souls, and they cheerfully proclaim to all who will listen that "against this world we stand."

The Altar Boys' proselytizing would immediately go down as hoke if it weren't supported by strong music. But it is. I bet these guys cut their teeth on the early Clash. Falling back on many stock punk arrangements, they basically revive '60s pop chord progressions, push a back-beating snare up front, and fill out the sound with soaring, chrome-tone guitars. Their husky harmonies, and the finesse and urgency of lead vocalist Mike Stand, are endearing. I don't know which I'd most like to see them do: Take a bunch of head-bangers by surprise at CBGB, or open for Amy Grant.

I don't for a moment doubt The Altar Boys' sincerity, even though the narrow scope of their vision weakens the effect. There's no room for reflection; the full glare of their religious conviction will make all but the most open-minded look away.

Susan Borey

**Little Games: The Yardbirds Fame EMI 4131241, \$6.98.**

Sound: B Performance: A+

You've already read the rantings of rock critics (such as ourselves) proclaiming The Yardbirds to be one of the greatest rock bands of all time. It's been virtually impossible to obtain many of their classic recordings, because some dolt saw fit to delete their albums from the catalog too soon after their release. Well, guitar-band fans, although you still can't get *Live at the Anderson Theatre*, you can finally get



On *Little Games* there is sloppiness, dated effects, and bum notes, but also some classic solo guitar from Jimmy Page.

the studio equivalent. This particular version of the album has a couple of extra tracks, including one, "I Remember the Night," which has never been issued or mentioned before and might not even be The Yardbirds. The pressing and mastering seem every bit as good as (if not better than) the original, although the liner notes are a little on the overly pithy side.

So, what's so special about this album? Consider the following scenario: The first great British blues guitar band has just chucked its producer/manager Giorgio Gomelsky, and ace guitarist Jeff Beck is about to leave. In come production Svengali Mickie Most, and session man extraordinaire Jimmy Page, on guitar. Page had played on TV jingles, soundtracks, and every straight session he could find—usually trying to please the producer by playing as little as possible, and getting the work done as quickly as he could. He had already turned down an offer to join The Yardbirds once before, and comes in at the spur of the moment while Beck is still in the band. Page starts off as the bassist, but soon talks rhythm guitarist Chris Dreja into switching instruments, most likely through subtle humiliation. All of a sudden Page is doing 20-minute guitar duels with Beck that sound somewhat like World War III just broke out.

When Beck leaves the group, all of a sudden Page, who's used to doing Donovan and Petula Clark records at 10 o'clock in the morning, is the only guitar player in perhaps the raunchiest group in England. And producing is Mickie Most, notable for being somewhat of a guitarophile, having made a string of hit records by The Animals and Herman's Hermits. The combination makes for a very strange cross of mid-'60s pop ("Ha Ha Said the Clown") and late-'60s psychedelic guitar blues.

This particular record more or less set the stage for Led Zeppelin. This was Page's first real opportunity to experiment in the studio as a featured artist. He had recorded some blues jams with Eric Clapton and Beck, but nothing that let him stretch like he does here. There is sloppiness galore, dated effects, and bum notes, but also some classic solo guitar and historic toying with violin bows, not to mention the furious sitar/acoustic instrumental,

"White Summer," which became the intro to Zeppelin's "Over the Hills and Far Away." This is where Jimmy Page first learned how to appropriate song-writing credits, making Elmore James' "Rollin' & Tumblin'" into "Drinkin' Muddy Water," and Beck's "Rack My Mind" (or Slim Harpo's "Scratch My Back,"

for that matter) into "Smile on Me." This is Jimmy Page learning how to layer guitars, a little bit on the careless side but completely inspired. Performances like this are rare, and no serious fan of Zeppelin, The Firm, or modern guitar can afford to be without it.

