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INTERVIEW:
MITCH MILLER/PART II

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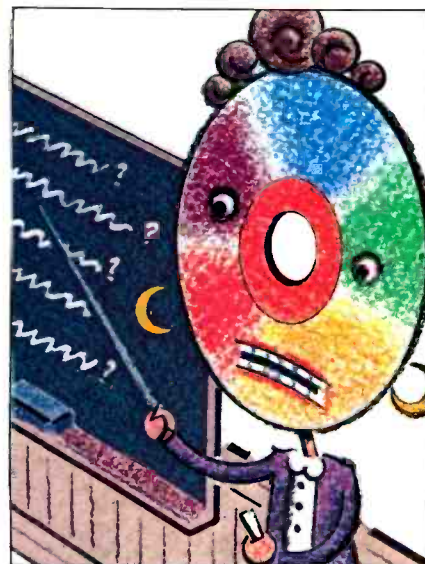
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Barbra Streisand
A Christmas Album

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Classical Favorites Remastered
MESSIAH

THE PHILADELPHIA ORCHESTRA
Eugene Ormandy
THE MORMON TABERNACLE CHOIR

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Annie

A New Musical

ORIGINAL BROADWAY CAST RECORDING

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THE ORIGINAL SOUND TRACK RECORDING

FUNNY GIRL
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Hubert Laws
Quincy Jones • Chick Corea

Blanchard: New Earth Sonata
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21 JUST RELEASED!

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It's which one?

Our answer:
The Adcom[®] GCD-300.



The GCD-300 features Adcom's exclusive Sound Window™ Frequency Contour Selector and Linear Phase-Correcting Circuit that fulfill the musical promise of compact digital discs.

The question about which CD player to buy is important to everyone—especially those “golden ear” music listeners who’ve long known and enjoyed the musicality of the LP, but with a love-hate relationship. That’s because of the background hiss and noise in soft passages, the clicks and pops and the gradual wearing down of their prized records.

Musical nirvana not yet reached.

These music lovers welcomed the promises of the vast technological advance that digital recording claimed over analog recording: crystal-clear, noise-free reproduction of music with wide dynamic range. And wear-free life for the CD itself. But when it came to critical listening, their ears told them that something was wrong.

What they detected in many CDs was lack of depth, an unmusical graininess and stridency. And they suffered listening fatigue in a relatively short time. There went the endless hours of pleasure derived from listening to recorded music. And they wondered about so many of the critics who raved endlessly about the new technology and heard nothing amiss.

**Our solution to this problem:
Linear Phase-Correcting Circuit.**

First, we chose to use a single digital-to-analog (D/A) converter. Its advantages: when properly designed, it can have less mistracking of reference voltages and lower digital clock interaction than dual D/A converters.

However, most players using single converters have suffered from phase distortion resulting from the switching delay between channels. Adcom's Linear

Phase-Correcting Circuit eliminates this form of distortion—and its effect on stereo depth and imaging.



Remote control: This remote control provides access to all functions: track/time, track selections, indexing, play, pause, stop, clear and memory. The numerical keypad allows random access to all programs.

Other features of the GCD-300. Triple-beam laser system, repeat play of any selected portion of disc, forward and reverse indexing, 15-selection memory.

Specifications:

Frequency response: 5 Hz-20 kHz \pm 0.5 dB
Dynamic range: 92 dB
Signal-to-noise ratio: 95 dB (IHF-A)
Harmonic distortion: 0.004% (at 1 kHz)
Wow and flutter: <0.001%
Channel separation: 92 dB (at 1 kHz)
Output voltage: 2.0 V
Sampling frequency: 44.1 kHz
Quantization: 16 bit linear/channel
Dimensions: 3-5/16" H, 10-3/4" D, 17-1/8" W

Also available: GCD-200. Same specifications as GCD-300, but without remote control features.

Our other concerns.

Listening tests have also revealed tremendous variation in the spectral energy balance embodied in some CDs. We believe this problem originates in part with some recording engineers—those who’ve not yet mastered the different demands of this new medium in which the high frequencies can easily be disproportionate in the musical balance. Other recording problems can occur in the transfer of musical sounds (essentially analog) into the digital format.

**And our other solution:
The Sound Window™ Contour Circuit.**

Our research indicated that the sound quality of many vocal and instrumental CDs could be greatly improved by introducing corrective frequency contouring to compensate for the unnatural sonic energy balance present in many CDs.

A three-position switch provides a choice of playback response curves which can be used to improve the spectral balance of those CDs that need it. As a result, such CDs can emulate the musicality of the finest analog recordings while maintaining the low noise and dynamic range advantages of digital technology.

A logical suggestion.

We don't know which musical camp you belong to: those who find no fault whatever with any CD, or those who haven't been satisfied with what they've heard so far. If the latter, that may be why you don't yet own a CD player. (Or why you are disappointed with the one you do own.)

If so, visit an authorized Adcom dealer and audition the moderately-priced Adcom GCD-300 against any other CD player at any price. Chances are you'll again be enjoying those long hours of musical listening pleasure.

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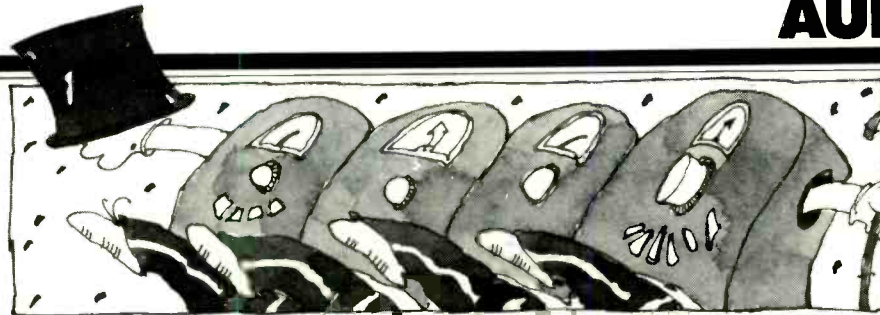
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AUDIO ON RADIO



PCM on NPR

Radio's a natural medium for audio discussions and some demonstrations, and about 100 National Public Radio stations around the country now carry a show devoted to it. *Audiophile Edition*, the creation of John Sunier, is carried on the NPR satellite on Sundays at 2:00 p.m. Eastern Standard Time; some stations use PCM digital recording for delayed broadcasts.

Why bother using PCM? Because *Audiophile Edition* is recorded digitally to start with, and sent up to the satellite system directly from the PCM digital master, not from an

analog dub, as is usually the case. (According to Sunier, his show was the first to be transmitted this way, though the St. Louis Symphony broadcasts have since followed suit.) The associated equipment used in preparing the show includes a mouthwatering list of audiophile components too long to be cited here—Talisman cartridge, Electron Kinetics Eagle 2 power amp, that sort of thing.

The show, which is underwritten by Telarc Records and Maxell, began more than four years ago in San Francisco. It offers a mix of interviews and audiophile recordings. The

recorded selections usually follow a theme, such as "The Piano on Compact Discs" or recordings with surround-sound capabilities. The interviews cover such topics as FM broadcast-signal processing, the use of ceramics in audio components, and the work of various audio designers and pioneers.

Sometimes, the recordings and the interview are built upon a common theme. For example, a show might feature synthesizer music and an interview with Wendy Carlos, or Broadway music and a discussion of audio restoration work going on at the Rodgers & Hammerstein Archives.

The December 15 show, built around just such a theme, should be of special interest to *Audio* readers within reach of the program. It will be the show's second annual binaural program, "For Headphone Listening Only," and will feature both binaural music and an interview with Bert Whyte on his binaural work.

Audio on a Wedding Eve

I recently spent a day selecting and taping 22 cuts of music to precede and follow my wedding. It made me more aware of where CD and LP stand in relation to each other, and of the differences between the two which don't show up on spec sheets but help define our experience of the two systems.

On repertoire, LP wins, hands down. At best, a fourth of the 22 cuts I taped could have been assembled from CDs, if I'd had them, but about three-quarters were on LPs now in print, the rest on older LPs. As it happened, I had one of the albums on both LP and CD, so I used the latter for one cut.

There is far more satisfaction, I admit, in playing records than in playing CDs. With LPs you get the pleasure of what Anthony Cordesman calls the purification rituals (one for disc and one for stylus), and an intimate involvement with precision machinery as you swing your tonearm over to the cut you want and set it down, gently and precisely, in the lead-in groove. Sometimes, even, there is more fidelity, especially when

you compare an nth-generation audiophile turntable system with a first-generation CD player.

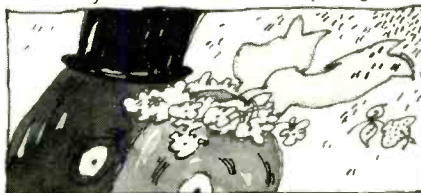
Still, if I could have done it all from CD, I would have—and gladly. Records are a lovely nuisance. I don't want to purify my records and my stylus every time I play a disc, especially when my newly cleaned records still come out sounding hissy and still get my stylus grundgy halfway through. I guess I need a record-cleaning machine, but even the cheapest ones are hardly cheap. A damp cloth to clean my CDs costs less and takes up less space.

When you cue up a cut on CD, you don't have to worry about denting the disc or chipping the stylus, should you let the arm slip. When you're taping from CD, you don't have to start with the last few seconds of the previous cut so you can gauge when the cut you want will actually begin. If

you want to tape part of a cut, you can use the CD player's time display as an exact guide to when the desired section will begin and end. (On some players—though not mine—you can even preset start and end points and let the player do your edits for you.)

This sort of dubbing—all from commercial records—is part of what the record companies are up in arms about. Yet what alternative had I? There was no way I could have segued all those records neatly in real time, and as the groom, I would have been unavailable to try. And while I'd gladly have bought a commercial tape of what I wanted, where would I have found one? My ultimate selections ranged from Bach to Basie and came from 14 separate albums, most from different record companies, at least one from a record never sold in the U.S.—and all discs I already owned.

Yet how much pleasure my guests and I got from all the record companies' and musicians' work—and from mine, assembling it! It's the music that matters. We of the audio industry are just here to help.



New research suggests that headphone listening isn't much more likely to cause deafness than TV caused blindness, or the waltz an epidemic of sin.

Portable News

Every public pleasure is proclaimed a plague—you may remember the warnings of incipient blindness aimed at early TV owners, and you should have heard the cries of sin at the introduction of the waltz! So it's no surprise that, when the Walkman and its imitators grew ubiquitous, we started hearing dire warnings that continued use would cause deafness. And people do play them loud—often enough so that you can make out, from yards away, just what they're hearing. I've often warned such loud listeners to protect their hearing by turning down the volume.

It seems I'm only half right in this. *Sound and Vibration* recently reported that the cries of doom may be unfounded. Dire early reports, says contributing editor Larry H. Royster, presumed full-time use at full volume. In practice, distortion limits usable output levels (even for average listeners, who tolerate a lot more distortion than most *Audio* readers), and listening is not quite continuous, either. Royster's measurements of actual listening show that moderate levels are most common: For average (50th-percentile) listeners, average levels are equivalent to external diffuse-field sound levels of 52 dBA in quiet interiors, 71 dBA outdoors, and 83 dBA with typical, on-the-job background noise levels of 80 dB. The top tenth of the people surveyed—those who listened to the loudest music—used levels equivalent to 64 dBA indoors, 83 dBA outdoors and 92 dBA with 80-dBA background noise. "For the most sensitive 5% of [the industrial] population," says Royster, "the expected increase in hearing loss over 20 years of noise exposure would be 4 dB at 4 kHz, an effect that is most likely acceptable to the employees in the type of work environment investigated, where the job function is very repetitive."

I'm not sure that music lovers and audiophiles would accept this hearing loss as readily, especially if added to the other hearing losses we can expect from aging in a mechanized environment. But at least we need not issue blanket condemnations of headphone listening.

Royster does, however, have some

words of warning: Users in high-noise environments should be warned of potential hearing loss. Managers of noisy facilities should conduct annual audiometric tests of headphone users and non-users, to check for signs of headphone-induced hearing loss. And listeners who already show significant, permanent noise-induced hearing losses should not use headphone portables.

Do the headphones attenuate outside sounds significantly? If so, while perhaps protecting the users' hearing, they might endanger listeners by isolating them from outside warning sounds. This, however, Royster and three colleagues report, is unlikely. Supra-aural phones (the typical Walkman type, which sit on the ear) had a modified noise-reduction rating of only 0.3 dB for straight-ahead or side sounds. Circumaural (ear-surrounding) phones attenuated straight-ahead sounds by 1.9 dB and side sounds by 1.2 dB. Semi-aural (in-the-ear) phones had attenuation figures of 0.6 and 2.6 dB.

Good news for headphone listeners may also turn out to be good news for those who'd rather not hear their neighbors' music, if it encourages those nearby to listen privately—not that the average loud-portable listener has any care for incipient deafness, near as I can tell.

New York City has now set aside areas in some parks and beaches where, to quote the newly erected signs, "Playing of radios or tape players without earphones is PROHIBITED." Violators are subject to \$50 fines and risk having their portables impounded. There were some grumbles; *The New York Times* reported one man as saying, "As long as you're not annoying someone else, you should be allowed to play your radio. It's soothing," and cited a mother's fears that headphones would prevent her from hearing her young son. But overall, the restricted areas are quieter.

Why not just prohibit *loud* radios? Because that would either involve police in judgments that might not stand up in court, or require that they carry—and know how to use—sound-level meters.



New Arrival

New-product announcements usually go in our "What's New" section. But this one, submitted by Mitch Kawasaki of Rotel, seemed to belong here: *Kawasaki*—Mitch and Darlene (nee Spencer) are pleased to announce the safe arrival of Rebecca Kiyoko and Katelyn Miyoshi. This exclusively limited-edition pair of twins weighed in at 4 lbs., 13 oz. and 4 lbs., 12 oz., respectively. After 37.5 weeks of detailed preparation, the diminutive pair was born simultaneously on May 11, 1985, at McMaster Medical Centre. They exhibit twin absolute phasing, with direct/reflecting time-aligned coherency, having been meticulously matched to within ± 1 oz. Both left and right channels are water-cooled, with no warmup necessary. For peak performance, breast milk at on-demand frequency has been selected. They have already exhibited excellent dynamic range and frequency bandwidth. SPL has been measured to be 105 dB.

Respiratory Failure

In stating, correctly, in the August 1985 issue that using Dolby B NR and dbx NR together would eliminate the latter's "breathing," I stated, incorrectly, that that breathing was proportional to noise in the input signal. Actually, it's proportional to the noise in the recording medium—which is why the problem is more often heard in dbx cassette recordings than in open-reel tapes made with dbx.

Wrong Number

The price quoted for NEC's AV-300 surround-sound processor in the September column was incorrect. The correct price is \$499.

Perreaux

HALF WAY AROUND THE WORLD

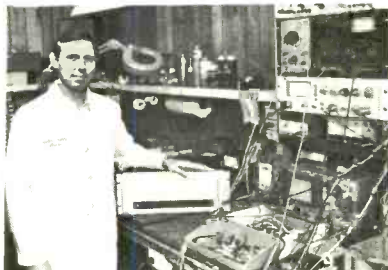
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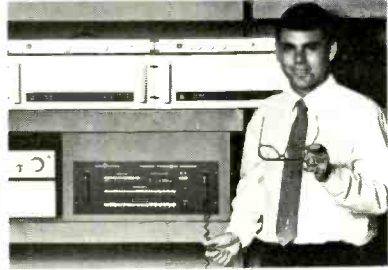
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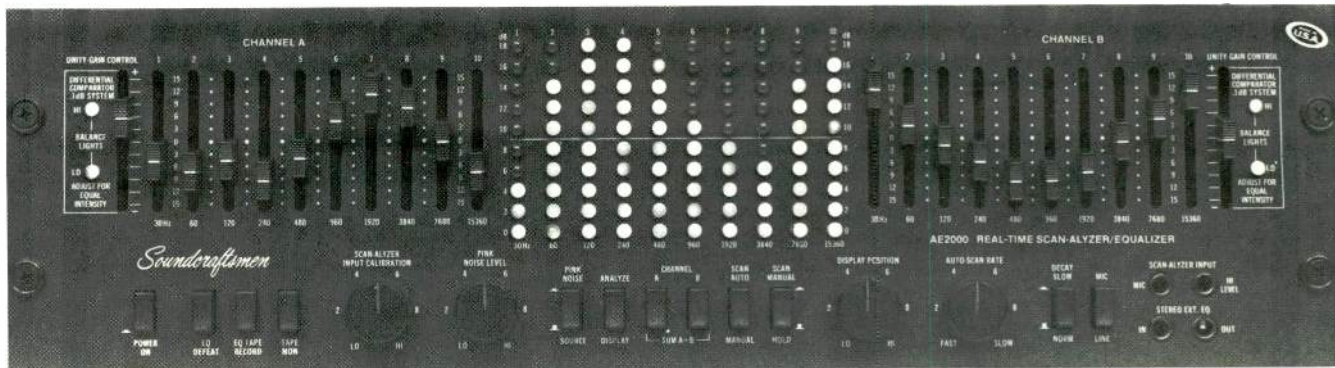
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is generally considered to be the ultimate in octave equalizers. The Differential/Comparator® system assures TRUE UNITY-GAIN within 0.1dB, regardless of the EQ curve selected. This guarantees maximum headroom for wide-dynamic-range material, highest gain, lowest noise, without overloading. With the AE2000 the peaks and valleys found in every listening environment can be effectively "neutralized" quickly and easily to realize the full potential of your sound system.

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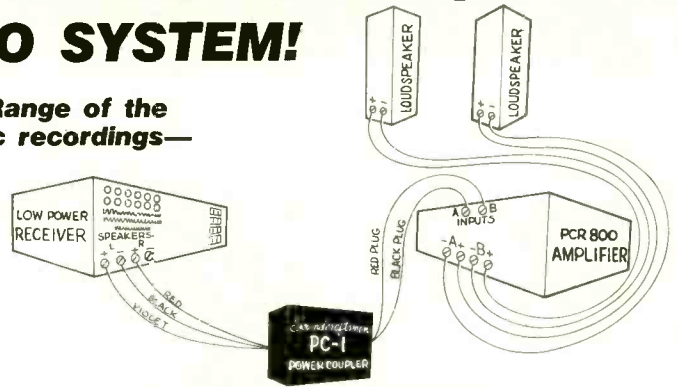
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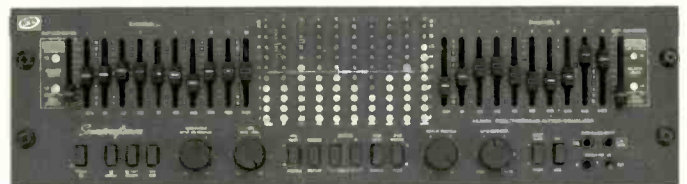
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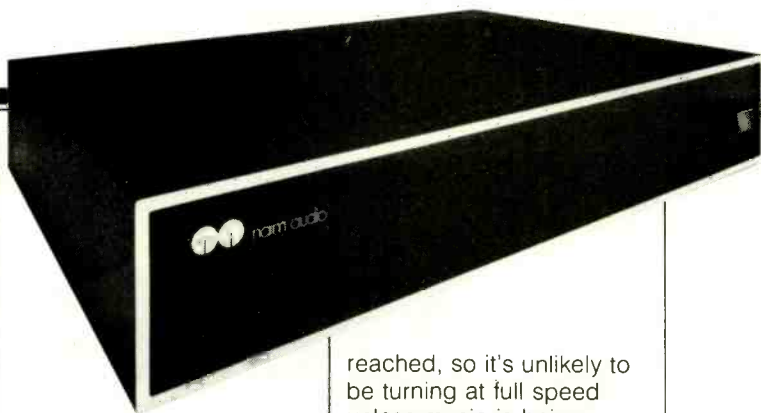


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reached, so it's unlikely to be turning at full speed unless music is being played loudly. The rated specifications (75 watts continuous into 8 ohms, 500-VA transient capability, noise and distortion of all types less than 0.1%) are measured with speakers rather than test loads. Frequency response is +0, -3 dB from 5 Hz to 40 kHz. Price: \$2,990 per pair. For literature, circle No. 100

Acoustic Research Turntable

The Acoustic Research turntable is now available in



a premium version, the ES-1, with a jewelled thrust bearing and a choice of cherry or Brazilian rosewood veneers. A 24-pole synchronous motor drives the 3.9-pound platter at 33 $\frac{1}{3}$ or 45 rpm. Wow and flutter are 0.04%, rumble (DIN-weighted) is -78 dB. The table is available with or without arm. Price: \$350 without arm, in cherry veneer; arm, \$125 additional; rosewood veneer, \$150 additional. For literature, circle No. 101

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Your Eyes Have Ears

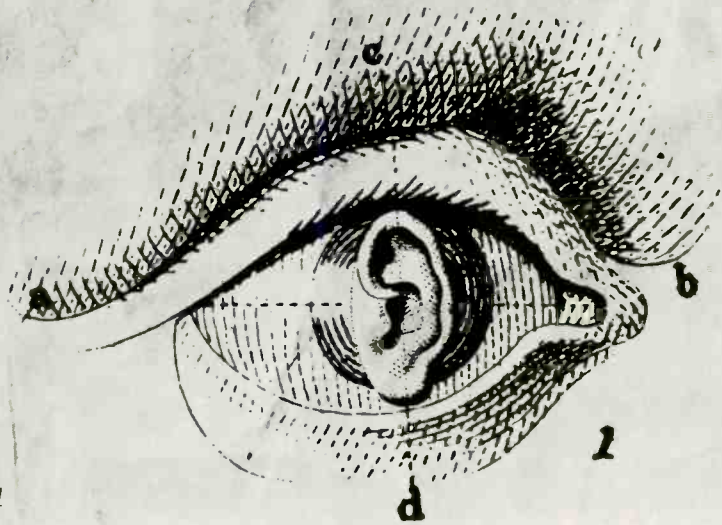


Figure 1

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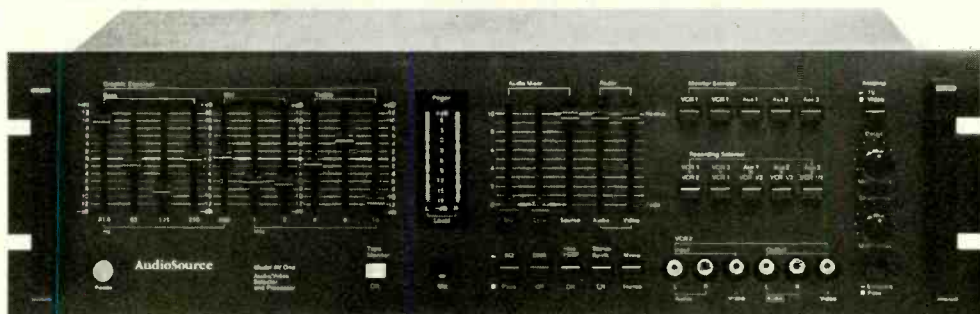
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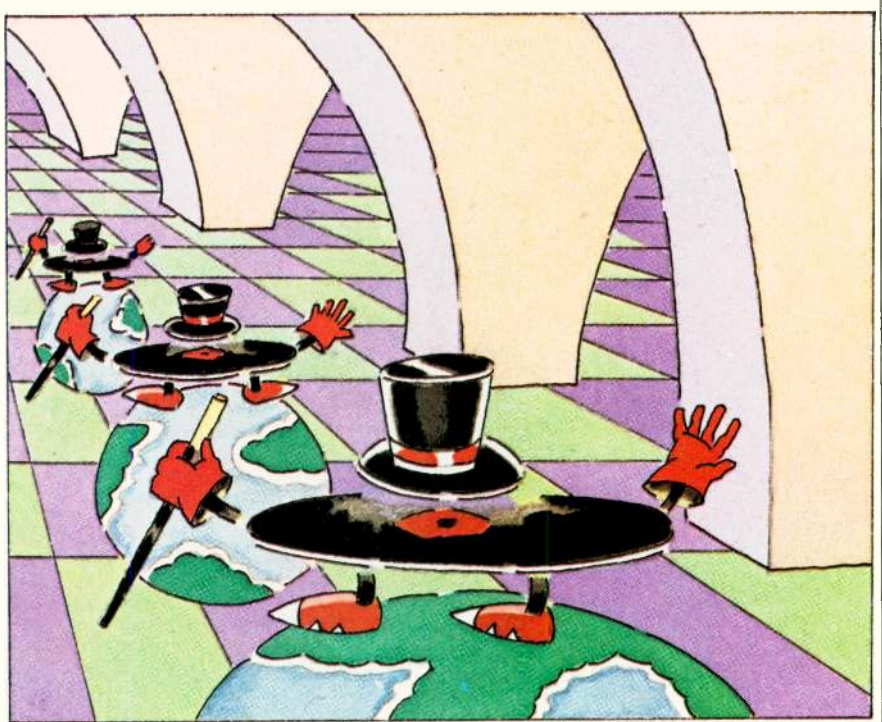
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WHIRLED PREMIERES

When I attend the annual Summer and Winter Consumer Electronics Shows and the convention of the Audio Engineering Society, I quite naturally get caught up in the excitement of new audio products and technologies. I also get involved with a lot of other matters, among the most pleasurable being the inevitable bull sessions with engineers and manufacturers. People who know my background invariably ask me about the recording business, especially with respect to classical music. They want to know how to become a recording engineer, how to break into the business. They very often ask technical questions about a specific recording I have made, such as what mikes I used. Others are more interested in the musical aspects of a recording. They want to know what it's like to work with certain conductors and orchestras, and are eager to hear my anecdotes about the trials and tribulations of record making. I've promised a lot of nice folks that from time to time I would write about the often frustrating, always fatiguing, but endlessly fascinating business of record making. This month I'll keep that promise.

In some major record companies, the production of classical recordings can involve a lot of people. There is the recording producer, the director of artists & repertoire, the recording engineer, and the music director. I've worn all of these hats. I was music director at RCA, and I was director of A&R and recording engineer at Crystal Clear. At Everest, I chose the music that was to be recorded, the conductor and orchestra who would perform it, and the hall or locale in which the recording would take place; I also engineered the recording, and even negotiated artists' contracts and handled other pertinent business matters. Additionally, I have been an independent engineer/producer, like Marc Aubort of Elite Recordings and Jerry Bruck of Posthorn Recordings.

Needless to say, all of these jobs are highly demanding, and the major record companies usually maintain several teams of highly qualified people to handle them. It is a far greater burden on an individual who wishes to establish a record catalog from scratch. It is he who must choose the right combi-



nations of music and artists, making certain they are recorded with such superior engineering that success is assured in the marketplace. If fortune smiles, and the recordings are critically acclaimed, a good reputation is established. With this reputation comes respect, and a certain degree of power. Power enough, in fact, to be a factor in the highly competitive record world. Thus, when *The New York Times* praised my first Everest recordings with such remarks as "unhackneyed repertoire" and "superb stereo sound," it gave me extra leverage in dealing with the movers and shakers in the world of music. This included the music publishers. It was very gratifying when such giants as Boosey & Hawkes, G. Schirmer, and the Oxford University Press became very cooperative and offered me some choice musical plums. Thereby hangs a tale.

As you might expect, a recording engineer feels very paternalistic about his recordings. They are indeed his creations, his children. He may even be forgiven for thinking of them as a noble legacy that can bring joy and pleasure to thousands of people for many years, even after he has shuffled off this mortal coil. Naturally, every re-

cording engineer has works he is particularly proud of. In my case, I feel very pleased that I was able to make six world premiere recordings of important new music.

Probably the world premiere recording I am most proud of is the Ninth Symphony of Ralph Vaughan Williams, generally recognized (along with Benjamin Britten) by musicologists to be one of the most important English composers of the 20th century. Although Vaughan Williams wrote music in many forms, his major works were his symphonies. These distinctively styled symphonies were widely acclaimed, and had been well represented with many fine recordings, notably from Decca and EMI. I use the term "distinctive" because his music is as instantly recognizable as, for example, the music of Copland or Mahler. It was also generally acknowledged that conductor Sir Adrian Boult was the definitive interpreter of Vaughan Williams' music. The people of Oxford University Press knew I was coming to England for a series of recordings with Sir Adrian and the London Philharmonic Orchestra. After considerable discussion about various choices, I was fortunate enough to arrange for the first record-

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A recording engineer feels very paternalistic about his recordings. They are indeed his children, his creations—and his legacy.

ing of their newly published Vaughan Williams Ninth Symphony.

The recording was to be made in Walthamstow Town Hall, my favorite recording location in all of England. The day before the recording, the Green Room in Walthamstow was set up with specially modified, three-channel, half-inch Ampex tape recorders and a custom-built Westrex mixing console. Gilbert Briggs, the "grand old man" of Wharfedale, had loaned us three of the big monitor speakers he had used in his famous "live versus recorded" demonstration at Carnegie Hall. These were powered by special McIntosh amplifiers. I also used a three-channel spaced array of omnidirectional Telefunken U-47 microphones. Three discrete audio channels were recorded on the Ampex units, and we employed direct three-channel monitoring.

With all technical matters under control, I was very pleased and honored to learn that Ralph Vaughan Williams would be at the recording sessions. On the morning of the recording day, I was met at the back door of the Green Room by Sir Adrian, a tall, spare, rather austere man with an imposing cavalry mustache. A gentle man with a rather formal manner, he greeted me by exclaiming, "Oh, Mr. Whyte, a terrible thing has happened!" Well, there are certainly plenty of things that can go wrong in any recording session. However, Sir Adrian informed me that Ralph Vaughan Williams had died just seven hours before. This was indeed distressing news, and I hoped it would not prove to be a bad omen. Now, you must understand that the London Philharmonic Orchestra was very familiar with the music of Vaughan Williams, and had not only performed his works many times but had also made recordings of his symphonies. The members of the orchestra knew that Vaughan Williams was supposed to be present during our sessions. Thus it was a very stunned group that heard Sir Adrian announce the composer's passing.

If you happen to have heard my Everest recording of Vaughan Williams' Ninth Symphony, you will know that Sir Adrian made a rather unusual tribute to the composer. Before the music begins, you can hear Sir Adrian saying that "We had hoped that our beloved



friend, Ralph Vaughan Williams, would have been with us in the studio while we were recording this symphony, but his death took place seven hours before we began our work on it. It's a wonderful thought that many musical friends in the United States will be enabled to hear his last symphony by means of this record."

Contrary to my foreboding about the effect of this news on the orchestra, the musicians and Sir Adrian provided an impassioned, heartfelt, virtuoso performance. The recording was acclaimed in numerous reviews and very well received by classical music enthusiasts. There have been several other recordings of this great symphony over the years, including a remake with Sir Adrian Boult and the London Philharmonic Orchestra. I greatly treasure the distinction of having made the first recording of it and will never forget the emotionally charged atmosphere of that 1958 recording session.

In subsequent sessions with Sir Adrian Boult and the London Philharmonic Orchestra, I recorded Vaughan Williams' "Job (masque for dancing)," a most powerful and evocative work. Sir Adrian's affinity for the music of Vaughan Williams is evidenced by the fact that the composer dedicated this score to him. I chose to record "Job" in London's Royal Albert Hall because I wanted to use its great pipe organ. This hall is very large, seating nearly 8,000 people, and has notoriously difficult acoustics due to its reverberation period of more than 3 S. In the music, in the climactic scene where Job

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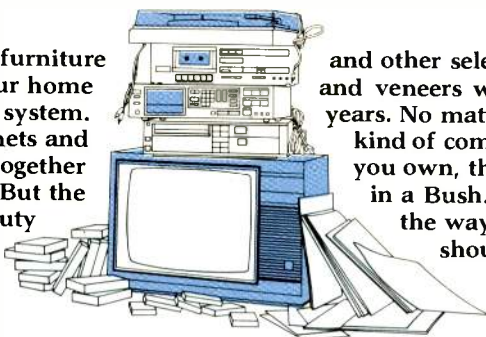


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I treasure having made the first recording of Vaughan Williams' great Ninth Symphony, and won't ever forget that emotional session in 1958.

curses God, there is a tremendous fortissimo outburst from the full orchestra and organ. I wanted the massive weight and sonority of this organ rather than the electronic pipsqueak I would have had to use if I had recorded this piece in Walthamstow. It was necessary to use an array of old wooden doors behind the orchestra to serve as reflectors, and to position acoustic reflecting "clouds" (baffles) above the orchestra for better projection. Here again, the spaced array of three Telefunken U-47 microphones was used in an omnidirectional pattern, and the signals fed into the three-channel Ampex tape recorders.

Using the Albert Hall involved a lot of extra work, but the spectacular sonics justified all the effort. I should add that, were I to record this work now, the ideal place to make it would be in the new Davies Symphony Hall in San Francisco, which has a wonderful Ruffatti organ and a reverberation time of slightly over 2 S.

Only one of my six world premiere recordings was uneventful. This was the Hindemith "Concerto for Violin and Orchestra" performed by violin virtuoso Joseph Fuchs with Sir Eugene Goossens conducting the London Symphony Orchestra. Fuchs, often referred to as the "violinist's violinist," has made this work his own, and his performance of it may safely be considered definitive. I coupled this work with his equally effective performance of Mozart's lovely "Third Concerto for Violin and Orchestra." As always, Sir Eugene had the London Symphony Orchestra playing at the top of its form in an appropriately sympathetic accompaniment. Fuchs' clean, smooth tone and the sound of the orchestra were greatly enhanced by the flattering acoustics of Walthamstow. The recording sessions went very smoothly, posing no problems either musically or sonically. The recording was well received by critics and public alike, and if you are a bit tired of the Tchaikovsky, Mendelssohn and other concertos in the standard violin repertoire, you might want to try this interesting Hindemith concerto for a refreshing change.

At another time, I will provide "behind the scenes" glimpses about the four other world premiere recordings I was privileged to make.

A

TAPING SOUNDLY

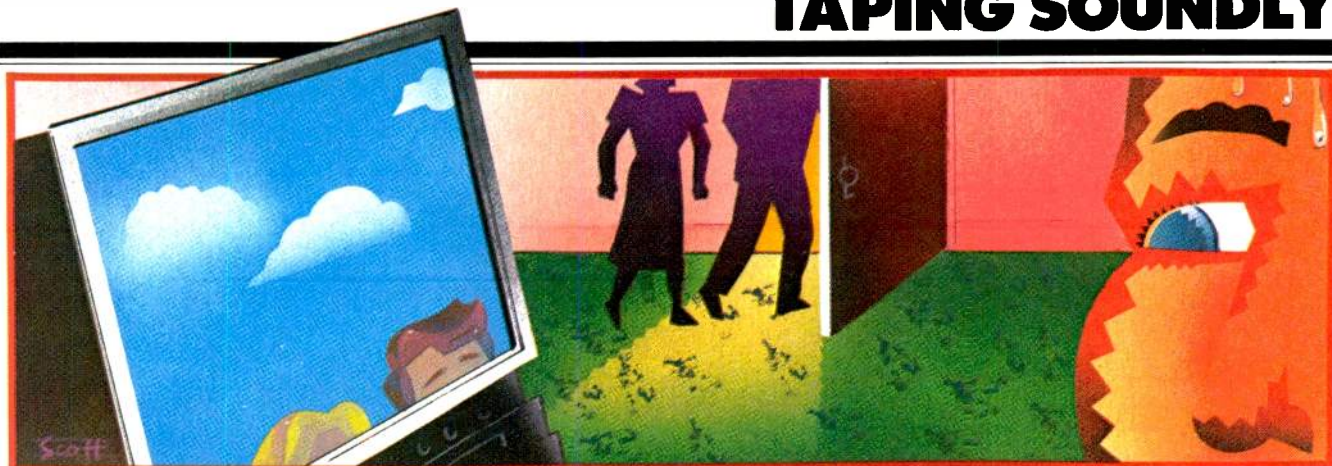


Illustration: Bob Scott

The home movie, pretty much in eclipse these late years what with so much else to distract us, is coming back in a new form—video. Product ads are already in the full-page stage. Not really for *this* Xmas, though you can try any of three incompatible types, if you want. But soon, I think, home video will indeed be everywhere, at reasonable cost. And this time it comes with sound—audio.

Now that was just as I had figured, some years back, when I tried out one of the earlier home video cameras and a full-sized VCR to see what I could do. I had been an early home-movie addict, way back, and I still go for the idea. Home movies do things that no still pictures can do.

As some may remember, that try at video was premature. It filled my living room with a maze of cables and auxiliary gear to feed the hefty camera and play back its product. We never got the camera itself more than a few feet outside the door in the direction of Nature, all around us, due to so much trailing entanglement and all the extra black boxes. Then we found that, if so much as a corner of bright blue sky got into the camera lens, the entire picture foreground turned a dark purple. So we took our pictures downhill, aiming at the ground. Nor would that camera focus further out than about 10 feet, which was its idea of Infinity. I could go on, but why bother? I still felt that it was just a matter of more time. And a lot more R&D.

Well, time has passed, and also R&D, and now we are getting somewhere. It's not quite Heaven (as the ads want to suggest). But the difference is huge and the competition is

warming up. Video movies with audio attached are surely here to stay. All we have to do is to learn how to make them, and, in particular, how to use the sound that has become obligatory.

Yet look at the ads! Astonishingly, there is hardly a mention of sound. You could almost think it didn't exist—like the old movies. Maybe that is the idea, and for good reason. Nobody, and least of all the manufacturers, has any clear idea as to what we amateur photographers are going to do with that sound. In an area where professionals have spent 60 years, with their fabulous equipment, their elaborate studios and sound trucks and so on, working to reach the present state of sound-plus-pictures that we know on the screen and TV, we are going to be left to manage things by ourselves in much simpler ways, to work out our own sound/picture match. It will indeed be a new way of movie life, and not easy at all. Easy enough to take the pictures—just press the button and let automation take over. But will anybody want to look at the result that we get? And *listen to it?*

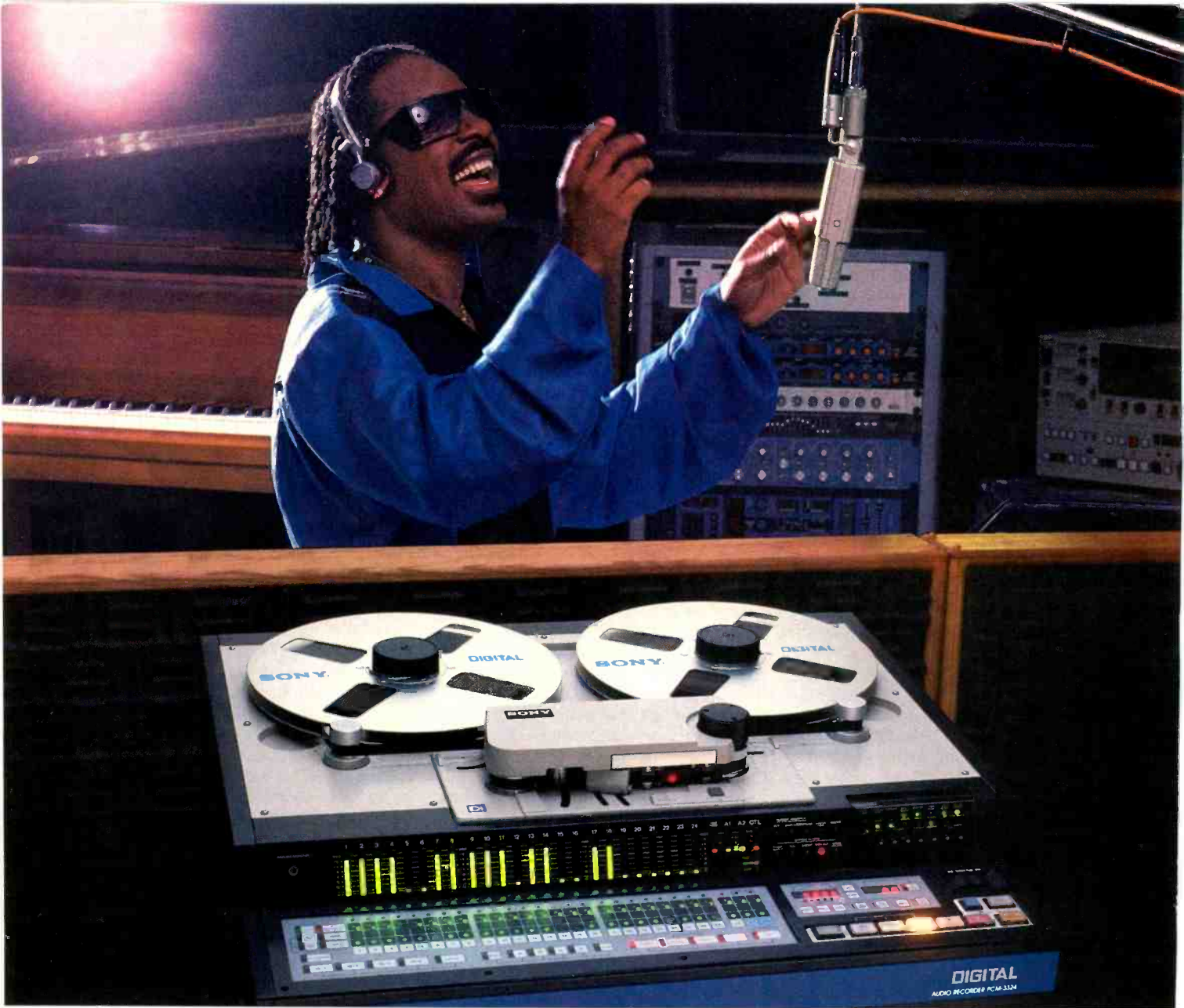
Even beyond sound, everything else is different. For most of us it will be virgin territory, a new experience. Color video pictures are remarkably unlike the old film movies when you get to "take" them on your own. Are you set for lumens and luminance, chrominance, white balance and a thousand other new items? And can you cope with a suddenly huge running time, perhaps 10 times as long per loading as film, perhaps much more than that? And with it, a cost per minute that is *far lower* than the same for the old home movies? You can really splurge—at

your own risk. You can go on and on with your pictures and, oh boy, can *that* be boring. Take care.

No more need, you see, for those quick, challenging, inspiring little scenes on the old film, where days of travel, camping, children's doings, were compressed into a few expert minutes. We learned to do that, some of us, and it was very satisfying to all concerned, both the taker and the takers, a genuine art in its special way. But what will you do now, with so much time? And so much sound?

Yeah, I can imagine. I see a 15-minute static shot of Niagara Falls, falling, falling some more, still falling, while the soundtrack projects a loud blast of white noise (water) that drowns out the people in the foreground who are trying to say something intelligible. Some picture! Get out your still camera; it'll do better. Or how about a sound-shot of Times Square? One minute of that kind of sound is enough, thanks. The old short shots, in such cases, would be about perfect. For the long, *long* haul you need better ideas, and newer ways to carry them out. What ways? None of us knows—yet.

Sound and pictures have very different requirements. Sound, especially talk, needs to be close-up and minus background interference. But do you want nothing but upper body halves, talking, minus legs? Your zoom lens only makes this worse. Nice faces, talking faces. But what else for all those minutes and hours? Maybe we could use a reverse zoom, a fisheye lens, to put the people off where we could see them whole, not in pieces, yet get their talking close-up. Or a supercardioid mike? Or a lot of detached



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Sound-plus-video won't fail as it failed with film, because sound is inherent in video, it fits, and it's of better quality.

mikes, not on the camera but hidden in the nearby shrubbery? Here we go!

I'm all for automation (just so I can override it), and we will have it in these video/sound movies. Everything. But will automation solve all problems? Hardly. It will help with good images and maybe uniform sound, and save precious time in getting ready to shoot or in changing scenes. But the job of picture making, any sort, still calls for brains, ingenuity, inspiration, imagination and advance planning. Especially with sound attached. It's a real challenge, as I see it. A new body of technique, not yet explored, just beginning. You, too, can be a charter member.

Yes, of course, we have had home sound movies before, on film, and for many years. In fact, it was just 50 years ago that the first sound film reached the home market, with associated gear, not long after it had hit the big-time theaters. In 1935 *Scientific American*, noting the innovation, observed that "sound-on-film, which revolutionized motion pictures in the theatre, now promises to do the same in the amateur home-movie field. . . ." Sounds good, doesn't it? But what actually happened? Did sound work out for home movies? *Sci Am* thought it would. "Anyone can now make his own talkies," it chortled optimistically.

Things didn't turn out that way. Sound-on-film for the amateur was not a raging success. Too expensive, too tricky, too bulky and clumsy, and the sound was bad. Instead, the silent home movie went right on because it was much cheaper, much easier to use, and it led to a lot of real satisfaction for those who tried it. Here was a case where audio was a burden, not an asset. Audio, we must humbly admit, is not always an added attraction. It can easily sink a new-launched entertainment ship. Or drive a man crazy, like loud rock music in a mountain wilderness (a recent experience of mine), or one of those sickly synthetic auto voices that tell you when you've made a driver's flub. Too much! *De trop*, as the French say. For these last 50 years, sound on home movies has been perilously close to that. *De trop*.