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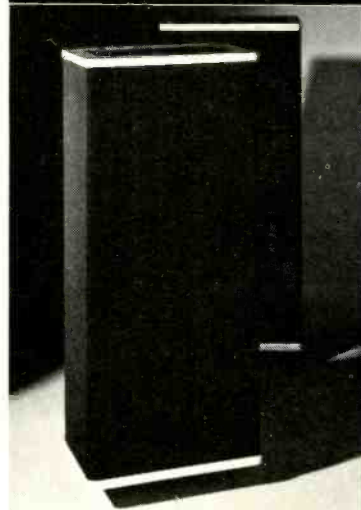
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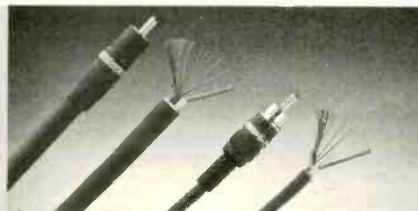
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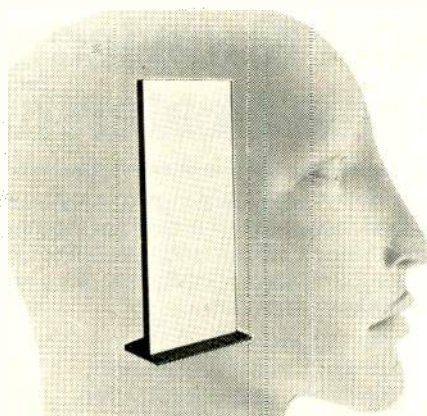
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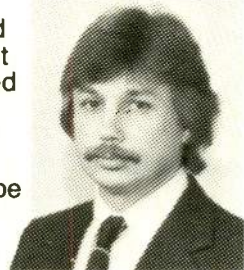
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Dimensions	160mm/6 1/4" Dia., 67mm/2 1/2" Depth
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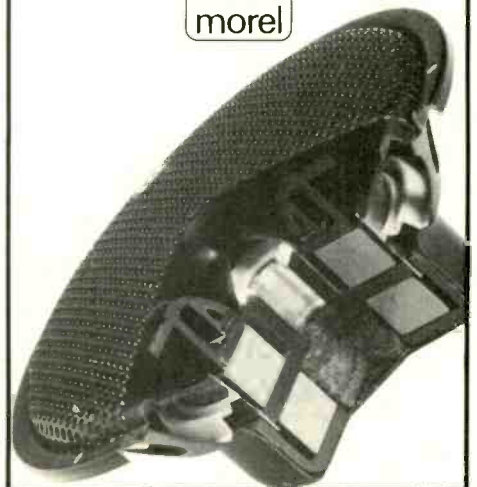
Power Handling Capacity	120 Watts RMS
Frequency-Response	35-25000 Hz
Woofer Type	8" Dia., 3" Aluminum voice coil
Tweeter Type	Soft dome, Aluminum voice coil
Ferrofluid Cooling/Damping	Yes
Impedance	4 ohms
Sensitivity 1W/1M	92 db
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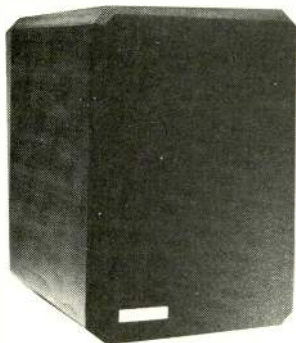


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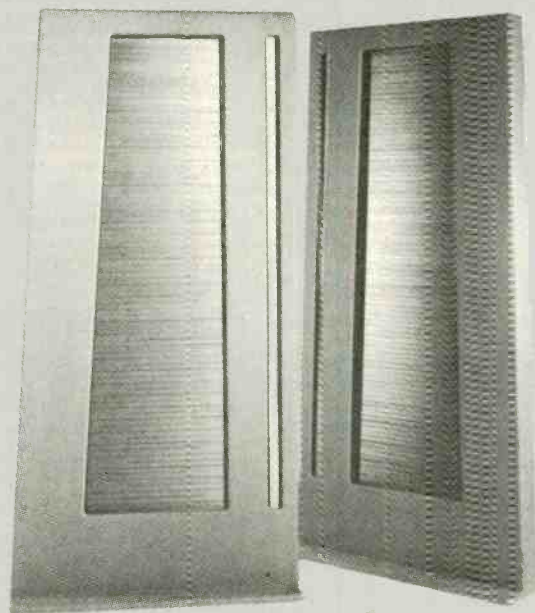
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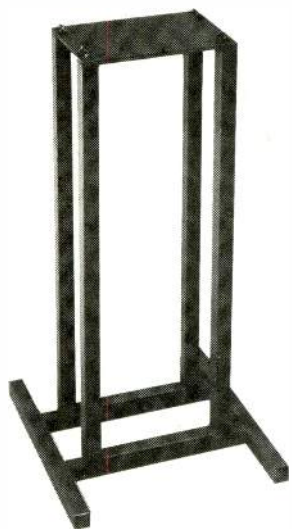
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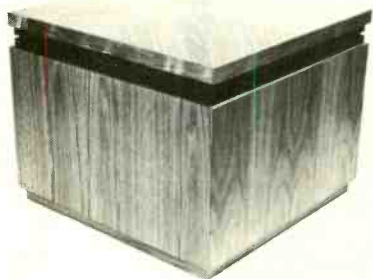
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**AD INDEX**

Firm (Reader Service No.)	Page
Acoustic Research (1)	78 & 79
Adcom (2)	11
Akai (3, 37)	31, 33
Audiophile Audition	91
BASF (4)	87
B & W (5)	29
Boston Acoustics	15
Brystonvermont (6)	28
CBS Compact Disc (7)	85
Canton (8)	Cover II & 1
Carver (9)	16 & 17
Columbia House	5
Concord (10)	35
DALI	25
Denon (11, 36)	19, 55
Harman/Kardon	73
Hitachi Cable (12)	83
Infinity (13)	51
Intraclean (14)	4
JBL	57
Jack Daniel's	95
Levinson	69
Maxell (15)	3
McIntosh (16)	Cover III
Meridian	97
Nikko (17)	20
Onkyo	65
Panasonic (18)	Cover IV
Perreaux (19)	75
Pioneer (20)	77
Polk (21)	7
Pyle (22)	4
Recoton (23)	23
Signet (24)	22
Sony (25, 26)	39, 67
Soundcraftsmen (30)	8 & 9
Stillwater (27)	92
Studer Revox (28)	24
Telarc (29, 34, 35)	59, 81, 83
Toshiba (31)	81
Velodyne (32)	21
Winston	61
Yamaha	41
Zapco (33)	37

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