Well, this time, with video, you will have no choice. Sound will be *there*, all the time. You'll have to use it, unless you act like the man who watches the

news on TV with the sound turned off. But will it be the same failure again? I doubt it. This time will be different. Big changes in a medium make for big changes in technique. In video, sound is inherent, built-in. It fits, it doesn't cost "extra." And, with pictures, it ties into so much of your present home equipment: TV, VCR, and of course audio components. The new sound will be good, too, as in the newer generation of VCRs. So we are going to learn about movie sound, learn to use it as an unquestioned part of the medium, however tough things may be at first while we are finding out what to do.

It's like the difference between the LP and the CD. The LP is ever so clearly a manual, hands-on system, and was so designed, even if automation has lately come to it. Automated operation is never easy with the LP, however ingenious. One senses the clumsiness. On the other hand, the CD was born automated and can never be "manual"—we have not yet tapped all the possibilities inherent in that automation. For the CD, it is right and easy. For the LP it is uncomfortable. So it is with sound-on-film in the home versus the video home movie with sound. Same sort of difference. Video-with-sound is going to be okay.

Yet so much will carry over! Don't underestimate the old movies. That was a wonderful medium when you tickled it in the right places. I took silent 8mm movies for many years (until color), beginning with the original Ciné Kodak Eight in early 1933—one of the best engineered and thought-out home systems I ever hope to see, and I trust Kodak can do as well today in video. We have a lot to learn from those older pictures, even minus sound. A beginner then was much like a beginner now, and we are mostly all beginners with video. I made the same idiot mistakes then that you will be making soon with your video camera, and, gratifyingly, I developed, in the end, a sort of expertise, exploiting the medium to its best advantage. I am hopeful you will attain the same, some day in the future. I was good, if I do say so. I put on sizable shows for a lot of people. I had to please them as well as myself, and I did. It's nice to learn. You *have* to learn. Or else.

Take a friend, circa 1935, who was

If you're not careful with video, you'll hit the same old home-movie pitfalls, and your added sound will be added, too.

planning a research trip in her car and wanted a record of that trip on film—movies, she decided. She wanted sharp pictures, not only of people but of places, so she rightly bought the expensive 16mm camera for the job, not the Eight. Of course, she had never taken a movie nor thought about one, but off she went, full of enthusiasm.

When she got back I was invited to the show. The lady had been reasonable enough in her approach; that film cost four times as much as 8mm and she wanted to make it go as far as possible, to cover all the points she had in mind. She was faultless, too, in her exposures; she didn't waste a frame. She stood herself before each scene and shot a precise and correct 15 or 20 seconds, just enough to register the required detail for later inspection. Much more lively than a still picture, she figured. Then she would move on to the next scene, an hour, maybe a day later. Very sensible, you might think.

Just as soon as that film started, I began to laugh. I was soon in stitches. This was the zaniest movie ever made! All those separate scenes were now telescoped, one right after the other without a break. You see, there are movie conventions which we all know, straight out of Charlie Chaplin and the like. If you see a man running and then a shot of a pond, you *know* that the man will end up in the pond—or that he is *already* in the pond. A head emerges at the surface. . . .

The film was an endless series of discontinuities of that sort, all too vivid, absolutely unintended. Cars slammed into the sides of barns (it seemed), people fell off cliffs, cows became horses, buildings converted from Victorian to old Colonial in seconds, mountains slumped into plains and erupted into different mountains, people vanished into thin air or suddenly appeared out of nothing. I was in hysterics. It was marvelous! Film technique gone berserk!

Can you imagine that film with sound? Well, take my own first movie, 1933. Different problem: A big Atlantic storm, huge waves crashing against a half-mile sea wall. I wanted all the waves, not just one or two. So I panned sidewise. And panned some more. I never stopped panning and always in the same direction. When the film was projected, those waves skittered by at full speed, sidewise, and in a zigzag blur; I had panned too fast! In moments the dizzy motion led to unease, then distress and near-seasickness. Dreadful, all that water lurching past.

So I learned to pan only sometimes—and *slowly*, with rests for the eyes in between. And to pan in both directions! Stops the seasickness. Such pitfalls! You'll fall into them again today if you're not careful with your video movies. And your added sound will be added sound, too.

But it will be fun and interesting, this new development, a big addition to the audio scene. I look forward to it. **A**

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TAPE GUIDE

HERMAN BURSTEIN

Slow Stop

Q. I am happy with my cassette deck except for one peculiarity. When the end of the tape is reached in fast-wind mode, the tape drive does not stop for several seconds. This period is accompanied by a moderate amount of squeaking from the deck. I have written to the manufacturer to ask about this, but they did not reply. Is this sound normal? If not, should I have the deck repaired?—Craig Steinfeld, Silver Spring, Md.

A. I have found that cassette decks differ in the alacrity with which they respond to tape run-out. Some will respond promptly in normal operating mode but less so in fast wind, while others do the opposite, and still others respond promptly in both modes or not at all. Although I cannot say that the behavior of your deck is "normal" in the sense of operating as the manufacturer intended, it is within the range of common experience.

If a very few seconds pass before

the transport stops, it is likely that no harm is being done. If the interval is substantial or getting longer, it is probably wise to take your deck to a competent service shop for repair.

Cassettes vs. CDs

Q. Is it worthwhile to continue investing in cassette tapes, considering that CDs are beginning to become fairly inexpensive and have higher sound quality?—Brian Barth, Cambridge, Mass.

A. Presumably, you refer to investing in prerecorded cassettes. While the CD format offers superior frequency response, signal-to-noise ratio, distortion and motional stability as compared to cassettes, not all CDs live up to the promise of the format. And there are people—albeit a minority—who hold analog recording in higher esteem than digital, claiming that the latter has sonic defects which present measurement techniques do not show.

The top-quality cassette decks

achieve very fine performance: Frequency response is essentially flat from about 30 Hz to 20 kHz. Distortion is less than what is usually audible on program material. Signal-to-noise ratio can be as high as 75 to 80 dB with Dolby C NR and about 85 to 90 dB with dbx NR; once S/N gets to about 75 dB, further improvements tend to make little perceptible difference, unless one plays at thundering levels. However, tape's motional stability (speed accuracy, flutter, etc.) is not as good as what is achieved by CDs.

Listen to both formats at their best and compare. But also compare their relative utility to you. If you already have a portable and/or car cassette player, and you decide to switch to CDs, you could get by with just a portable CD player (which can be used in

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.



What other audio tapes fail to hear.

the home and car, with suitable adaptors) but will probably want home and in-dash CD players, too. (*Editor's Note:* You might consider, in that case, buying CDs and dubbing them to cassette for portable and mobile use. With good tape, a good deck and an NR system such as Dolby C or dbx, the results can be impressive.—I.B.)

Swivel-Head Azimuth

Q. In shopping for a cassette deck, I visited a dealer who was intent on impressing me with the problem of maintaining azimuth alignment of the swivel heads in the current crop of reversible machines. Is this just sales talk?—Coy L. Lay, Washington, D.C.

A. Maintaining correct azimuth alignment of the tape heads is crucial in order to preserve high-frequency response. To preserve response out to 20 kHz or so, azimuth must be maintained to within about 6 minutes of 1° of arc, and hence, there is very little room for error. It is easier to maintain precise

azimuth alignment with fixed heads than with swivel ones, so what you were told is not mere "sales talk." On the other hand, tape-deck technology keeps improving, and the accuracy of swivel-head azimuth keeps getting better. You may want to read my article, "How Important Is Tape Azimuth?", in the September 1984 issue, for a more thorough explanation.

Cassette Longevity

Q. As my cassettes get older, it seems that their sound quality deteriorates. Is longevity affected by the number of times the tape has been played, the age of the cassette, or the type of tape?—Brian Barth, Cambridge, Mass.

A. Tape quality is one of the chief factors in maintaining good sound reproduction over a long period of time. A high-quality cassette is capable of 500 or more passes before deterioration sets in. Storage conditions are another factor; one should avoid excessive heat or cold, as well as humidity

extremes. Also, some decks do handle tapes more gently than others.

Taping 78-rpm Records

Q. I am a Frank Sinatra buff. There are 150 or so Sinatra recordings which were issued only on 78-rpm shellacs between 1939 and 1949, and I want to dub them onto open-reel tape. I have a general idea of what is involved but need some guidance in terms of equipment, choice of styli, and basic techniques. Would you suggest the use of a transient-noise-reduction system? I have an SAE 5000A impulse-noise reducer, which I thought would help remove some of the ticks and pops in the old shellacs.—Charles Granata, Bloomfield, N.J.

A. Yes, an impulse-noise reducer should be helpful. In addition, provided the two are not incompatible, a dynamic noise reducer could cut down on hiss and similar noise; the Burwen DNF 1201A has a switch position specifically calibrated for 78s, and the

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Most tape heads in use today last for a very long time, so automatic search is probably a minor factor in reducing head life.

Packburn 123 has elaborate facilities for coping with 78s.

Correct equalization—precisely complementing the bass boost and treble cut used in making a recording—is another problem. The standard RIAA equalization used for all of today's records does not match the equalizations used for 78-rpm records (which varied with the maker and the year), but it is the only equalization position available on the phono stages of most modern amplifiers and preamps. (The Onkyo P-3030 preamplifier is the only modern preamp I know of with both RIAA and 78-rpm phono equalization settings.) The main difficulty is excessive treble cut.

While tone controls can often be used to touch up equalization for playback, they usually do not affect a recording because they are wired after the tape output jacks. Better results can be obtained by using an equalizer between your system and the tape deck. The Esoteric Sound Re-Equal-

er (*Audio*, November 1985) is specifically designed for this use.

You will definitely need a different stylus for playing 78s. Shure, Audio-Technica, Pickering, Stanton and perhaps other cartridge makers offer various styli designed for the purpose; Shure even offers a hyper-elliptical version. Check your cartridge's manufacturer to see what's available, since few stores will carry these items in stock. Because old record groove widths and shapes also varied, some companies specializing in items for collectors offer a variety of special styli for records which require them.

Search and Wear

Q. I have heard that using automatic search on a tape deck causes extra head wear. Is this correct?—Dave Hoover, Iowa City, Iowa

A. In some decks, the tape is in contact with the head during automatic search, and this will cause extra head wear. In others, the tape is held a very

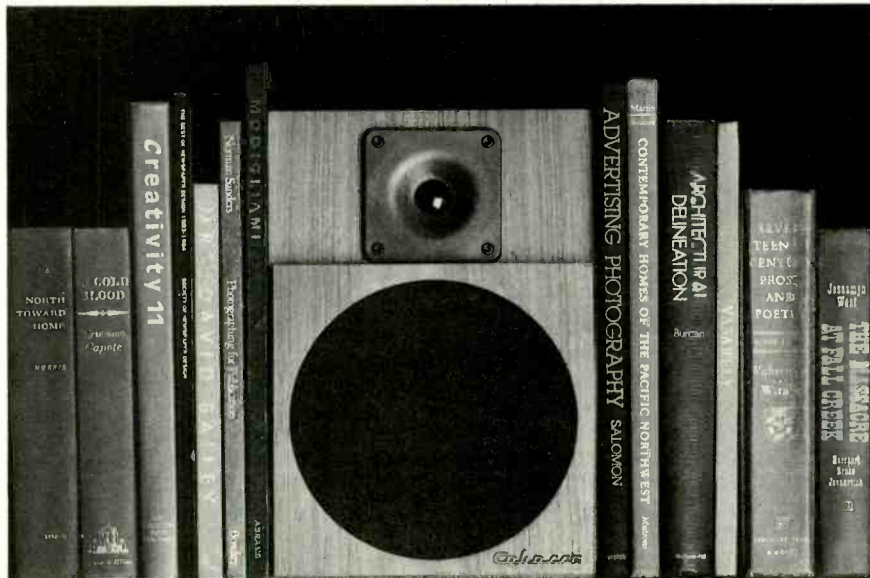
small distance away from the heads, so no head wear will occur. In any event, most heads in use today last for a very long time—something like 20,000 to 200,000 hours of use—so automatic search (a feature found on the majority of tape decks) is probably a minor factor in reducing head life.

Demagnetization Alternatives

Q. I use a demagnetization cassette for my car deck and would also like to use it for my home deck, since it demagnetizes the capstan as well as the heads. My home deck has automatic demagnetization. Would the cassette demagnetizer harm it or be unnecessary?—David E. Jones, Mt. Tabor, N.J.

A. Use of a demagnetizer, either a cassette or probe type, will do no harm if instructions are carefully followed. Even though your home deck has an automatic demagnetizing circuit, this would not demagnetize the capstan, so the use of an external demagnetizer is a good idea. A

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SCA Interference

Q. Have you ever heard of multiplex signals from an FM tuner causing "beats" in recordings made off the air? What does this noise sound like? And can I adjust my tuner's SCA filter just by listening?—O. O. Callaway, Carlsbad, Cal.

A. Yes, I have heard problems related to bias beating with SCA signals. The sound, however, is not a steady tone, because the frequency of the SCA subcarrier is constantly shifted by the signal modulating it. Thus, the sound heard is a kind of "swishing."

It is possible to adjust the SCA filter by listening, but only if your cassette recorder has simultaneous record/playback capability. Adjust the tuner's filter for minimum background noise. Note that there are times when the subcarrier will not be present. Do not be misled by this into thinking that the adjustment is correct.

The more conventional alignment process involves the use of a signal generator and other equipment to modulate an FM carrier with a 67-kHz subcarrier. Once this is set up, follow the tuner manufacturer's alignment instructions.

If you never hear such interference, no matter which station you are tuned to, then follow the advice of the well-worn proverb: "If it ain't broke, then don't fix it."

Pre-Echo on CDs

Q. On a few tracks of one of my CDs, I hear "pre-echo"—a faint hint of the music before the music actually begins. Until now, I had heard this phenomenon only on phonograph records, and associated it with the stylus playing the groove next to the one containing the music. How is this possible on a Compact Disc? Could it be from print-through caused by the master tape being wound too tight in storage? Is the CD defective?—Edward Bauman, San Diego, Cal.

A. The "pre-echo" you mention is the result of print-through, just as you suggested. The master analog tape must have been wound tightly; this is always done to avoid edge damage during storage. Added to this is the fact that the tape was probably recorded at a high signal level. Chances are, too, that this tape had not been played

since it was used to cut the disc master. Because the turns of tape are in intimate contact with one another, some of the magnetic data contained on one turn was transferred to the next one. This effect can be hastened if the tape is stored in a warm room. Because of this transfer of magnetic information, there is a faint echo or maybe a faint pre-echo, or "ghost."

Linear-Tracking Tonearm Noise

Q. I own a linear-tracking tonearm which makes an audible "kloonk" on soft passages and between songs. Could this noise be related to the motor that drives the tonearm? Can it be stopped, or will I just have to accept it?—Steve Wallace, Dillon, Colo.

A. I have limited experience with linear tonearms. With my own rather inexpensive one, I do not hear any noise resulting from the stepping motion of the arm servo motor. This does not rule out the possibility of such a sound occurring if the motor makes its moves too quickly or in too-large jumps.

Before deciding the motor is causing the problem, check your cartridge. If the tracking force is too great, the cartridge body may drag on a record, especially if the disc is slightly warped. This warp could cause the cartridge to strike the disc; such contact could be translated by the cartridge as output.

Assuming that the noise you hear is the result of servo motor problems, I can't believe you should just have to live with it. I suggest you have it factory-serviced.

Intermittent Turntable Operation

Q. My three-year-old turntable recently stopped operating properly. Now, after a few minutes of operation, the platter stops turning. After 30 S or so, the platter will accelerate to the right speed, run for a few seconds, and stop. The power light remains lit, which rules out any difficulties with the a.c. wall outlet. The tonearm remains on the disc's surface rather than rising as it would at the end of an album, which rules out a lead-out adjustment problem. I have looked into the unit for burned components and found none. I would appreciate any information you may have.—Douglas Comstock, Bangor, Maine

A. A number of factors could result

in the intermittent operation you have described. Most likely, a component (possibly the motor) becomes erratic after it heats up. To locate this component, wait for the turntable to stop turning. Then look underneath or inside and spray each component on the p.c. board with a coolant made for this purpose. You will likely find one component which, when the spray is applied, will permit the proper operation of your turntable.

It is also possible that the speed buttons need a contact cleaner. If oxide has formed, heat buildup might result in intermittent contacts. (Naturally, if these are momentary-contact switches, contact problems are unlikely.) Or it may be that there are hairline cracks on the circuit board or poorly soldered connections which act up when they become heated.

Tape Loops and AUX Inputs

Q. My cassette deck is plugged into one of my equalizer's two tape-monitor loops, and the equalizer is plugged into one of the two tape-monitor loops on my receiver. There are, therefore, two unused tape-monitor loops in my system, one on the receiver and one on the equalizer. My receiver also has an unused AUX input which, according to the instruction manual, can be used for any high-level source, such as a tape deck.

I plan to add another cassette deck and a CD player, connecting the cassette deck to the equalizer's second tape-monitor loop. But where should I connect the CD player if I want to be able to equalize the music—to the AUX input or the receiver's second tape-monitor loop?—Victor Orellana, Culver City, Cal.

A. By all means connect the CD player to the AUX input. This will enable you to route its output to any of the components you have mentioned—the equalizer or either cassette deck. Engaging the appropriate tape-monitor switch on your receiver will pass signals from your CD player through the equalizer, just as it now passes signals from your other signal sources.

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.

With any equalizer, this setup will also allow you to equalize the signals from either cassette deck in playback; with some equalizers, it will also give you the option of equalizing the signals going to the two decks in recording.

CDs and Static Discharge

Q. I am about to purchase a Compact Disc player but am concerned about how static electricity might affect its performance. My home is plagued with lots of static; when I walk across my living-room rug and touch my stereo equipment, I invariably get a shock from the static charge, and I hear it in the loudspeakers. What suggestions do you have for alleviating this? We already humidify our house.—Andrew Hinds, Fort Collins, Colo.

A. I do not believe that the static discharges you have described will damage your CD player or the discs used with it.

Without actually curing anything, you can eliminate most of the "clicks" you

have described by touching some metallic object other than part of your stereo system *before* operating the equipment. Of course, what you really need is a substance to spray on your carpeting which can eliminate the static buildup in the first place.

Humidifying your home is a good idea. I do it in my home, but I live in a climate where it's only necessary during winter months. It is likely that in drier climates this is necessary even in the summer. I am not a heating/humidity expert, but it seems to me that unless you have a hot-air system, humidifying a home is a difficult task. Even with hot air, I have found that some systems just cannot put out enough moisture to make a difference.

Heat Buildup in Amplifiers

Q. I recently purchased a new power amplifier which becomes quite warm to the touch soon after it has been turned on. The owner's manual advises against placing the unit in a

bookcase or cabinet, or in any location with restricted ventilation. What will result from too much heat if I leave the amp in a cabinet, where it is presently situated? Will the heat harm nearby equipment? Can a small a.c. fan, installed in the rear of the cabinet to pull air through, solve the problem? And if not in a bookcase or cabinet, where can I place the amp safely without subjecting it to too much dust, etc.?—John S. Cates, Atlanta, Ga.

A. If you use your amplifier for extended periods and allow the heat to build up, there is a risk of damage to its output stages. Excessive heat can also shorten the lives of other components, notably electrolytic capacitors. This is why the manufacturer of your amplifier recommends that it be used where air flow is not restricted.

If you are forced to keep the amplifier in an enclosure, the use of a fan, as you have suggested, can help greatly. You may have to cut a hole in the rear panel of the cabinet so that cool air

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VCRs can record audio signals for hours at a stretch. However, editing and cueing are more cumbersome than with audio tape decks.

can be sucked into its interior and made to flow over the amplifier. Most of the heat is generated at the heat-sinks, usually at the rear of the amplifier but sometimes at the sides. So be sure that the fan directs cooler air onto the heat-sinks.

Additional heat will develop in the power transformer and other components. You may, therefore, need to take added steps to ensure that any vent openings in the amplifier's case receive a cooling air flow, too. This might require the use of a "muffin" fan if the one used to cool the heat-sinks does not force enough air over the rest of the amplifier.

Although heat dissipates with distance, it's still possible for an amplifier's radiated heat to affect other audio components, which will, theoretically, shorten their life. This applies not only to electronic devices but to the drying out of lubricants in turntables and cassette decks.

Putting the amplifier on an open shelf often reduces the amp's proximity to other components and ensures a clear air flow to all parts of the amp itself. I believe that dust is far less of a problem than heat. It would be a good idea, moreover, to vacuum the equipment occasionally, and to routinely dust its outer surfaces.

**VCRs and Conventional
Audio Recording**

Q. I have heard that VCRs can deliver higher fidelity than cassette recorders can. How can this be, when a VCR has no level meters, noise reduction, etc.? What do you recommend as the best recording speed for audio on a VCR? Is fidelity increased significantly by using a PCM converter when recording?—Steve Wallace, Dillon, Colo.

A. The "Hi-Fi" stereo soundtracks of Beta Hi-Fi and VHS Hi-Fi VCRs, which work by Audio Frequency Modulation (AFM) rather than straight, linear audio recording, have flat frequency response throughout the audio spectrum, with S/N ratios of perhaps 80 dB. Wow and flutter are virtually unmeasurable, and distortion is extremely low. For more details, see "Beta Hi-Fi: Better Audio for Video" (*Audio*, May 1983) and "VHS Hi-Fi: Five Units Tested" (November 1984). The PCM stereo

digital tracks on some of the newest 8-mm VCRs have similar performance, except for frequency response limited to 15 kHz. All these machines can record in stereo, and some can also record stereo television broadcasts off the air. There are meters and manual (as well as automatic) level controls to help you in setting proper recording levels.

These decks all have conventional audio tracks as well, for compatibility with existing tapes and players (though "conventional," in 8-mm's case, means monophonic AFM). In some VHS and Beta machines, even the conventional audio track has been improved, with wider, flatter frequency response, stereo recording and playback, and noise reduction.

There are both advantages and problems in using these decks to record audio alone. The Hi-Fi decks, at least, do a superb job of recording, and all VCRs can record for hours at a stretch, with no breaks for tape-changing. But editing and cueing are more cumbersome than with open-reel or even audio cassette machines. Most modern VCRs move the tape backwards a bit when the pause button is pressed, to avoid loss of sync and picture breakup when recording is resumed. Thus, pressing the pause button too soon after the end of a piece of music will cut the last note off.

Audio recording quality is independent of tape speed with AFM and PCM recording. With conventional (linear) audio tracks, the best recording speed for audio is the fastest one available on the VCR.

If you are purchasing a VCR with the idea of using it for stand-alone audio recording, be sure the machine has the built-in sync necessary for this application. Although most models are so equipped, I have seen one or two which required video input to provide this sync.

A PCM converter records digital sound in place of the audio sound tracks. This system has better fidelity than any of the systems described above—dramatically better than the standard linear tracks—and can be used with any VCR. When a Hi-Fi machine is fitted with a PCM converter, it can record four high-fidelity (and two low-fi) channels simultaneously. **A**

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SHOP TALK

Do hi-fi salesmen give you a pain in the neck? They rank second on my list, close runners-up to used-car salesmen. (After 16 weeks of looking, I still haven't found a good used Corvette—anybody out there know of one?) Anyway, stereo salesmen give me a pain. There are just two types—the dud who spends 15 minutes looking for the on/off switch, and Mr. Techno, the walking glossary of audio gibberish. With the advent of digital audio, the situation has gotten a lot worse. Everywhere you shop for a CD player, you have to endure noninformation (e.g., "Wait and ask Biff when he gets back from his lunch hour") or frankly wrong information (e.g., "They're the same as LPs, only the grooves are 60 times smaller"). With Christmas almost upon us, and CD players at the top of practically everybody's list, the situation in the showroom is serious, indeed.

Thus I have compiled a list of effective maneuvers for smart CD shopping—considerations that will separate the great players from the merely good and, more importantly, communicate to the salesman that you need neither his help nor his hindrance. Don't worry—this text has been specially encrypted so you and I can communicate freely without stereo salesmen listening in. They think they're reading a column on their favorite topic—sales commissions.

Are all CD players alike? The answer is definitely no. First, some players are a lot more expensive than others. Second, some sound better than others. And the correlation is sometimes the inverse. I recently auditioned a \$300 player and a \$2,000 player with a group of recording engineers, and we agreed that the less expensive one sounded better. So, exactly how do you shop for a CD player? There are seven important questions to ask:

1. *Who is the manufacturer?* This is the best overall measure of quality in CD players. In my evaluations of players, I have found that certain manufacturers deliver consistent quality, whereas others apparently haven't got the hang of it yet. Do your homework, and ascertain exactly which companies have the required expertise; it isn't always obvious. There are some sleepers out there. Sanyo, for example, is a



major manufacturer of Compact Discs and has thoroughly researched CD technology, both in terms of disc manufacture and player design. Their budget Model CP660 player has sound that rivals the best.

2. *How good is the error handling?* Discs aren't indestructible, especially as they enter the car- and portable-player environments, and they get dirty. Unfortunately, consistent specifications for error-handling performance are still not available. Even without a special test disc, you can gauge a player's ability to play through errors without mistracking. Take a strip of opaque, black tape, perhaps 1 mm wide, and lay it radially across a disc. A good player should play through it. Now try two strips, on opposite sides of the center hole, and see if the disc plays. Keep loading the tape on until the player capitulates. An excellent player will have no trouble with six strips of tape.

Of course, even a normal disc contains errors, and the player's error-correction and error-concealment circuitry must prevent their audibility. Correction strategies yield absolutely correct data, so errors become nonexistent and inaudible. Error concealment sim-

ply synthesizes data to the best of the circuit's ability. Because not all optic/servo systems are equal, players have differing success in reading disc data accurately; the poorer the data read from the disc, the more concealment must be used. And concealment circuits aren't equal, either. The bottom line is audible errors. On some players you hear something funny once in a while—not a mute or a click, just badly concealed data, and it sounds weird for an instant. On good players, you don't hear this very often.

3. *Does the player have dual D/A converters?* When the output data is multiplexed through a single D/A, the audio signal must be alternately switched between the stereo channels—and that switch (another analog stage) can cause distortion. Moreover, an 11- μ S difference between left and right channels will be created. Although this can be compensated for, it is difficult to provide linear compensation across the frequency band; the result is often an interchannel phase difference at high frequencies. Dual D/A converters prevent zero phase error between channels.

Unfortunately, not everything is sunny in dual D/A land. A pair of convert-

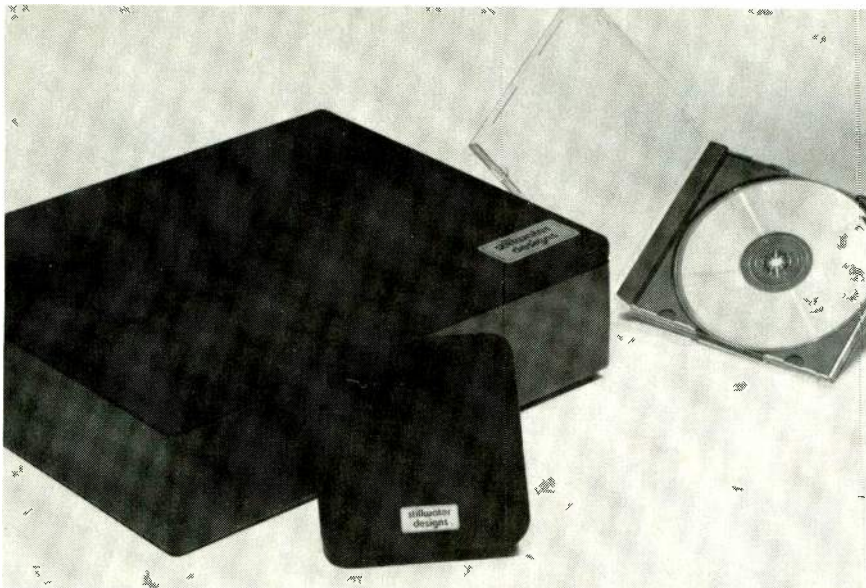
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Error-correction varies from player to player, but the bottom line is what's audible. On some players you just hear something funny once in a while.

ers might mistrack due to fluctuations in their reference voltages or to anomalies in the chips themselves; the result could, again, be phase error. Sooner or later, manufacturers will solve both problems by offering dual D/A converters on a single chip. Until then, the evidence weighs in favor of dual D/A converters.

4. *Does the player have digital output filtering (oversampling)?* In theory, there should be no audible difference between analog and digital output filters. In practice, the audible difference is slight, but significant. Primarily because it is much easier to design a good digital filter than a good analog filter, the former technique tends to deliver consistently good sound. In addition, a digital filter is contained on a chip, whereas an analog filter is comprised of many discrete components. Thus, the digital design yields greater reliability and long-term stability, and lower power consumption.

Also, oversampling is considerably cheaper to produce. That means the manufacturer can invest some of the savings in other facets of the player, beefing up subsystems such as the audio output circuitry, including the gentle low-pass filter necessary to remove extreme high-frequency components present at the output of a digital filter. Of course, it also means the manufacturer might have simply beefed up his profit margin.

5. *How does the THD measure up?* Specified THD and measured THD sometimes are worlds apart. The problem is supersonic artifacts (at least above 21 kHz). "Beat" frequency components caused by clock interactions, and other high-frequency junk, can increase in-band measurements of THD. Therefore, some manufacturers measure THD with a 21-kHz "brick-wall" filter between the player's output and the distortion analyzer's input. This guarantees that the supersonic junk does not raise THD.

But is that really kosher? If you're measuring harmonic distortion at 20 kHz, and you put in a 21-kHz filter, of course you're going to get a great reading. Besides, some players don't have any of that junk; is the use of filters fair to them? For example, with a low-pass filter inserted, I recently measured a THD of 0.0022% at 1 kHz and

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.

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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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It's tough to evaluate sound in a showroom, and with CD players it's even tougher. The trick is to concentrate on one aspect of sound at a time.

0 dB on a Sony CDP-102, and THD of 0.0030% on another big-name player. Without the filter, the Sony measured 0.0029% and the other player measured 0.35%. Sure, the junk is super-sonic, but I'd prefer it to be absent. That's where *Audio* comes in handy; when Len Feldman measures THD, he

is careful to state the conditions of the measurement and the presence of any supersonic components.

When evaluating Compact Disc players, look for a single master clock, as opposed to several unsynchronized clocks; this tends to reduce supersonic junk and provide good THD read-

ings—as measured the old-fashioned, unfiltered way.

6. *Are there vibration problems?* CD listeners tend to play their discs at louder levels than others, and there is augmented bass response. This can lead to airborne and structure-borne vibrations from loudspeakers, which tend to cause vibration in discs which are not tightly clamped. As the disc flutters, the pickup servos cannot keep track, the error-concealment circuits cannot cope and the result is added distortion at loud listening levels. (That's why users of some players have learned to put in two discs simultaneously for better gripping.)

Checking for this problem in stereo showrooms is one of my favorite past-times. If you crank up the amplifier level, the problem may occur, but it might not audibly manifest itself because of amplifier or loudspeaker (or room) overload masking the problem. You have to crank up the level, *then listen with closed-ear headphones*. This is guaranteed to drive salesmen crazy. But listen closely: On some players you'll hear a deterioration of sound quality as the error-concealment circuits go into overdrive. It's difficult to describe the effect, but you'll know it when you hear it, if you keep an open mind—remembering that it's something you've never heard before in analog equipment.

7. *Does the player sound good?* This question is tougher to answer than you might think. In general, all CD players sound okay. A showroom has always been a tough place to listen to anything (except the salesman's pitch). With digital audio, it's even tougher. The trick is to concentrate on one aspect of sound quality at a time. Listen for badly corrected errors. Listen for high-volume disc instability and for full ambience. Listen for naturally warm sound. It isn't easy, and it takes time. Sometimes it takes me days of comparison before I can reliably choose the better player. Of course, you might have a better pair of ears. And as all of us become more familiar with what we're listening for, we'll get better at it.

Okay, I'm already over my word quota. Go out there and hit those showrooms, holiday shoppers. And watch out, you salesmen!



Revox Remote Remote Control

Ordinary infrared remote control is okay, as long as you're not too remote from what you want to control. Example: You are listening to your downstairs audio system through extension speakers upstairs, but the music doesn't fit your mood. You want to change FM stations, lower the volume, switch to the CD player, select CD tracks, or record a concert from FM to your cassette deck. Your remote control probably can't help up here.

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AUDIO SYSTEMS

Mitch Miller: *A Hidden*

We were speaking about picking songs and so forth. Let's talk about this whole brouhaha with Frank Sinatra. He was at Columbia from 1950 to 1953. He was under your direction at Columbia, and he left the company, charging that he was forced by you to sing what he called "inferior" BMI-published tunes instead of ASCAP tunes. He felt his career suffered as a result. In fact, he even sent a telegram to a House antitrust subcommittee investigating the networks in 1956. How did this all come up?

There were two reasons, I guess. In the first place, let's start with the fact that Frank Sinatra had a BMI firm of his own. Also, ASCAP did not allow country writers in, nor rhythm and blues. It was shortsighted; they got smart afterwards. ASCAP as an organization was never involved in these charges. It was just certain writers who felt they were being slighted, writers testifying in front of a Congressional committee. When this came out, the CBS attorneys descended on me and looked at everything I had ever recorded. As it turned out, 95% of the songs I did were ASCAP. Only 5% were BMI. And of the BMI songs Sinatra did, two were published by his own company.

Where did these charges come from? What would prompt Sinatra to make charges like that?

I think he just didn't want to take responsibility for the dip in his career at that time, which had nothing to do with me. He had lost his motion picture contract. He had lost his television show. Look, I have to preface this—the guy's a great artist. I never said that he couldn't sing. But physically, he couldn't sing well at that time.

I risked my neck with the union. I can say it now and everyone will laugh, but I wanted Frank to sing some rhythm songs. He had done "It All Depends on You"; otherwise, they were all ballads he had recorded. I had an idea for an album, *Sing and Dance with Frank Sinatra*. I got George Siravo to do the arrangements. One of the sessions, Sinatra never even showed up. So under the guise of balancing, I made a track of the orchestra alone. I just kept the tape going. Then he came in another time and his voice was off. In other words, the whole eight sides were tracked. Then weeks later, at midnight, we snuck into the studio with Frank and finished the recording. You can hear that album today and it's pretty damn good. "American Beauty

Rose" and all those rhythm songs. If you ask me, I think he just couldn't face the fact that he was responsible for the drop in his career.

This is when he was involved in an affair with Ava Gardner?

Yes.

But Sinatra did suffer then. You did pick songs for him, right?

Yes! And we had advanced him money to pay his income taxes. So the president of Columbia, Wallerstein, said to me, "You've got to make this money back." Some of the songs we did—"I'm a Fool to Want You," "Why Try to Change Me Now," "Blues Azurte"—we couldn't give those records away. But as soon as Frank did the movie *From Here to Eternity* it was his resurrection.

That was right after he left Columbia.

Yes. His being stomped to death in that movie was like he did his public penance. You know, priests were telling kids, "Don't buy his records because he's immoral."

Because he was having an affair with Ava Gardner?

Well, whatever. Don't forget this was in the early '50s. Now, people have babies without getting married and nobody cares. Look what happened to Ingrid Bergman when she had Rossellini's child. She couldn't even get a movie. So that was the morality at the time. They reacted against Frank.

Underlying this whole thing, though, you and Frank obviously had a pretty stormy relationship at Columbia. I believe he said he barred you from the studio at one point.

No. I was never barred from a Sinatra session. Look, he can say what he wants. He still sings good. . . .

POP PRODUCER MITCH MILLER describes working with artists like Frank Sinatra and Johnny Mathis, talks about his own success on records and television, and defends his reasons for resisting involvement in rock 'n' roll. This is the conclusion of a two-part interview.

Photograph: ©Carlos Eguiguren

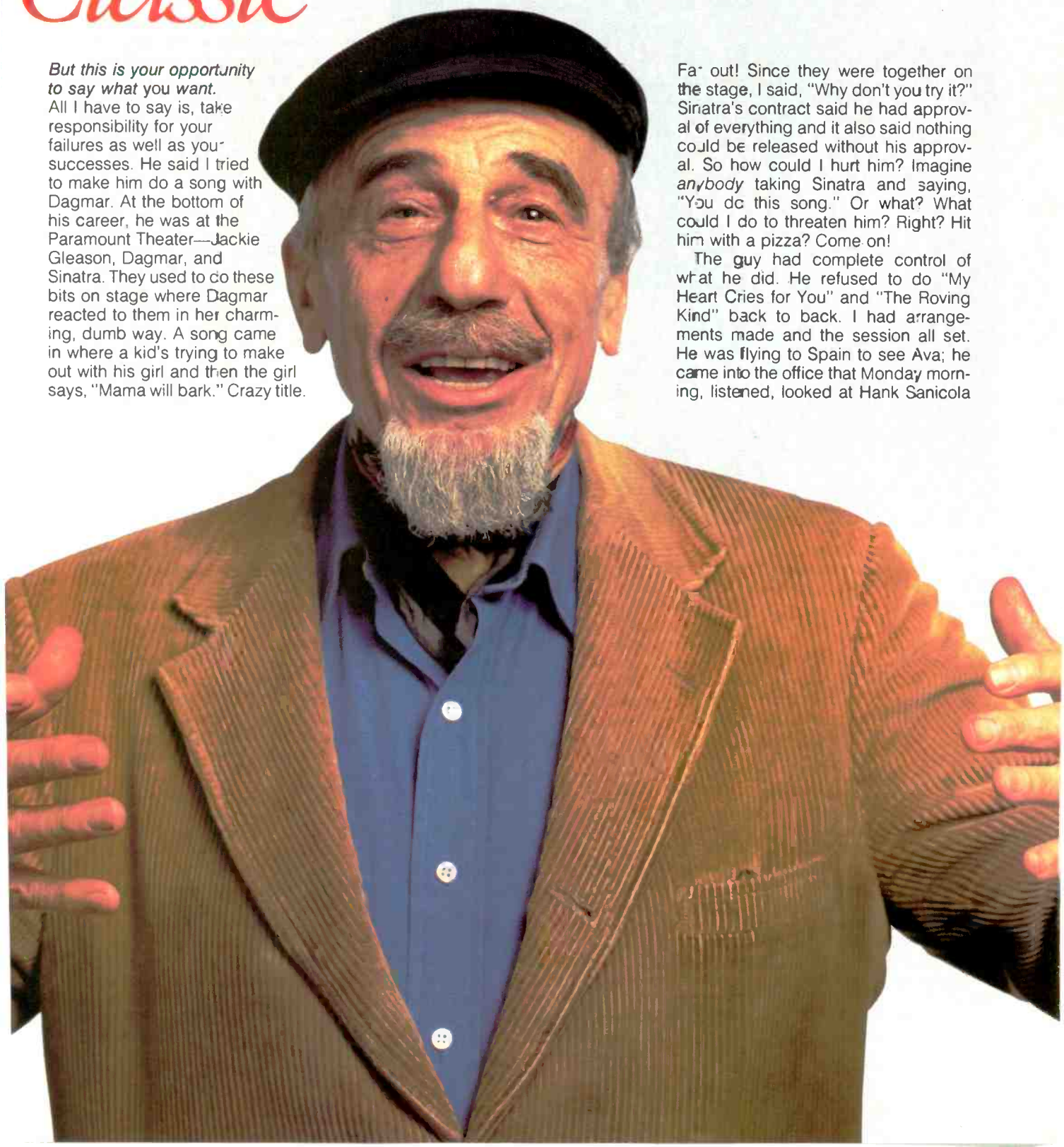
Classic

But this is your opportunity to say what you want.

All I have to say is, take responsibility for your failures as well as your successes. He said I tried to make him do a song with Dagmar. At the bottom of his career, he was at the Paramount Theater—Jackie Gleason, Dagmar, and Sinatra. They used to do these bits on stage where Dagmar reacted to them in her charming, dumb way. A song came in where a kid's trying to make out with his girl and then the girl says, "Mama will bark." Crazy title.

Fa- out! Since they were together on the stage, I said, "Why don't you try it?" Sinatra's contract said he had approval of everything and it also said nothing could be released without his approval. So how could I hurt him? Imagine *anybody* taking Sinatra and saying, "You do this song." Or what? What could I do to threaten him? Right? Hit him with a pizza? Come on!

The guy had complete control of what he did. He refused to do "My Heart Cries for You" and "The Roving Kind" back to back. I had arrangements made and the session all set. He was flying to Spain to see Ava; he came into the office that Monday morning, listened, looked at Hank Sanicola





listen to Tommy Dorsey play trombone, you can hear Sinatra singing.

You worked with a number of the masters of the Swing Era in the '50s at Columbia.

That was one thing Goddard Lieberson was marvelous about. He said, "We make a lot of money on certain things; we must also have a history of the great music of our time." Everyone agrees that Ellington is a fantastic composer and musician. And when he wasn't selling in the '50s, we kept recording him. It was a joy to come to work because many times he would put it together in the studio. I did Sarah Vaughan's "Corner to Corner" and "Perdido." I did all those records. She was very easy to work with, she was a wonderful artist. Except she was married to the wrong guy then. I forget who her husband was, but he always tried to get the songs of publisher friends recorded. I had to give in to him a couple of times. You know you don't have the last word if someone goes to bed with your artist at night.

I worked with Benny Goodman once, and it didn't turn out well. We didn't hit it off. He's a fabulous artist, but this was at a time when he wasn't selling. The few suggestions I made, he ignored. So I just asked John Hammond to take over after that. Benny's a great artist, but there isn't anybody who's been a part of his musical life who hasn't gone through a time when they couldn't get along. But that's all right, he has his way! It's what comes out in the end that counts. If you meet the greatest writers, you may find people you hate. But if their writing is good, that's all you judge them by.

You contributed to the folk craze of the early '50s. Did you work with The Weavers at all?

No. But I covered "Tzena, Tzena, Tzena" and "Goodnight Irene." Everybody covered those. I had Terry Gilkyson; he had "Cry of the Wild Goose" and then he wrote other things that were ripped off. Dean Martin took a couple of his songs and they became very big hits. I never tried to follow much. The sales department would come and say, "So-and-so has this hit. Why don't you make it with Doris Day?" I'd say, "Wait a minute. Let's make something with Doris Day where *she'll* have the hit, not be chasing some-

Sarah Vaughan; her "Corner to Corner" and "Perdido" were produced by Miller, who says she is "very easy to work with" and "a wonderful artist."

and Benny Barton, and said, "I won't do that crap." Here I was, stuck with musicians hired and the chorus. There was a kid who I had auditioned on a record. His name was Al Cernick, then Al Grant. I put him in the studio and rehearsed him all day. He had a two-sided Number One record with those tunes and became Guy Mitchell. But the point is, if Sinatra did it and did it perfectly . . . I think Mitchell's hit was a stroke of luck for me. At that time people wouldn't have bought it if Frank had done it. He was *persona non grata* with the public and the Church.

Now he leaves Columbia, does *From Here to Eternity*, and starts selling records again at Capitol. Suddenly all his records at Columbia start to sell—all those that I made with him. We repackaged and put them out. Not only did he

make back the money that Columbia loaned him, but he got about a quarter to a half million dollars above it in royalties! The records are there for anyone to hear. So if you look at the overall work, don't just take the one song that I tried as a novelty with his permission. After all, he could have walked out of the studio if he didn't like it. He could also have said "I don't want it released" if he didn't like it. But he had nothing to lose at that time, and we put it out. His friends said, "How could you do a record like that?" But it's very interesting he did one with his daughter, sort of novelty rock 'n' roll, "These Boots Are Made for Walking." Then he went right back to what he does best. *Sinatra has never really been a big record-seller, has he?*

Funnily enough, he never has had a million-seller, even at the height of his career. But he sold well. Look, he's the Tommy Dorsey of the voices. He and Jo Stafford. They learned from singing with Tommy Dorsey, the long phrase and the inflection of the notes. If you

YOUR STRENGTH WILL BE YOUR WEAKNESS, TOO: *If a good song comes along that doesn't suit your standards, you'll miss out on it.*

body." There again we get back to the bullet theory: If you only have so many to shoot, you have to husband your munitions. We covered very few records. You also find, if you look up the statistics, that we had more hits in proportion to releases—way more—than any other record company. Because we didn't do the borderline things. Sure, I'd miss out on some things. I'll never forget a guy who came in with a song called "Till I Waltz Again with You" in 2/4 time. I said to the kid, "How can you write 'Till I Waltz Again with You' and it doesn't have waltz time?" He says, "Man, that's the kicker!" I didn't do it, and he went and gave it to Teresa Brewer and she had a big hit [laughter]. And that's the only hit he ever wrote, too.

What I'm driving at is that your strength is going to be your weakness, too. By that I mean you're looking for a certain quality. If something comes that doesn't suit your standards, you'll miss out on it. There was a song, "Let Me Go, Devil," a song written by Jenny Lou Carson. [He sings:] "Let me go, let me go, let me go, devil." Then the middle: "The drinking and the gambling, and the bottles of rye." Hill and Range [music publishers] brought it over. I said, "The song's marvelous, but who's going to listen to this? Only recovered alcoholics and down-and-outers. Why don't you change the lyrics?" They said, "No, this is the story of her life," this lady country songwriter. They went to her and she wouldn't change it. I said I'd give her Johnny Ray. She wouldn't. And Decca made it, and it was played on every radio station. I never heard so much play. I thought, "Boy, did I ever blow this." But it was a turntable hit. Everybody played it and nobody bought it. So I was right and wrong. It died. Now, a year or two later, Studio One is doing a show and they want a song. The director comes to me and asks, "Have you got a theme song we can use?" I immediately thought of "Let Me Go, Devil" because it's got lots of holes in it, lots of long notes, so you can use it in

the background and it won't fight the dialog. The more of that you have, the more you can use the theme and the more you can sell it, see? So I called up Hill and Range and said, "Now that the song has had its chance, will you change it?" In a half hour they had guys up in the office. They came over with a lyric called "Let Me Go, Lover." I got this young kid because I didn't want anybody identifiable recording it. It would have taken away from the dramatic use on the show if they had Rosie Clooney or somebody well known. So there was this gal, Joan Weber, who sounded like she worked in the five-and-dime, like the kid down the block. She did that and boom, that was the first television smash, made by television. The record sold about 2½ million.

You signed the great gospel star Mahalia Jackson to her first major record-company contract in 1955. How did that come about?

At John Hammond's urging; he knew

her well. He wasn't with Columbia then. He said, "Mitch, she likes you." She was being ripped off by the small labels. I just talked to her. I said, "Look, you can do it the way you want it." She was afraid that we'd try to mold her into a pop artist. I wish I could have, sometimes, for certain songs. But she was a true original. I didn't even try, because I knew you couldn't get to step one with that approach. She had to be in the mood, she had to have her grapes and fruit in the studio while she was working. Had to feel right. But we made some wonderful records.

When she made records, did you have everybody in one big room like she did in a church?

The studio on 30th Street was an old Greek church, so we were in church. That was the best studio. Columbia sold it, and there's an apartment house there now. She was successful, and she got royalties for a change.

When Alvin Barkley died and I was doing the music for the Democratic



Gospel star Mahalia Jackson, whom Miller signed to her first major record-company contract at the urging of John Hammond.

IN DRAMA, SONG OR WHATEVER, *the writer comes first; without writers we're all dead. It's true—imagine no Gershwin, no Berlin.*

Convention in 1956, I used her. The place was dark, and on television there was just a pin spot on her. There were 20,000 people in that hall and you could hear a pin drop. The place was spellbound by her singing.

Let's talk about another great singer who at least started in gospel music, Aretha Franklin. Everywhere you read about soul music, you hear the story of how Aretha was brought to Columbia by John Hammond, and Mitch Miller wanted to make her into a pop star. Is that true?

That's baloney! I never had a chance to record her. Never! Look it up.

You never picked songs for her?

Nothing, absolutely nothing. In fact, John put a jazz band behind her. He wanted her to be a jazz singer. I could see why he tried to do that, but it didn't work. So then when she went to Atlantic and Jerry Wexler recorded her with big success, John asked, "What did you do?" Jerry said, "I put her in church." So that explains it. Not only is the story [about my working with Aretha] not true, but I've never met Aretha Franklin, to this day! I admire her and I'll go anywhere she's singing, but I've never met her.

Percy Faith (standing), whose arrangement of "On the Street Where You Live" helped make that song a hit for Vic Damone. At left is engineer Jack Lattig.



Why was she unsuccessful at Columbia? Was it just that John had put her in a jazz vein?

Yeah. Maybe now in a jazz vein she'll sell, too, but to break through to the public . . . Look, nobody can second-guess John Hammond. If you look at the list of stars, the people that he found, everybody else pales in comparison over the years.

Let's talk about another great black pop star, Johnny Mathis. How did you first hear about him?

He was found by George Avakian, singing in a bar in San Francisco. As is usual when a guy gets a recording contract, who's the manager? The owner of the bar, who turned out to be Helen Noga. George recorded Mathis. See, I had this staff and when they wanted to do something, if it was something original and unique, they had absolute freedom to do it. George came back and said he found this wonderful singer and I said fine, do an album. He produced it, he did everything. Out of that album you could hear Mathis' talent. But as with all young singers, he was influenced. One song was completely influenced by Ella Fitzgerald, another by Lena Horne. In fact, he even did a Lena Horne song, "Let's Do It," and Lena said, "He stole everything but my gown!" [Laughter.] Each performance on its own, you couldn't find anything wrong with it, but it was all derivative, which is not unusual in a

young singer. Then, we were having this convention in Estes Park in Colorado. Everyone at Columbia was high on this album. Everyone was screaming and yelling that he was a new star. I had my reservations, but I kept quiet. Look, I've done things that weren't my taste that I thought people would like, and I thought this could be like that. There was a big hoopla, big promotion and everything, and no sales. As usually happens when everybody is for something and then it doesn't work, nobody really wants to talk about it afterwards. Nobody!

So nobody had any plans for Johnny. Only Helen Noga; I've got to give her credit, she was persistent. Avakian couldn't make another album because the first was a failure, so she kept hounding me. Literally, she came in and cried. She said, "You've got to do something with him, you've got to!" I told her, "I'll tell you what, Helen, I'm going to listen to that album and I'm going to find out what he has that is unique, and I'm going to look for songs. If I find songs that are good for him, I'll do a session with him." She kept bugging me. Months went by. I just kept listening for songs. There was a song called "Wonderful Wonderful," these guys rewrote it maybe two dozen times. It sounded like Debussy, that's what attracted me to it at first. Another guy came in with "Scarlet Ribbons." Frank Loesser had a song called "The Twelfth of Never." The fourth one was "It's Not for Me to Say." After about four months I realized I had a session. Mathis came in and I told him what was attractive about his voice. It'd be very interesting for you to hear that first album and then hear these four releases, because it shows what direction I gave him. As I've said, you cannot put in what isn't there, you just have to take the wrapping paper off and show a singer what is there. Three out of those four songs became hits. Then Bob Allen wrote "Chances Are" for him, and he was off and running.

Now, get this: The Felds, the guys who own the circus, got to be big rock 'n' roll promoters. They had a touring show and they wanted to give Mathis \$5,000 a week to be one of 20 performers. In arenas. That's the complete antithesis of what Johnny Mathis is. But he was hot, and Helen Noga had him

Photograph: Frank Driggs Collection



signed. He was with General Artists Corporation then, Tom Rockwell's group. I said, "If you take that, I will not record him."
Why?

Because that would have destroyed him! I didn't want him in arenas. I didn't want him surrounded by a bunch of groups like . . . The Four Nosebleeds! The people on that tour, you wouldn't know who they are today!
You didn't want him stigmatized by rock 'n' roll.

No, I didn't want him . . . He was a long-term artist. He was in the category of Nat Cole. If you compare him to anyone, you have to compare him to Nat. These are the artists that defy whim, fashion—excellence is what accounts for their enduring success. That's what I'm proudest of about my work at Columbia. Here 30 and 35 years later, Rosemary Clooney, Tony Bennett, Frankie Laine, Vic Damone, Ray Conniff, Johnny Mathis, and if Percy Faith were alive, and Erroll Garner were alive, if the original Four Lads were working—they're all top performers. They may not have big records, but they sell out everywhere they perform and make big money. They last. So anyway, I just didn't want Mathis in that milieu. Helen screamed and yelled and I said, "Well, you take your choice." She opted not to go [with the Felds]. The funny part was, three months later he was making \$10,000 a week [laughter].

How long did you keep producing his records?

Helen Noga—she said this—she said, "I'm Armenian, and it takes three Jews to beat an Armenian in any business deal." [Laughter.] Right away she started a publishing company. So I said, "Fine, Helen, but the songs have to be good." What would happen is that writers would come in . . . If I did what she told me to do, I'd go out with only one side of a record. The writers would come with a song that suited Johnny and I'd say, "Give it to her publishing firm." Which they did. Pretty soon she wanted two sides of the record published by her. Of course, I refused that. People don't realize that whether it's drama, song or whatever, the writer is first. Without writers we're all dead. Performers come and go. It's

true. Imagine no Gershwin, no Berlin.

With Mathis I did all sorts of things. I did an album called *Open Fire, Two Guitars*. We improvised the session. I wanted to get that intimate feeling Johnny has. After that I did *Johnny Mathis' Greatest Hits*, and it was on the chart longer than any other record. That was the first greatest-hits album by anybody. You know, people are always taking bows. In our business what they do is they copy, they imitate and they call it a trend. No one is a pioneer.

How was the greatest-hits idea received within the company?

At that time I could do anything I wanted to. There was no fight. It cost them nothing, just the packaging.

Finally, I had Bob Allen write a song for Mathis, and Bob Allen had his own publishing company. Johnny wanted to do the song and Helen Noga said, "I want to publish it, but Bob Allen said, 'No, I'll keep it for myself.'" She said, "If I can't publish it, we won't do it." So I told her, "If that's the case, I won't record Johnny. You'll have to get another producer. If I'm going to produce him, I have to be the guy who chooses the material. I'm not going to be a yes man for you."

But producers today don't necessarily choose material.

Producers today are carpenters, mostly. With the multi-tracks they come in and they get their name on the album. If I had my name on every hit album that was produced by me, I'd put them all to shame. So what if you've produced even a dozen albums? I've produced a *hundred* best-selling albums [as well as 75 Top 10 singles, more than a third of which went all the way to No. 1—*Ed.*]. But in those days we never put the producer's name on. I wanted to put the engineer's name on just for his glory and ego, but the company said no because it'd set a precedent. Now even the guy who sweeps the floor has his name on the cover.

You feel that what you were doing is what a producer should be doing?

That's right. You have to follow it through. Pick the arranger, go over the music with him. When you came in the studio, the whole thing had to be done, four sides in three hours. Everyone was important. If one of the connecting





Johnny Ray (left), whose many recordings with Miller spanned a wide range of styles from country to mainstream pop to gospel.

links broke down, you were up the creek. Sometimes you had to change something. I'll never forget one time with Percy Faith and Vic Damone. People don't realize that "On the Street Where You Live" is just a thing done in *My Fair Lady* while they changed the scenery. The guy's singing to a house. It was just filler. But I saw it as a hit song for Vic Damone. Percy wrote the arrangement and everything, and we came into the studio and suddenly it occurred to me that everything falls on the strong beat. The record didn't seem to get going. It didn't take off until the middle, when Vic sang "Ooh that towering feeling." So I went out to Percy quietly. I never talked through the loudspeaker to give suggestions. I said, "Percy, let's start the record right there, that'll be the introduction. Kill the other introduction." Percy was so fast; he took five minutes. You hear the record now, and the sound goes up and you hear "Ooh that . . ." and everyone's ears perk up. Then you don't mind the strong beat. You need the

hook for the listener's ear. It became a big hit. It became a bigger hit than anything else in the show. Everybody began to record it after Vic, including jazz people.

A producer has to have the ability to change and the people talented and flexible enough to do it. I couldn't do it myself. You had to have a wonderful staff. I was lucky that I did.

You were certainly a phenomenal hit-maker, at Columbia especially. In your first year and a half there, sales in pop went up 60%.

Yeah, I guess so. Then it went up even more after that. We would sometimes have eight out of the top 10 in the country if you look at the charts. Also, this made the success of the Columbia Record Club. Stop to think. If you're going to put out the record of the month, if you have two or three artists, what are you going to do every month? The same two or three artists? We had the classical part, we had the Philadelphia, the New York Philharmonic and the Cleveland—the three top orchestras. In pop we had all these hit artists who could be offered.

How many club members were there? I don't know; it was all done secretly. They were afraid dealers would complain. It was found money for CBS.

There are a lot of people who don't like to go to a record store. *Reader's Digest* sells millions of records so quietly nobody knows. And they do it all by mail order.

Were record-club sales figured in when they computed whether a record was a hit or not?

No. The record became a hit, and then it would become a record-club choice.

Talking about selling records that way, a phenomenal success that I think most kids of my generation grew up with was the Little Golden Records series. I think you sold 33 million of these.

More. Al Massler owes me so much in royalties and I can't even find him [laughter].

How did all this come about? These were little six-inch recordings of classical music, specifically for children.

And we did some popular music. We did "A Child's Introduction to the Instruments of the Orchestra." Alec Wilder wrote it; it's a gem. We took Bach, the *Badinerie* of his "Suite in B Minor," and called it "The Flute Dance" and put dancing flutes on the cover. We had top musicians play it. It worked. See, Simon & Schuster had Little Golden Books, and they had Pocket Books—the only paperbacks available in 1948. They were in candy stores on the corner, in racks. They were put in on consignment. If you sold them you paid the publisher, if you didn't they took them back. Paperbacks went for a quarter. They were not in bookstores at all. They wanted to put in another rack with Golden Books and Golden Records, which would also be a quarter. So George Duplaix, who was the editor of Golden Books, had this idea. Al Massler used an injection mold with yellow vinyl. Well, it wasn't vinyl, it was dung [laughter]. If the cartridge was heavy, it ground the disc down into yellow powder. But the kids loved them, and they only cost a quarter. We did not play down to the kids. We didn't itzy-poo them at all. Kids keep being born, so they keep buying the records. The Little Golden Records are out on LPs now.

I read that your royalty on that was an eighth of a cent. Let's talk about the changes in royalties and how artists are paid.

Well, the eighth of a cent . . . I'll tell you why I took an eighth of a cent. If it

I CAN'T THINK OF A PRODUCER TODAY *who takes the talent and develops it.*
It's the lawyers and accountants who make the deals.

retails for a quarter, it wholesales for 11¢, 12¢. If they're going to give you the space in the store, you've got to give them that little profit. So George Duplaix said, "Look, if these sell in the millions, there is no room for a penny royalty. If you sell a million records it'll be \$1,250 [at an eighth of a cent each]."

Was that good, \$1,250?

It's better than a kick in the ass [laughter]. Don't forget, this was 1948. I was just starting at Mercury at the time. The regular royalty on pop records was 5% of 90%. I have a suit now at Columbia. They tried to take the cost of the cover off—50¢ for a cover. All these lawyers are in there; they won't let me in the books. This is an ongoing thing that I started five years ago.

How do you feel about the multi-million-dollar deals recording stars are getting now? Is that out of control?

No. I'll tell you why. Because whatever is coming in, these people are making themselves. Offhand, I can't think of a producer at any record company today who takes the talent, develops it. Today the lawyers and the accountants make deals. They give them so much, and the record is made somewhere else, and they deliver the record. Of course, they spend more on a video than I ever did on a whole record session. So if the artist is bringing it all in, let them get as much as they can. No one forces the record companies. I know that after Simon and Garfunkel left Columbia, to make up for what they called their lost sales, Columbia gave a deal to Wings, to Paul McCartney, where they gave him ownership of the Frank Loesser music company as an advance. Now Columbia, just by sitting on its fanny, would take in a million dollars a year just in performance rights on Frank Loesser's catalog. They were so hot to show sales, they got McCartney and Wings for two albums and they gave him the Frank Loesser catalog. Of course, Lee Eastman is Paul's father-in-law, and he engineered it—he knows the value of copyrights. If I was a Columbia stockholder, I would sue for dilution of assets. And those Wings records didn't do well at all, either.

But to Paul McCartney you would say mazel tov.

Of course. Look, no one held a gun to

their heads. But that goes to show—when the lawyers are making the decision, and a lawyer is president of the company instead of a musician When I was at Columbia, we were all musicians. Sure, we had lawyers to tell us about the contracts, and accountants to watch the budget. But they weren't making policy. They weren't making the aesthetic decisions. I'm sure, though the president of Columbia is taking bows for Michael Jackson, I would bet my bottom dollar that there's someone on the staff who found Michael Jackson, who nurtured him or got the idea. Maybe he got a good bonus, but not the credit.

Let's talk a little about your career as a pop artist. Everyone remembers your big hit, "Yellow Rose of Texas." How did you decide to become a pop performer, and how did you choose the material you did, which certainly wasn't highbrow?

No, it wasn't, but on the other hand it wasn't lowbrow either. "Yellow Rose of Texas" was a Civil War song. In the original, like all soldiers' songs, they were talking about women. They were comparing the "high yaller" girls of Texas to the black belles of Tennessee. Of course, that doesn't go now, and they changed two words and the girls became flowers. But the idea was you certainly couldn't do that with another artist. I was using choruses with Guy Mitchell and a lot of people, so I thought, "Why not just use the chorus itself?" They would be the star. That was a song that got covered very fast by a lot of companies.

I was called in many times to screenings. *Bridge on the River Kwai*, I was in the room alone while the picture ran and I'll never forget it. My stomach literally knotted at the opening of that picture. What a masterpiece it was. I'll tell you what happened. The soldiers are whistling "The Colonel Bogie March." Of course, I didn't even know myself then that it was "The Colonel Bogie March." This was their act of defiance. [He sings:] "Hitler, he has no balls at all. Goering has some but very small." They couldn't say the words so they whistled the tune. My stomach knotted at this and I said, "This has to be a record." I went in and I did it with the chorus. It came out and was an immediate hit. In fact, it sold even more

in Germany and Japan than it did here. Then they used it to play in the intermission at the picture. David Lean [the director] told me they saved about two million dollars in publicity thanks to that record.

Did you make some sort of deal with David Lean?

No, with somebody who wrote the contramelody. They had the copyright.

Nowadays the producers would have that all locked up.

Of course. Another one that I saw the same way was *High Noon*. It was a fantastic picture. I was alone in the Columbia screening room. In the music, the lyrics were telling the story. I called the publisher up and said, "Look, change the lyrics, make it a love song. Because it is a love story between Grace Kelly and Gary Cooper." At first they said they wouldn't. But I said, "If you do, I'll give you Frankie Laine." So they couldn't resist. Ned Washington wrote the words over and it became a love song: "Do Not Forsake Me Oh My Darling." It became a big hit and that helped sell *High Noon*. **Probably the biggest controversy in your long career was your stand on rock 'n' roll. You produced some rock precursors—certainly not rock music, but precursors like Johnny Ray's "Cry," which many feel was one of the forerunners of rock, and even Frankie Laine's "Mule Train." Yet you vowed when you were head of A&R that Columbia would never record rock 'n' roll. You called rock 'n' roll, among other things, "musical illiteracy" and just a phase. Now, 30 years later, would you care to eat those words?**

No, no! Let me tell you. With the artists I had, I couldn't have them turn around and do rock 'n' roll. Secondly, most of those rock 'n' roll artists—you can euphemistically call them that; some deserved the term but others didn't. They needed such nurturing and caring and rehearsing. I'm sure if you talk to Jerry Wexler, he'll tell you he would spend days with groups to get the songs right, and they wrote the songs. I didn't have time for that because I was supervising all this other stuff. But also, I saw what was going on in that deal long before the scandal came out. Payola. Pay to play. I asked Columbia, "Look, are you ready to pay? Because if you don't . . . Are you ready to buy

WHEN I CRITICIZE ROCK, *I'm not talking about the beat! I'm talking about the content, the literacy and musicality, that's all.*

time on the stations? I prefer if you buy time. Buy a spot and they'll play a record for three minutes." They said no. They couldn't afford to; they owned a network and had to keep their hands clean. They didn't even want to go into the publishing business. Now, of course, they're a big conglomerate, but in those days they were very wary. **What did you see in payola that was any different from what had always happened before, when a song publisher would come to an A&R man and try to romance him into taking a song? How is payola any different?**

It's different because if a guy took money from a publisher to record a song and the song was not good, that song would never get anywhere, no matter what.

But at least it got a chance to get out there, which it normally wouldn't have. All right, but he's defeating his own purposes. I think any A&R man who did that was a fool. I know it happened, and there are all kinds of stories. So that made it easier for me. To me, in payola nothing was being judged on quality. I mean, before payola, you put a record out and got it started and got reaction and other guys had to play it, whereas with most rock 'n' roll you couldn't get the first play without the

Blues artist Dinah Washington may have sung "with a rock 'n' roll beat," but, unlike rock artists who came later, according to Miller, "she sang great songs."



pay. Payola took all sorts of forms. A payoff in the toilet, for example. Some did it in a corporate way. Some had pressing plants, some had music stores, some had publishing companies. Some had all three.

Who were the big players?

The record will speak for itself. I don't care to start a whole big thing again. There are very respectable people out there today who were big players in it. You must go back further. In those days, certain radio stations like WNEW—you never could have payola there, because they had musicians. They had librarians who listened to songs. Those disc jockeys had taste and they still do. There are other stations, the same. But there were certain stations that didn't pay their guys enough. They were looking for a fast buck themselves, and as long as they had the audience they didn't care what went on.

Are you saying that rock 'n' roll would not have caught on had it not been for payola?

No. I'm saying that I couldn't get into the field because of the payola. I had one experience where I went to a guy who had a big television show. We had a rock-flavored record that we made with The Four Lads using another name, which we put out on the OkeH label. It was a damned good record that was making noise, and we wanted to get it on this program. After keeping us waiting about an hour and a half, the guy suggested that the publishing rights be given to him. I told him we didn't own the rights. So that was that. **So that experience turned you off?**

I couldn't operate in that milieu. See, if you were a small company and you had your one or two records, you'd go out and you'd fight and scratch. I had a job to do. I mean, Columbia sales did not go down in that period. Hell, I sold more albums in the midst of all this! Along came the *Sing Along* albums, and they sold 22 million copies. So it goes to prove that there's room for all kinds of music if you don't run and chase after what everybody else is doing at the moment.

But you know, it sounded like sour grapes. It seemed like: Mitch Miller is feeling that this new generation is passing him by, and he does not want them to succeed.

No, quite the contrary. I had no complaints with record companies who made rock 'n' roll records. I had complaints with radio stations. Before FM, we had Top 20 and Top 40 and didn't listen to anything else, and played only one kind of thing, and the hippy-dippy disc jockey was king. All I said was . . . program a balanced diet of music—don't abdicate to the very young. I never complained about any of the record companies.

FM didn't come into its own until the early '60s, when the FCC decreed that manufacturers had to put in an FM tuner along with an AM tuner. Now you have every choice of music that you want, from jazz to symphonic to dentist music to rock 'n' roll. In fact, it's very interesting that the best rock 'n' roll stations are on FM, and AM has gone to the news.

You came down very strong in condemnation of disc jockeys in a speech in March of 1958. You said they had abandoned adults in favor of what you called the sub-teen 8 to 14-year-old group. You said these kids had no buying power. First of all, where did you get this 8 to 14-year-old figure as being representative of a rock 'n' roll audience? Second, if they had no buying power, then how come rock 'n' roll records took off in such a big way in the late '50s?

I said no buying power for products, Ted, that were advertised. God help them they should buy a bar of soap.

But they buy soda and candy and clothes and complexion cream. What's the difference? The radio stations could sell that junk.

I had no argument with that. My argument was with the lists. If you read the whole speech, I said the stations played the same songs over and over like an automated jukebox.

Which they still do today.

Very few do. Top 20, the stations still have that?

Now you have Contemporary Hit Radio which is probably the most important format in radio. Album Oriented Rock is on its way out. Top 40 is back, Mitch. Look, my contention was, they were the 8 to 14-year-old group then and they got older as they went along. But I'll just come back with a rhetorical question: Where are the artists of those days now?

Photograph: Frank Driggs Collection

Let's talk about the staying power of Elvis Presley, Buddy Holly, Ray Charles . . .

Ray Charles is a fabulous artist! Don't call him rock 'n' roll! Kids today would not call Ray Charles rock 'n' roll.

You're right that there was a lot of junk, especially in the early days of rock 'n' roll.

But there was a lot of junk in the type of pop music you were involved with in the '50s. I mean, "I Saw Mommy Kissing Santa Claus"? Don't you think the percentage of junk was really about the same in all eras of pop music?

Not what was played on the radio. Also, there's the idea of repeating the same four words over and over in the same song.

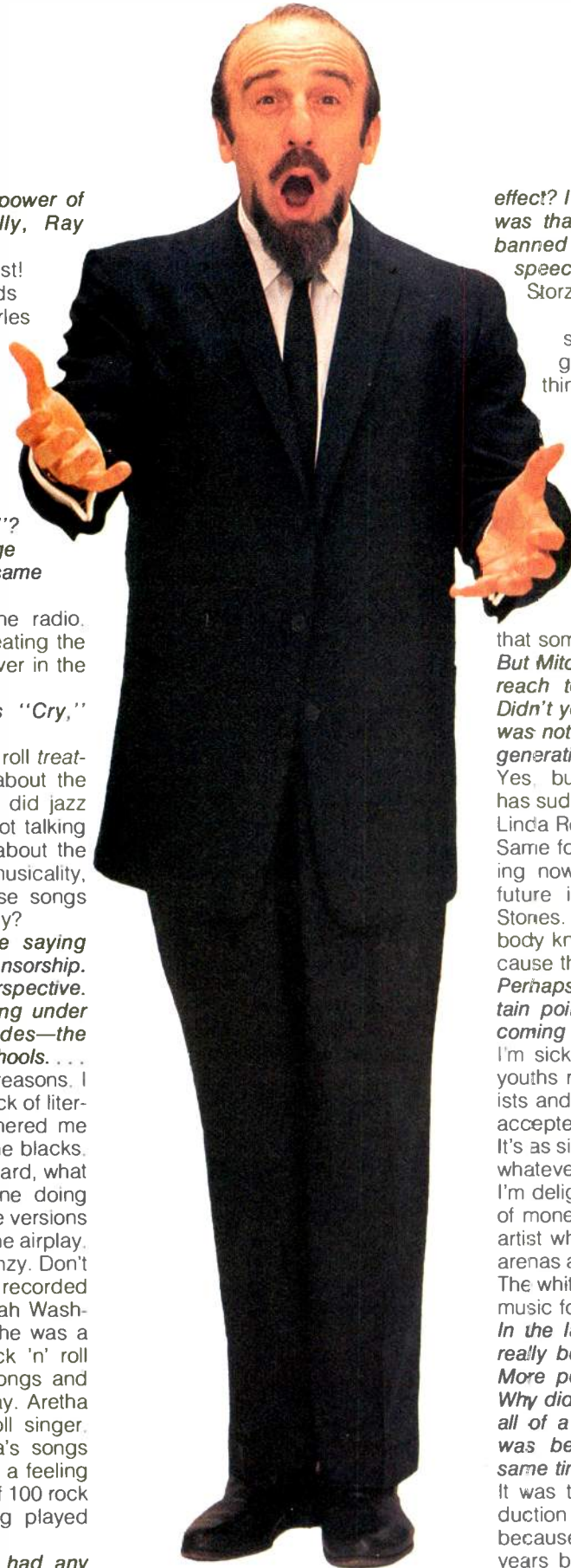
What about Johnny Ray's "Cry," which you produced?

I'm not talking about rock 'n' roll *treatment* of songs! I'm talking about the songs! Hell, Miles Davis, he did jazz with a rock beat. Fine! I'm not talking about the beat! I'm talking about the content. The literacy and musicality, that's all. How many of those songs can stand that kind of scrutiny?

But frankly, what you were saying came off sounding like censorship. Let's keep the times in perspective. Rock 'n' roll then was coming under vicious attack from all sides—the Church, public authorities, schools. . . .

I never attacked it for those reasons. I attacked it only for its utter lack of literacy. And the thing that bothered me most was the ripping off of the blacks. You take a guy like Little Richard, what a shuffling he got. Pat Boone doing white versions, buckskin-shoe versions of his songs, and getting all the airplay. Hell, I recorded Big Bill Broonzy. Don't tell me about blues singers. I recorded Dinah Washington. Hell, Dinah Washington wasn't rock 'n' roll! She was a singer who sang with a rock 'n' roll beat. But she sang great songs and sang them in a wonderful way. Aretha Franklin is not a rock 'n' roll singer. Listen to any one of Aretha's songs and you'll find a literacy and a feeling that you won't find in 99 out of 100 rock 'n' roll songs that are being played today.

Do you think your protests had any



effect? I know one effect it had on you was that a number of radio stations banned you for a while after that speech.

Storz stations banned all Columbia records. Sure. I have a feeling some of his guys were the biggest payola-takers of all. I don't think with his knowledge, though.

But I wasn't looking for effect.

What I was objecting to was being dismissed from a list, as simple as that. By the way, if you look at what went on, we didn't do badly at Columbia without Storz. We did tremendously. There is also the idea of not running and chasing after something that somebody else is successful at.

But Mitch, wasn't this abrogating your reach to a whole new generation? Didn't you kind of miss the beat? This was not just a new music. This was a generational revolution happening.

Yes, but the generational revolution has suddenly turned around. You have Linda Ronstadt doing standard songs. Same for Carly Simon. That's happening now. Why? Who said there's no future in rock 'n' roll? The Rolling Stones. The politics of rock 'n' roll. Nobody knows it better than they do because they've worked it to the bone.

Perhaps no future for them after a certain point, but there are new people coming up all the time.

I'm sick and tired of British-accented youths ripping off black American artists and, because they're white, being accepted by the American audience. It's as simple as that. Michael Jackson, whatever reservations you might have, I'm delighted to see him making a pile of money because he's the first black artist who's able to go out and do the arenas and the stadiums and clean up. The whites have been doing it on black music for a long, long time.

In the late '50s, the record business really began to expand and explode. More people bought hi-fi equipment. Why did records become so important all of a sudden, especially since TV was becoming so important at the same time?

It was the improvement in the reproduction of sound. It's very interesting because many of the records made years before sounded sensational on

IN CONDUCTING ORCHESTRAS LIVE, you strip all the crapola away. If people don't like you, you won't be re-engaged. Sell out the house, great!

the new equipment. The new equipment is what did it. So after you had the house and the car, the next thing you took pride in was the stereo set. The LP—suddenly you were able to hear performances of Mahler. There isn't anything you can't find on LP. I think that's the success of the record business. The variety that you can choose from. Some of the most obscure things are available. People like to have it at hand to play for themselves. And not only great reproduction, but reasonable cost. For \$200 or \$300 you can get a stereo set that's not bad. I think that television had a tremendous effect, too, by showing the orchestras. I wish they had more imagination in the way they showed them, and I wish the sound was better on television, but they're getting there. Stereo is coming and they are paying more attention to the sound.

Having your Sing Along with Mitch show on television must have been an incredible boost to sales of those Sing Along records.

No. Quite the contrary, because it confused the public. I had so many albums out. When I was on the air, the people weren't sure what records they *didn't* have. They kept selling, but they didn't sell any more.

How did the idea for the Sing Along records come about?

It's an old idea. After all, Milton Berle did it on radio with Community Sing. During the '30s and '40s, there was a

group on CBS every day called the Landt Trio and White; they'd do a sing-along. Mine came out of a suggestion from a staff guy named Stan Kavan. We were sitting around the office and he said, "Why don't we do some of the songs the guys sang in the service and call it 'Barracks Ballads'?" So I said, "Hey, it's not a bad idea." I always liked to play devil's advocate and ask who's going to buy a record, and why. I reasoned that the guys who'd been in the army wanted to forget about it, and those who weren't servicemen couldn't care less. But the idea kept nagging at me. I began to ask Boy Scouts, Girl Scouts, Kiwanis and Rotary members, "What are the songs you sing when you get together at a party?" I made columns like a Chinese menu. All the songs that appeared in everybody's column I put on the first album. Then I got the idea of making it sound improvised, which is not easy. Ukulele, guitars, drum, accordion, and harmonica. Jiggsy Carroll worked out simple but interesting harmonies because we wanted people to be able to sing in the right key and tempo, and, if they didn't want to sing, we wanted them to enjoy listening. The tempo and feeling had to be right. And the records took off like a rocket in the midst of rock 'n' roll.

Do you think Sing Along could come back?

On television? Hell, yes.

What happened? They cancelled the show abruptly at the height of its suc-

cess. Weren't they killing the goose that laid the golden egg?

They blamed the demographics; NBC claimed we weren't getting enough young people. They were looking for the 12 to 20-year-old group, but they weren't home anyway on Friday nights [laughter]. Sure, we went out with a 34 share. Would you believe it?

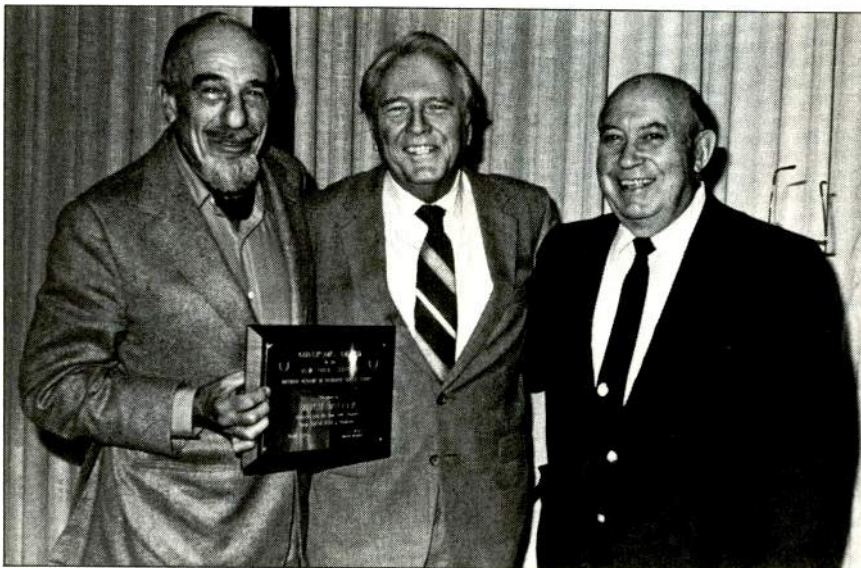
After the TV show, you went to MCA briefly. You were trying to develop musicals for Broadway?

And music for films. A vice president at MCA, Berle Adams, hired me. He had preceded me at Mercury. He thought MCA could use the talent that I had shown at the record company. He gave me an office and a good salary, and after the investment of a project was recouped, I would share in half of all the profits. I didn't want to go out to the Coast; I thought I could do it from New York. But I didn't figure that the Coast just wouldn't listen. All the ideas I had just got ignored—they weren't shot down, they just got no reaction. Ideas for musicals, for television shows—I told them about a great young French composer that they should use for films, Michel Legrand. This was 1965. They didn't buy Michel then. I told them about a book—I took the option myself because I thought it was so good—about a black medical student coming home, and there's a murder, and he picks up a hitchhiker. The scene was set in Arizona. They said, "Oh, no." Lew Wasserman [now the chief executive officer of MCA] said, "It's all right, but I know the governor of Arizona, and I don't want any bad reflections. And besides, it's controversial." Two years later *In the Heat of the Night* came out. Without risk there's no success. It's the old story here. Then I urged them to think about making cartoons into movies.

Did you feel there was a place for you in the recording business in the '60s, after the TV show? Everything was quite different then, wasn't it?

Yeah, but during the TV years CBS

Earlier this fall, Miller received a Governor's Award from the National Academy of Recording Arts and Sciences' New York Chapter. With him are Jim Conkling, former president of CBS Records (center), and Milt Gabler, member of the New York Chapter's Board of Governors (right).



Photograph: John Bright

Records kept an office for me. I didn't get paid, but I had a secretary. They told me, "We just want to be able to pick your brain, that's all." That lasted until the mid-'60s.

Wasn't the direction into rock that Clive Davis took CBS Records in, in the late '60s, a direct repudiation of your philosophy? Or was he, maybe, just changing with the times?

If it was a repudiation, let him repudiate the profits that come from that catalog that still sells like mad, repackaged over and over again. If it's a repudiation, let him say so.

Well, he made a pretty big point, both in his book and when I interviewed him, in saying that Columbia was a fuddy-duddy company. That he came along and discovered, after the Monterey Pop Festival, this whole resurgence in rock 'n' roll in the late '60s.

Well, I was out of Columbia from 1961 on. Monterey was six years later. Clive Davis is my candidate for the most self-serving guy you will ever find. Why ask me to answer the comments of a man who has no credentials, as far as I'm concerned? If you ask me, the only credential he has is when people laughingly would say he's trying to make himself another Mitch Miller in the studio.

But didn't he have astounding success with Columbia after he took over, much as you did when you first took over as the head of A&R?

What success?

Commercially, with people like Janis Joplin, Sly and the Family Stone, Chicago, and so on.

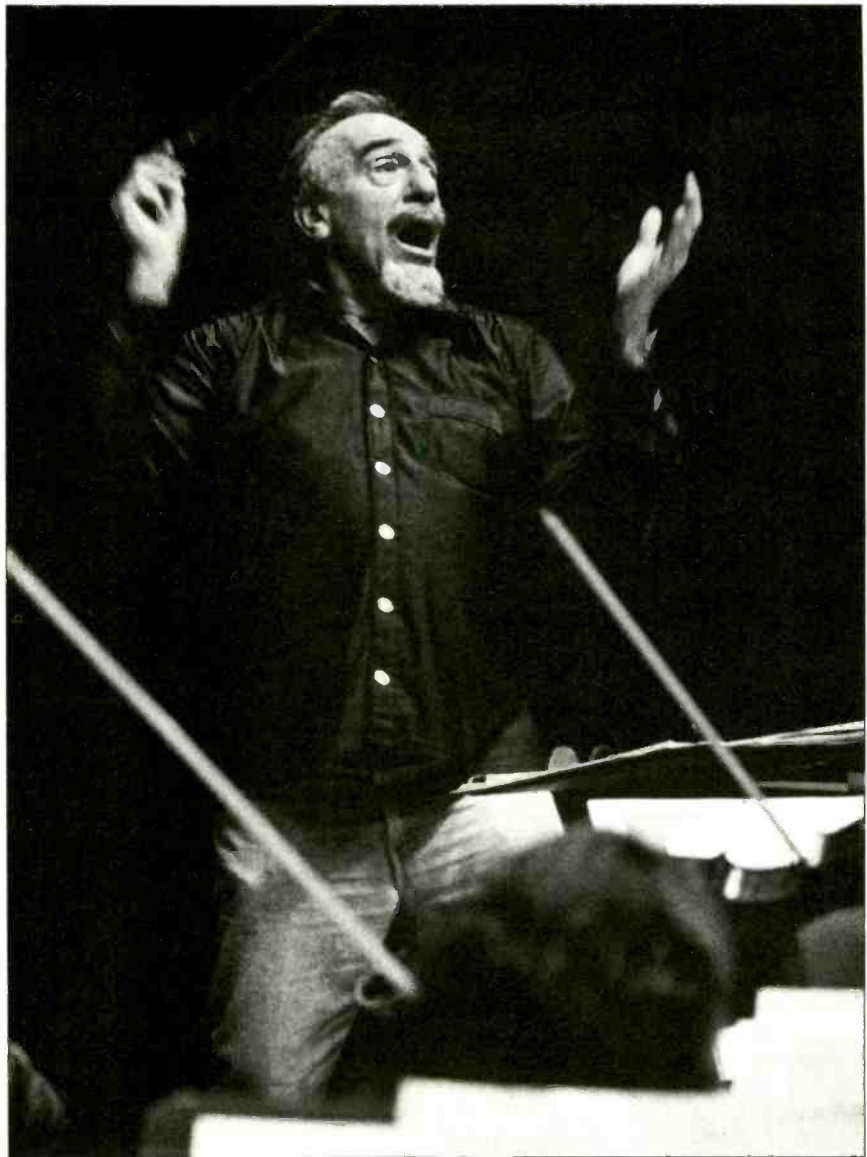
Chicago is a good group. If I had heard Chicago I would have signed them. But that was way later, long after I had left.

He never was a studio man, but he did have great success as a record executive, didn't he?

How about some of the performers who weren't successful? Come on! A record executive must be a nurturer, in the mold of Conkling and Lieberson, and not take credit that rightfully belongs to his staff.

There was a great deal of success at Columbia. Wouldn't you have to give him his share of the credit?

No. I wouldn't give him *any* of the credit. There's guys in the field who brought the stuff to him, and the rest were all



Classical music once again occupies most of Mitch Miller's professional life, as he conducts major symphony orchestras in America and abroad.

deals. Where's Laura Nyro today? Ask him. I could take a list of people who were promoted with four-color posters as the second coming of the Lord who couldn't ad lib a burp after a radish dinner. If he's going to talk about, quote, "his" successes, I want him to show you his failures, too. Why, for him to be successful, does he have to put somebody else down? It's very interesting. He always sought me out to sit on the dais when he was given those phony, self-serving honors. You know, the Man of the Year for this and that. You never saw *me* as Man of the Year, and it hasn't been because I haven't been *offered* it. As far as I can see, his ego comes first, his talent comes last. And it is ironic that his two enduring

artists are Melissa Manchester and Barry Manilow, both of whom are my kind of artists.

And for you now, you're doing a lot of guest conducting.

I've come full circle—back to symphony orchestras. I conduct all the major orchestras in America, Italy, Canada, some in Mexico. I'll tell you why I'd like to keep doing this. It's live. You strip all the crapola away. No editing, no re-takes. People have to pay to hear you. They have to like you or you won't be re-engaged. Sell out the house, great! You come to an orchestra and you have to communicate fast, you have to get the music ready. There's no room for fakery. And I like that kind of atmosphere to work in, with consummate pros. The people are talented and we respond to each other, and we create an emotional experience that takes 3,000 or 4,000 people out of the here and now, which only symphonic music can do—and I can't ask for more. **A**

A NEW CD TEST STANDARD

Leonard Feldman

Ever since the first Compact Disc player reached my lab in 1982, it has been clear that measuring the performance of such devices would involve techniques and test signals not normally used in testing analog audio components. The makers of CD players were quick to see that specially made Compact Discs containing test signals would be needed to evaluate their products. These test discs, originally prepared for manufacturers' in-house use, eventually became available to testing and service laboratories. But there was little agreement on what signals the discs should contain.

The first test discs I acquired were supplied by the Philips company of Holland, the co-developer of the CD format. Not surprisingly, the other partner in CD development, Sony, came up with a test disc of its own. Shortly thereafter, Sony offered yet a second test disc, which contained some additional signals left off the hurriedly issued first version. Since then, I have acquired test discs from such diverse sources as the German Hi Fi Institute, the Japan Audio Society, Technics

(Matsushita Electric Industrial Co.), and Denon. (In fact, Denon has issued a second test disc for which I was asked to write the liner notes.) Some of these discs include not only test signals but musical selections, ostensibly to tax the capabilities of a CD player or of an entire audio playback system. In addition to the dozen or so discs which these companies offer for testing the electrical performance of CD players, there are discs designed to uncover tracking or error-correction limitations. While some test signals can be found on more than one of the available test discs, certain signals are unique to only one disc. Clearly, if Test Lab A uses one disc while Test Lab B uses another, their measurements of a given player may or may not be identical.

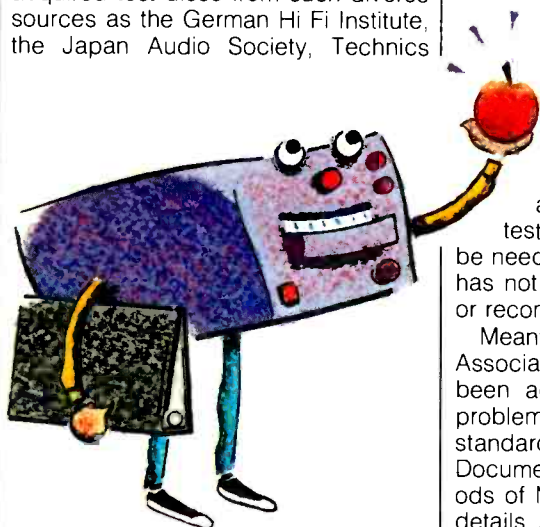
About 18 months ago, the Electronic Industries Association (EIA) decided to sponsor a committee to develop uniform standards for measuring CD players. John M. Eargle, the well-known recording engineer, design engineer and audio consultant (he heads his own company, JME Associates, and also works with JBL), assumed the chairmanship. The committee has met four times, thus far, and reached some agreement on what should be tested and what test signals would be needed to conduct these tests, but has not yet issued any formal reports or recommendations.

Meanwhile, the Electronic Industries Association of Japan (EIAJ), which has been actively working on the same problem, has issued a complete test standard, in the form of two reports. Document No. CP-307, entitled "Methods of Measurement for CD Players," details some 13 individual tests that

should be made when evaluating a CD player's performance. The standard tells how to perform the tests and how to report the results in a consistent manner. The EIAJ's document No. CP-308, "Test Disk [sic] for CD Players," describes a standard test disc that should be used in performing the tests listed in CP-307. The disc is to contain 16 tracks, with a total playing time of approximately 63 minutes, but at this time it is not yet available. However, most of the signals that would appear on this disc are available on some of the test discs issued earlier. Table I itemizes the contents of the proposed test disc and which of the 13 tests each test signal is used for. The Table also shows which currently available test discs contain similar or identical test signals. The following paragraphs describe the individual tests, how they are to be performed, and how the results are to be reported.

Frequency Response

As is true of any audio component, frequency response measurements are of primary importance in testing CD players. The methods used to measure frequency response of a CD player are much the same as those used for any audio component, except that the test signals are supplied by the test disc instead of a signal generator. Response measurements may be made using either 17 spot frequencies, recorded at maximum (0-dB) level and ranging from 4 Hz to 20 kHz, or by using a sweep-frequency signal that extends from 16 Hz to 20 kHz. According to the proposed EIAJ standard, if the maximum deviation over the range of frequencies tested is less than 1.0 dB, the deviation need not be stated in the manufacturer's published specifications. I suspect, however, that most



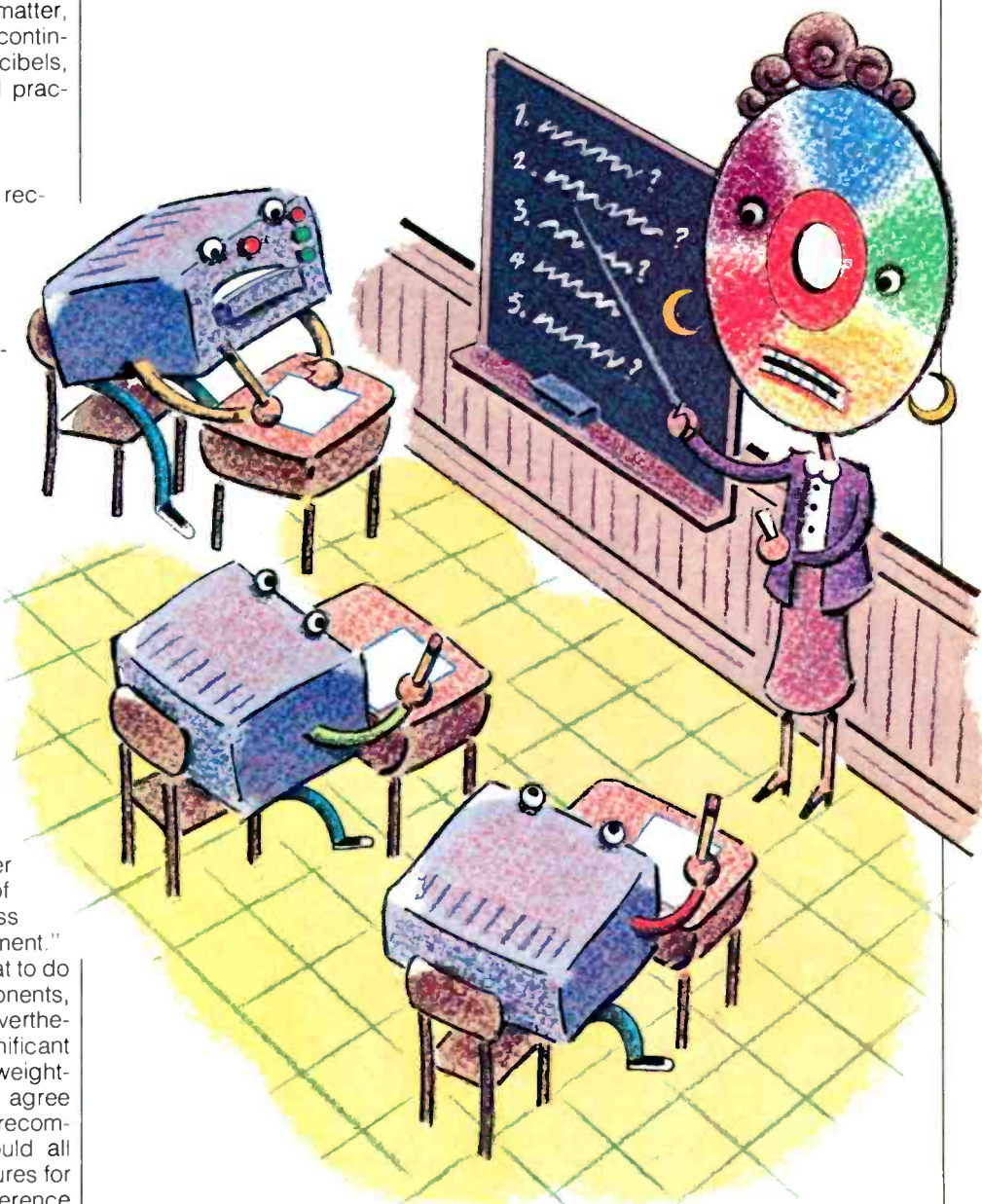
From the beginning, makers of CD players knew that test discs would be needed, so they made their own. Now there's a proposal from the EIAJ for a single standard test disc and uniform measurement standards. But do they go far enough?

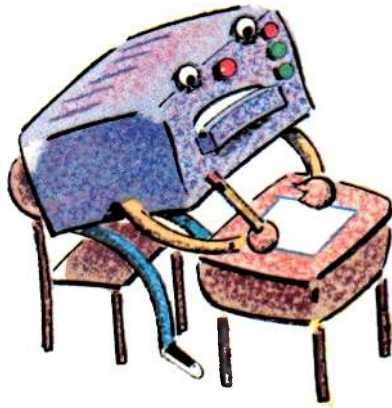
manufacturers (and, for that matter, most testers and reviewers) will continue to state the deviation in decibels, "plus or minus," as is the usual practice for this specification.

Signal-to-Noise Ratio

Figure 1 shows the test setup recommended for S/N measurements. The EIAJ approach resolves a couple of questions and does away with a couple of ambiguities that have been bothering me since I began testing CD players. You will notice that both a filter and a weighting network are included in the signal path. The weighting network is specified as having an A-weighted curve; the filter called for has cutoff frequencies of 4 Hz and 20 kHz, with an attenuation of 60 dB or more at 24.1 kHz. (The EIAJ document refers to this both as a band-pass and as a low-pass filter. While its low-end roll-off does make it, technically, a band-pass, the roll-off is so close to d.c. that it can be considered a low-pass filter for all practical purposes.) An alternative filter, having a slope of only 18 dB per octave and a cutoff frequency of 30 kHz, is also allowed "unless any question arises in measurement."

In the past, I've wondered what to do about out-of-band noise components, which, though inaudible, are nevertheless quite measurable and significant in the absence of filtering and weighting networks. Now, if we can all agree to use A-weighting and the recommended type of filter, we should all come up with consistent S/N figures for CD players. Of course, the reference





I'm perplexed when specs are given for S/N and dynamic range. The new standard clarifies the latter and dictates how both parameters should be measured.

level from which noise is measured is maximum output level (0 dB), which gives the most favorable S/N number. Like the S/N test tracks on current test discs, the S/N track on the proposed disc would be digitally recorded as a succession of samples of zero amplitude (16 zeros per sample) over its entire length. This simulates an infinitely attenuated signal.

Dynamic Range

I continue to be somewhat perplexed by manufacturers who quote both S/N ratio and dynamic range. Often the two figures are the same, but occasionally they differ. The new standard clarifies the term "dynamic range" and dictates a specific way to measure it. Dynamic range is defined as the level of total harmonic distortion plus 60 dB when a 1-kHz signal at 60 dB below maximum (0-dB) recorded level is reproduced. As an example, suppose during playback of a 1-kHz, -60 dB signal you read a THD of 3.0%. Translating that to dB yields -30.5 dB. Adding -30.5 dB to -60

dB results in a figure for dynamic range of 90.5 dB. Once again, band-pass and A-weighting filters are to be used in measuring the residual THD for the -60 dB level signal. You can see that dynamic range, as quoted by makers of CD players, need not necessarily be equal to the S/N specification for a given player.

Total Harmonic Distortion

The EIAJ recommends that THD be measured at 14 test frequencies, all reproduced at maximum recorded level. A low-pass filter is inserted in the signal-measurement path, effectively taking care of any out-of-band components that might otherwise upset the readings observed on a distortion meter. Personally, I would have preferred that the use of a spectrum analyzer without a filter had been proposed, instead of a distortion meter. The use of spectrum analysis discloses the presence of any nonharmonically related beats, noise, etc., all of which are not, strictly speaking, THD but which may nevertheless be audibly annoying to a listener.

Another important point should be noted about the THD measurement or, more specifically, about the test frequencies used. The EIAJ standard calls for the familiar ISO test frequencies shown in the first column of Table II. The actual frequencies to be found

on the proposed standard test disc (and on several existing test discs) are not quite the ISO frequencies; these are also shown in Table II. The differences are small, as the Table shows, but extremely important.

The problem is that certain of the ISO standard frequencies are integral sub-multiples of the CD's 44.1-kHz sampling frequency. While a 16-bit digital encoding system can theoretically have as many as 65,536 (2^{16}) distinct codes, representing that many different signal values, the number of distinct codes actually used will be limited when the ratio of the recorded frequency to the CD sampling frequency is an integer. The number of distinct codes is also reduced when the recorded signal level is low—and many test tones are recorded at low levels. Using too few different codes can cause artificially inflated distortion readings. These would obscure the important differences in D/A linearity which distortion tests are basically designed to measure.

For example, if a test signal of 315 Hz (1/140 of 44.1 kHz) were used at a level of -20 dB, only 71 different codes would be used in a period of 100 mS. Maintaining the level at -20 dB but shifting the frequency up by only 2 Hz, to 317 Hz (a bit less than 1/139 of 44.1 kHz), would yield 3,282 codes over the same 100 mS! We are indebted here to Robert A. Finger of the CBS Technology Center, who studied this problem and came up with detailed test-frequency recommendations. His findings were transmitted to the EIA's CD measurement standards committee, which, in turn, notified the corresponding committee of the EIAJ.

As a result, the EIAJ's published reports make due note of the problem, and the frequencies shown in the middle column of Table II are recommended for all future CD test discs, instead of the ISO frequencies shown in the Table's first column. Most of the nominal ISO and actual test frequencies differ by less than 1%. While the true ISO frequencies could be used for frequency response and other measurements not related to distortion, in practice the frequencies for distortion measurements on the proposed test disc will probably be used for these parameters as well.



Fig. 1—Test setup for measuring S/N ratio, as recommended by the EIAJ. Using a "low-pass" filter (see text) eliminates all out-of-band noise from the measured results.

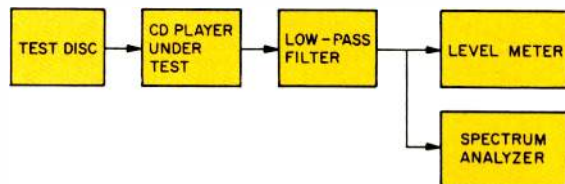


Fig. 2—Test setup for measuring channel separation, as recommended by the EIAJ. By using the filter and a spectrum analyzer, only fundamental crosstalk products will be measured; harmonics will be ignored.

Although electromechanical considerations have been slighted, the EIAJ is to be commended for its excellent efforts in standardizing specs for Compact Disc players.

TABLE II

ISO standard frequencies compared with recommended test frequencies for use in CD player performance.

ISO Nominal Freq., Hz	Actual Freq., Hz	Difference, Percent
4	4	—
8	8	—
16	17	+6.250
32	31	-3.125
63	61	-3.175
125	127	+1.600
250	251	+0.400
500	499	-0.200
1,000	997	-0.300
2,000	1,999	-0.050
4,000	4,001	+0.025
8,000	7,993	-0.088
10,000	10,007	+0.070
12,500	12,503	+0.024
16,000	16,001	+0.006
18,000	17,989	-0.061
20,000	19,997	-0.015

pass filter is inserted in the measurement chain to eliminate any out-of-band components.

Phase Difference Between Channels

This test, as its name implies, simply measures the phase difference between two high frequencies, each recorded on opposite channels. If 20 kHz is used, the phase difference between channels, stated in degrees, need not be accompanied by a statement of the test frequency used. This test will easily differentiate between those players which use a single, multiplexed D/A converter and those which use two separate D/A converters. The former will always display a phase difference between left and right channels corresponding to approximately 82° (assuming 20-kHz test signals on each channel), owing to the time delay of about 12 μS between sample D/A conversions from the left- and right-channel digital signals.

Level Difference Between Channels

The purpose of this test is obvious, and the new EIAJ standard requires

that it be performed using only a 1-kHz test signal at 0-dB (maximum) recorded level. Results of the test are to be stated in dB, as follows:

"Level difference between channels _____dB or less (EIAJ)."

Output Voltage

The specification for output voltage is intended to assist the user when connecting a CD player to other audio components. The EIAJ standard requires that a CD player's output voltage be stated for signals at maximum recorded level. The player's volume or output-level controls, if any, should be set either at maximum or, if the player has a single detent or reference mark on its level control, at that reference level. Output voltage specifications are to include a "plus or minus" tolerance, e.g., "Output voltage, 2.0 ±0.5 V."

Pitch Error

Contrary to popular notion, slight errors of pitch can be introduced during playback of a Compact Disc. To determine pitch error, the highest available frequency on the proposed test disc, 20 kHz, is measured with a frequency counter. In reporting pitch error, the difference between the measured result and 20 kHz is expressed as a percentage by using the formula:

$$\frac{(F_1 - F_0)}{F_0} \times 100 (\%)$$

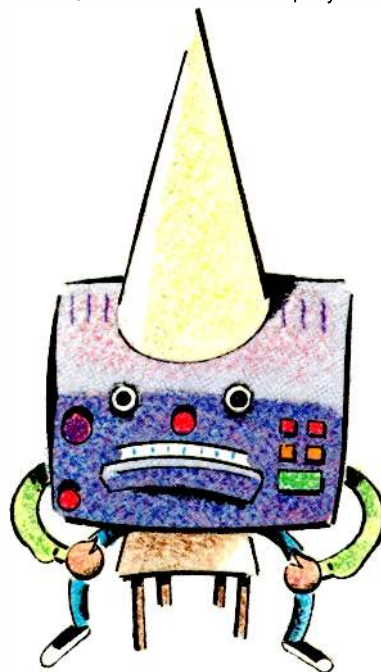
Access Time

The only measurement in the entire EIAJ standard that addresses the mechanical rather than the electrical performance of a CD player is access time. Two types are defined: Short access time and long access time.

Short access time is the number of seconds that elapse from the time the play button is pressed (in the middle of a track or in a ready-to-play state) until the next adjacent track begins to play. Long access time is the number of seconds elapsing from the time the play button is pressed while the first (innermost) track is playing until the time the last (outermost) track begins to play. Both access times are measured with an ordinary stopwatch. In specifications, this measurement is understood to be long access time, unless otherwise stated.

Missing Measurements

As far as it goes, the new EIAJ recommendations do an excellent job of standardizing the way measurements of CD players are to be made and reported. As readers of our "Equipment Profiles" know, however, some of the major differences among CD players are related more to their electromechanical than their purely electrical performance. The ability to track a disc accurately, even if it is scratched or dirty, varies greatly among current models. So, too, does the ability to maintain good tracking in the presence of vibration or mechanical shocks applied to all plane surfaces of a player. Error-correction capability (which is purely electrical) affects a player's performance in these areas, too. There should also be some sort of test to tell what kind of filtration is in use, and a test to determine phase error within a single channel. The phase test would not be easy to accomplish (no test disc yet has properly accomplished it), but it would quantify a property which many critics blame for unpleasantness in CD sound. Perhaps separate standards for measuring these qualities of CD players are required. In any event, the EIAJ is to be commended for coming up with a workable measurement standard so soon after the introduction of Compact Discs and CD players. **A**



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1

YAMAHA R-9 RECEIVER

Manufacturer's Specifications

FM Tuner Section

Usable Sensitivity: 8.8 dBf (see text).

50-dB Quieting Sensitivity: Mono, 14.8 dBf; stereo, 37.3 dBf.

S/N Ratio: Mono, 85 dB; stereo, 81 dB.

THD: Mono, 0.05% at 1 kHz, 0.05% at 100 Hz, and 0.1% at 6 kHz; stereo, 0.07% at 1 kHz, 0.07% at 100 Hz, and 0.15% at 6 kHz.

Alternate-Channel Selectivity: 85 dB.

Image Rejection: 40 dB.

I.f. Rejection: 90 dB.

AM Rejection: 55 dB.

Spurious-Response Rejection: 70 dB.

Capture Ratio: "Local," 1.2 dB; "DX," 2.5 dB.

Stereo Separation: 50 dB at 1 kHz, 45 dB at 100 Hz, 45 dB at 10 kHz.

Frequency Response: 30 Hz to 13 kHz, ± 0.5 dB.

Output Level: 500 mV for 100% modulation.

AM Tuner Section

Usable Sensitivity: 250 μ V/m.

Selectivity: 24 dB.

S/N Ratio: 50 dB.

Image Rejection: 40 dB.

Spurious-Response Rejection: 50 dB.

THD: 0.3% at 400 Hz.

Output Level: 150 mV for 30% modulation.

Amplifier Section

Power Output: 125 watts continuous per channel, 20 Hz to 20 kHz, 8-ohm loads; 145 watts continuous per channel, 20 Hz to 20 kHz, 6-ohm loads.

Rated THD: 0.015% at 8 ohms, 0.03% at 6 ohms.

Dynamic Headroom: 1.58 dB.

Damping Factor: 60 at 8 ohms.

Input Sensitivity: MM phono, 0.22 mV; MC phono, 14 μ V; high level, 13.4 mV.

Phono Overload: MM, 110 mV; MC, 8 mV.

Frequency Response: MM phono, RIAA ± 0.3 dB; MC phono, RIAA ± 0.5 dB; high level, 20 Hz to 20 kHz, +0, -0.3 dB.

S/N Ratio: MM phono, 75 dB; MC phono, 74.5 dB; high level, 80 dB.

Residual Noise: 120 μ V.

Subsonic Filter Cutoff: 10 Hz, 12 dB/octave.

Tone Control Range: Bass, ± 10 dB at 50 Hz; treble, ± 10 dB at 20 kHz; midrange, ± 12 dB at 1 kHz.

Loudness Control Range: 40 dB at 1 kHz.

General Specifications

Power Requirements: 120 V, 60 Hz, 500 watts.

Dimensions: 17 $\frac{1}{8}$ in. W \times 5-15/16 in. H \times 16 $\frac{3}{8}$ in. D (43.5 cm \times 15.1 cm \times 42.2 cm).

Weight: 26 lbs., 7 oz. (12 kg).

Price: \$799.

Company Address: 6660 Orange-thorpe Ave., Buena Park, Cal. 90620.

For literature, circle No. 90



Yamaha describes the Model R-9 as an audio/video receiver. I can't deny that it is able to handle and switch signals from two video program sources, including both video and audio (stereo or mono) signals, and to direct those signals to a connected video monitor. Nevertheless, I wish manufacturers would agree on precisely what constitutes an A/V receiver. I've seen some that simply provide a couple of extra inputs for the audio tracks of a VCR or other video program source; at the other extreme are those which switch a variety of video program sources and even have built-in TV audio tuners. The R-9 falls somewhere in between these two extremes.

In terms of its sound capabilities, the R-9 is a superb example of the audio art. Most of the features that have impressed me favorably over the years in earlier Yamaha receivers have been carried over into the R-9. For example, it has a *legitimate* loudness-compensation control; that is, a separate, continuously variable control adjusts the degree of compensation according to the requirements of your actual maximum listening levels, speakers used, etc. Another excellent feature—and one which Yamaha was among the first to introduce—is a separate "Record Out" selector which allows you to record one program source while listening to another. In addition to its high power rating at low distortion levels, its excellent frequency-synthesized tuning system and its 16-station preset capability, the R-9 has a wireless remote control. In some respects, I found that having a remote module for a stereo receiver is even more useful than having one for a TV or a video recorder.

Another interesting innovation, found in the receiver's amplifier section, is its dual mode of operation. At the user's discretion, the amp will operate in true Class A up to around 20 watts per channel, automatically switching to Class AB if signal levels exceed that power output. Of course, in the Class-A mode, power consumption—even with no signal applied—is much higher than in Class B, so you are given the option of having the system operate in Class AB at all times if you feel that the sonic improvement offered by Class A isn't worth the extra power drain.

The tuner has its share of innovative circuitry, too. What Yamaha calls a Computer Servo Lock Tuning System samples incoming signals and determines which of two tuning methods will yield the best and clearest sound. A synthesized, phase-locked-loop tuning circuit is used for weak or noisy stations; for stronger, clearer signals, the R-9 uses an "infinite resolution" FM servo tuning circuit—that is, one which locks onto the station signal rather than the station frequency. "Local" or "DX" settings can be selected manually or automatically, and the new digital fine-tuning arrangement permits you to tune in increments as small as 0.01 MHz in FM or 1 kHz in AM.

Control Layout

The R-9 is a rather tall receiver, its front panel standing nearly 6 inches high, which gives it a somewhat heavy look. But the height is needed, if for no other reason than to accommodate the great number of controls and switches on the front panel. Many of the less often-used controls and switches are hidden behind a hinged flap so that the panel doesn't look quite as cluttered as it otherwise might.

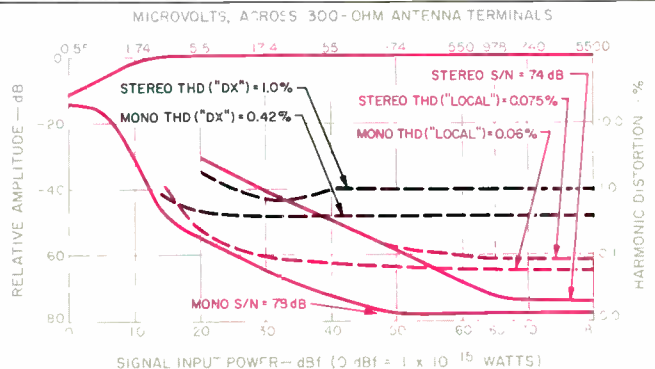


Fig. 1—Mono and stereo quieting characteristics in "Local" (wide-band) mode, and distortion in both "Local" and "DX" (narrow-band) modes, FM section.

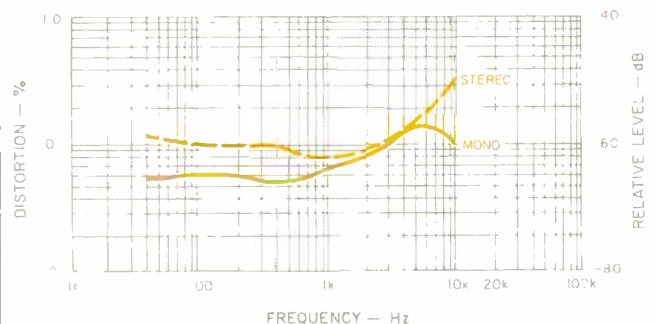


Fig. 2—THD vs. modulating frequency, "Local" mode, FM section.

Most of the controls that are always in view are pushbuttons. There are buttons for on/off switching, audio and video program selection, audio muting, and activation of the automatic Class-A/Class-AB selector. There is also a row of 15 tuner controls. These include eight preset buttons (plus a shift key for selecting any combination of 16 AM or FM stations), and others which activate the preset "Memory" or select the band (AM or FM), the "Receiving Mode" ("Local," "DX," or automatic switching between them), and the "Tuning Mode" (manual or auto scan). Rockers for regular and fine tuning complete this group. The only rotary controls normally visible are the "Volume" knob and the "Loudness" ring surrounding it. The continuously variable loudness control has a full, 40-dB range, as opposed to the 20-dB range on earlier versions of Yamaha's separate loudness control.

Visible at all times, at the upper left of the front panel, is the digital display for AM or FM frequency and a 10-segment "Signal Quality" bar-graph display. Additional indications in this area show the current tuning and receiving modes and which, if any, of the 16 preset stations is current-

With 2.3 dB of dynamic headroom, the R-9 can deliver more than 200 watts per channel, in short bursts, without clipping!

ly selected. Lights to the right of the display show the status of the "DNC" (Dynamic Noise Canceller) and "Simulated Stereo" circuits. In addition, tiny indicator lights illuminate above the program selectors when each is activated.

Opening the hinged flap on the lower section of the R-9's front panel reveals a headphone jack; three speaker-selector pushbuttons; a "Tone Bypass" switch; bass, midrange, and treble rotary tone controls with detented center positions; a balance control; pushbuttons for "DNC" (a single-ended dynamic filter along the lines of the more familiar DNR), "Simulated Stereo," "Stereo/Mono," and "MM/MC" phono, plus a rotary record-out selector.

Functions of the wireless remote control are limited to input selection, power on/off, selection of any one of the 16 preset AM or FM stations, audio muting, and volume adjustment. These functions are the ones you would most likely want to control from the comfort of your listening position.

A diagram in the owner's manual, depicting how various external components would be connected to the R-9, gives some idea of just how much of a "control center" this receiver really is. Shown are a pair of videocassette recorders (one of which could just as easily be a videodisc player), a TV monitor (which must have a video input jack; connection via the antenna input will not do), a Compact Disc player, a turntable equipped with either a moving-magnet or a moving-coil cartridge, two audio tape decks, and three sets of loudspeakers.

Few amplifiers or receivers have three sets of speaker outputs, because the net load impedance could fall dangerously low if all three were connected across the amplifier's outputs at once. Yamaha gets around this by connecting the

"B" and "C" speaker terminals in series, to maintain a reasonably high net impedance across the amplifier output during use with three sets of speakers. Operating speakers in series will, of course, seriously compromise the amplifier's effective damping factor, and should be done only for casual listening in secondary locations. When either the "B" or "C" speakers are used alone or in combination with the "A" speakers, the impedance problem does not arise.

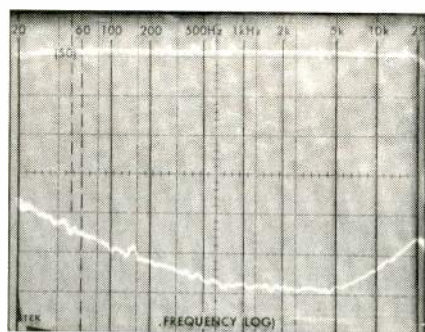
Tuner Measurements

In testing the R-9's FM tuner section, I quickly established that the major difference between the "Local" and "DX" tuning modes was not so much in sensitivity as in selectivity. In other words, the "Local" setting corresponds primarily to a wide i.f. bandwidth setting on other tuners and receivers; the "DX" setting provides higher alternate-channel selectivity, useful for zeroing in on weaker stations that might otherwise be interfered with by strong stations broadcasting at frequencies near the desired signal's.

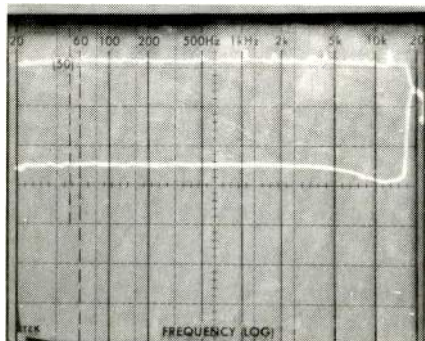
Figure 1 shows mono and stereo quieting characteristics in the "Local" mode. It also shows harmonic distortion for a 1-kHz modulating signal, in mono and stereo, for both the "Local" and "DX" modes. With the tuning set to "Local" (wide) mode, best S/N ratio in mono was 78 dB; in stereo, it was 74 dB. Usable sensitivity measured 12 dBf, improving somewhat to 10.8 dBf when I switched to the "DX" position. Yamaha's claim of 8.8-dBf usable sensitivity in mono is measured for a 30-dB signal-to-noise ratio. The IHF standard usable-sensitivity measurement is for a 30-dB ratio of signal to noise plus distortion. Hence the apparent discrepancy between my reading and Yamaha's. Our testing methods were obviously the same when it came to 50-dB quieting sensitivity, however. I measured exactly 14.5 dBf in mono and 37.0 dBf in stereo, close enough to Yamaha's published figures.

Figure 1 also shows how distortion rises when tuning is switched to the "DX" (narrow) i.f. mode. In the "Local" mode, harmonic distortion decreased to a low of 0.06% in mono and an almost equally low 0.075% in stereo. Using the "DX" setting, I measured 0.42% THD in mono at all signal levels above about 40 dBf, and stereo THD rose to around 1.0%. Figure 2 shows how THD varied with frequency, for mono and stereo, again in the "Local" or low-distortion mode. Even at 6 kHz, in stereo, THD was only 0.17%.

Tuning mode ("Local" versus "DX") had a great effect upon FM stereo separation, too, as you can see by looking at Figs. 3A and 3B. Both of these spectrum analyses were made for strong-signal conditions and cover the range from 20 Hz to 20 kHz in a logarithmic sweep. The top trace in each case represents desired output from the modulated (left) channel, and therefore constitutes a frequency response plot over the stated frequency range. Deviation from flat response was never greater than 0.3 dB in the "Local" mode (Fig. 3A) and was down 1.5 dB at 15 kHz for the "DX" mode (Fig. 3B). Separation was superb in the "Local" mode (bottom trace of Fig. 3A). It was 58.5 dB at mid-frequencies, nearly 50 dB at 100 Hz, and in excess of 40 dB at 10 kHz. In the "DX" mode, with its higher selectivity but more restricted bandwidth, separation decreased to less than 30 dB across the entire audio spectrum (bottom trace of Fig. 3B)—still



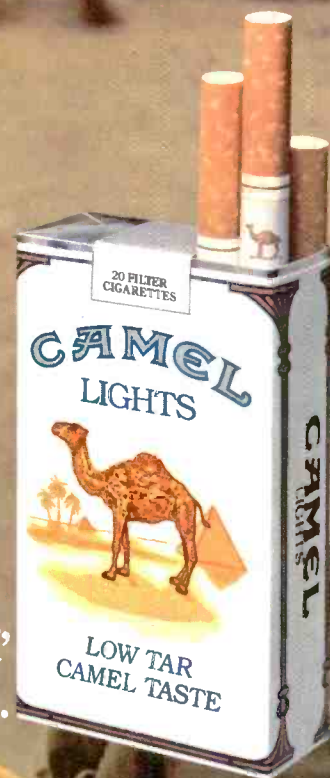
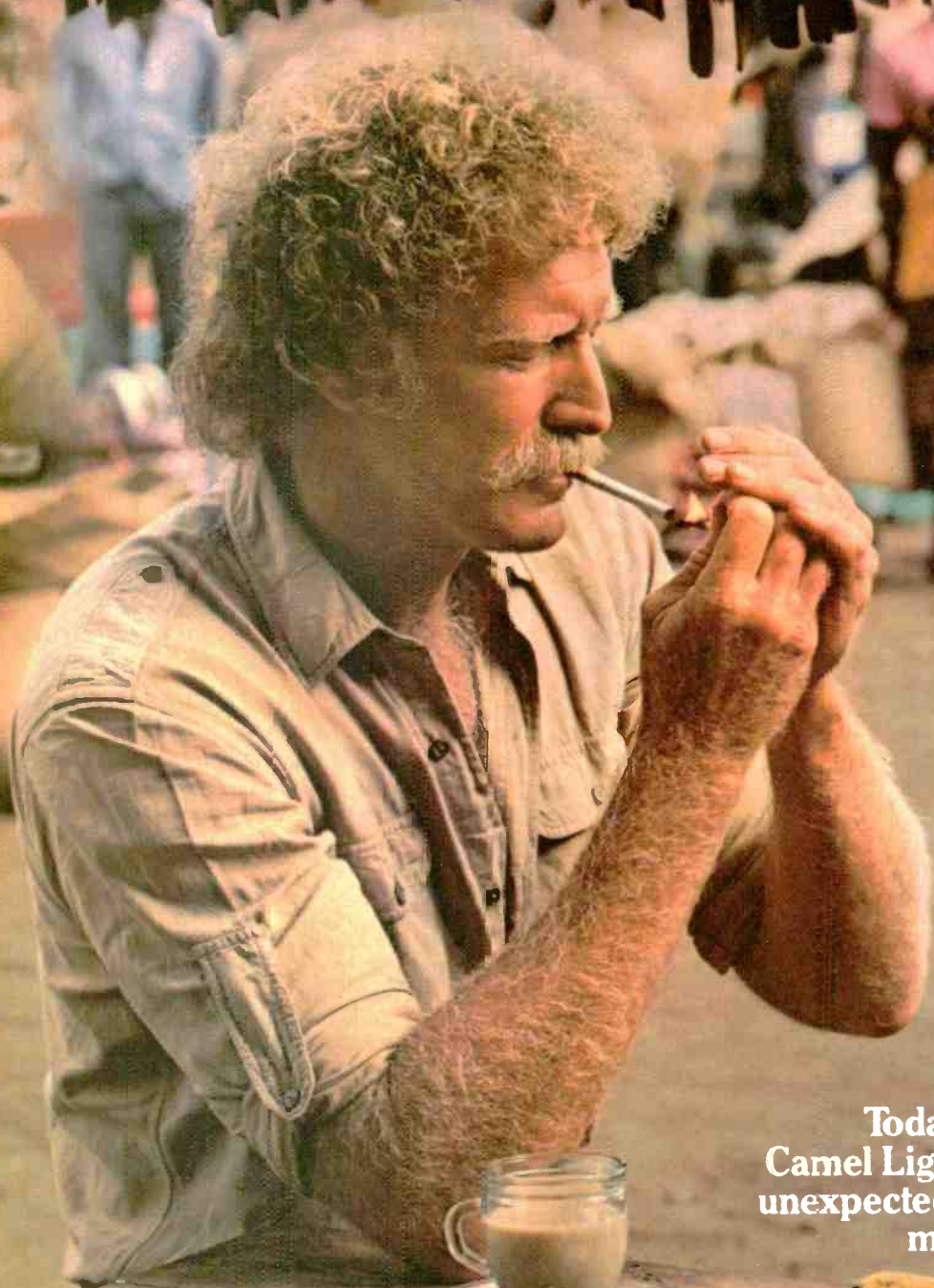
A Fig. 3—
Frequency
response
(upper traces)
and separation
(lower traces)
in "Local" (A)
and "DX" (B)
modes, FM
section.



B

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The 82-dB S/N ratio on phono would be very good for a separate preamp. When you consider all the possible noise sources in a receiver, it's remarkable.

adequate for good stereo imaging, but nowhere near as high as with the "Local" setting.

Figure 4 shows output products observed from the unmodulated channel's output when the opposite channel is fully modulated by a 5-kHz signal. The sweep extends linearly from 0 Hz to 50 kHz, and the tall spike at the left is the desired 5-kHz signal (the shorter one within it represents the crosstalk at the opposite channel's output). A rather high-amplitude, 19-kHz subcarrier product can be seen to the right of these spikes. Still further to the right is a short spike representing residual 38-kHz output, surrounded by sidebands which are 5 kHz above and below 38 kHz.

I measured a capture ratio of 1.1 dB in the "Local" mode; in the "DX" mode, capture ratio increased to 2.5 dB, as claimed by Yamaha. Both i.f. and spurious-response rejection were 90 dB, AM rejection was 57 dB, and alternate-channel selectivity (measured in the "DX" mode) was 87 dB, a bit higher than the published spec of 85 dB.

AM frequency response, plotted in Fig. 5, extends from around 50 Hz to 4 kHz for the -6 dB points. Best signal-to-noise ratio in AM was exactly 50 dB, as claimed, while harmonic distortion at 30% modulation measured 0.35% for a 1-kHz modulating signal.

Amplifier Measurements

In the "Auto Class A" mode, the R-9's power amplifier section operated in Class A until output power into 8-ohm loads exceeded 20 watts, at which point it smoothly made the transition to Class-AB operation. Maximum output for rated THD was 144 watts per channel into 8-ohm loads for most of the audio spectrum, decreasing to 136 watts per

channel at 20 Hz and 139 watts per channel at 20 kHz. The receiver's rating of 125 watts per channel is, therefore, very conservative. In fact, at rated output of 125 watts per channel, THD at mid-frequencies was a mere 0.0028%, and at the frequency extremes of 20 Hz and 20 kHz, THD measured only 0.009% and 0.007%, respectively. Distortion as a function of power output and frequency is shown in the three-dimensional plot of Fig. 6.

Damping factor of the power amplifier section was 79, referred to 8 ohms, using a standard 50-Hz test signal. Dynamic headroom was very high, measuring 2.3 dB above the rated continuous power level of 125 watts per channel. This means that for short, music-like bursts of signal, the R-9 can deliver in excess of 200 watts per channel without significant clipping! Twin-tone or CCIF distortion was no more than 0.0026% at rated output power.

Phono input sensitivity for 1 watt output was 0.23 mV for the MM phono input and 15 μ V for the MC input; 15 mV of input signal was required for the high-level inputs to produce 1 watt of output. Phono overload measured 145 mV for the MM cartridge input and 14 mV for the MC pre-preamplifier input. Frequency response for the high-level inputs was flat within 1 dB from 20 Hz to 50 kHz. Yamaha has opted to use a nondefeatable, subsonic filter with a nominal cutoff point of 10 Hz. This accounts for the slight drop at the extreme low end, which, in the sample I tested, reached the -3 dB point at 12 Hz. High-frequency cutoff (the -3 dB point) occurred at 100 kHz. All of these measurements were made with the tone-control circuits defeated. The range of the three tone controls is shown in the multiple-sweep spectrum analysis of Fig. 7.

Signal-to-noise ratio for the MM phono inputs was 82 dB, A-weighted, referred to a 5-mV input signal and 1 watt output. That would be a very good S/N ratio even for a separate, high-priced preamplifier. When you consider all of the possible noise- and hum-generating circuits in a receiver as complex and comprehensive as this one, 82 dB seems all the more remarkable. The MC phono input did almost as well, with a measured S/N of 76 dB referred to a 0.5-mV input and 1 watt output. This figure, too, is excellent and compares favorably with results obtained for the very best separate preamplifiers having MC inputs. Signal-to-noise ratio for all of the high-level inputs measured 83 dB, referred to 1 watt output and 0.5 V input. Translated to rated output, this means that if a 2.0-V maximum signal (typical of CD player outputs) were fed to the high-level inputs and the volume-control setting were increased to produce 125 watts, the effective S/N would be about 33 dB higher, or 116 dB. Clearly, this receiver is not going to impose any limitations on the dynamic range or signal-to-noise ratio achieved by even the very best CD players.

RIAA equalization was accurate to within -0.4 dB from 30 Hz to 20 kHz. At 20 Hz, response was off by 1.0 dB, but that can be attributed to the presence of the subsonic filter, which is in-circuit at all times.

Figure 8 shows the action of the separate, continuously variable loudness control at several settings. The control attenuates the midrange, rather than boosting bass and treble. In use, the listener first sets the "Loudness" ring—which surrounds the "Volume" knob—to its maximum (flat)

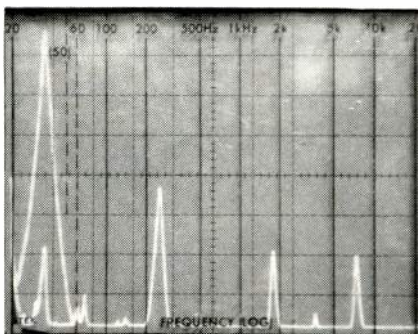


Fig. 4—
Crosstalk
and distortion
components
for a 5-kHz,
FM modulating
signal.

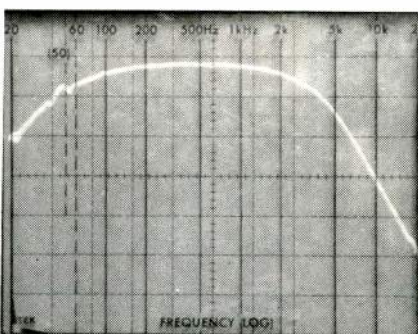


Fig. 5—
AM frequency
response.

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The R-9 is, without a doubt, one of the most flexible, well-thought-out central audio components I have encountered.

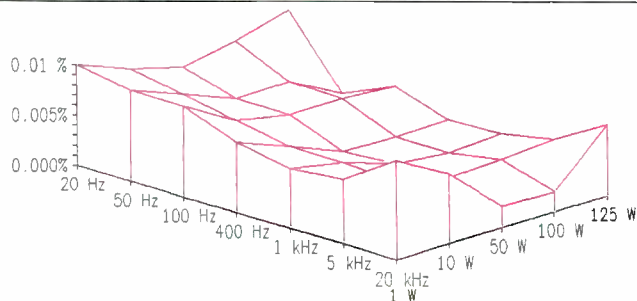


Fig. 6—Power output vs. frequency vs. THD. Perspective exaggerates the corner point representing 125 watts at 20 Hz, where distortion is only 0.009%. The R-9's distortion remains below its rated 0.015% until above 135 watts (see text).

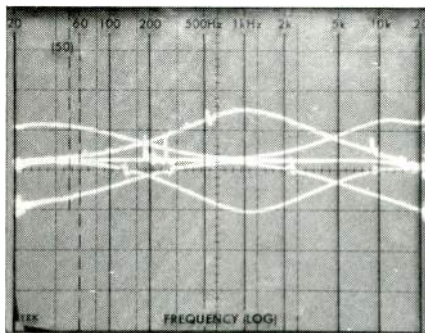


Fig. 7—Tone control range.

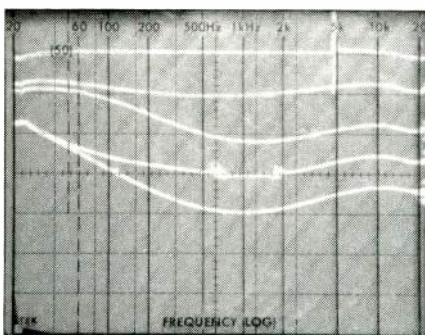


Fig. 8—Loudness contour curves for several settings of the continuously variable loudness control.

setting, adjusts the knob for realistic, live-performance listening levels, and then uses the ring to lower the sound to levels more comfortable for home listening. This calibrates the loudness compensation setting to match the sensitivity of your speakers and the acoustics of your room. At the ring's minimum position, mid-frequency levels are attenuated by around 40 dB regardless of the volume-control setting; this would be suitable for background listening.

Use and Listening Tests

I have already commented on the excellent performance of the R-9's FM tuner section. The choices of tuning and reception modes made by the tuner's microprocessor were almost always the same ones I would have made myself. The tuner section rarely switched into the "DX" mode in my listening location, so I benefited from the extremely low distortion and the excellent stereo separation afforded by the wide-band "Local" mode.

I used a variety of audio and video program sources with the R-9, and found that it served as an excellent multi-media control center. Even when playing CDs selected for their wide dynamic range, the R-9 never ran out of power when driving low-efficiency reference speakers. I did try using the "Auto Class A" mode at lower listening levels and, frankly, could detect no difference between sound quality in Class A and Class AB at those levels. I'd like to think that this speaks well for the low-distortion circuitry of Yamaha's Class-AB amplifier rather than implying a lack of critical perception on my part.

The stereo synthesizer circuit did wonders for some of my video home movies which have only monophonic soundtracks. This circuit, like many others of its type, utilizes a comb filter to convert a monaural signal into simulated stereo. Of course, if you listen carefully, you know that the results are not true stereo, but the spread of sound is pleasing and effective nevertheless.

The Dynamic Noise Canceller circuit is similar in principle to the DNR circuit widely used in car stereos, tape decks, and videodisc players. Essentially, DNC is a sliding low-pass filter which follows the upper-frequency limit of program content and removes noise above that frequency.

The three tone controls provided just about all of the tonal compensation I would ever need. For those who feel that a narrower band multi-control equalizer is needed, the R-9 even has an accessory output loop to which an equalizer or other signal-processing component can be connected. This effectively puts the additional accessory in series with the signals passing through the R-9; the accessory loop acts as a third tape monitor loop but is not switchable.

The Yamaha R-9 is, without a doubt, one of the most flexible and well-thought-out central audio components I have encountered. My only fear is that for some, perhaps, it may actually turn out to be too flexible. People assembling an audio system for the first time may not need all of its features. On the other hand, audio and video enthusiasts who like to plan ahead may well find that, even though they may not use all of the R-9's extensive facilities at first, more and more of the rear-panel jacks will be occupied as their involvement in audio and video increases.

Leonard Feldman



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speakers and you get 40 watts of power. Or, buy a system of four and you get 80 watts of electronic fury in your car. The extra power actually helps your system reproduce more of the signal contained on today's better tapes or compact digital discs. You'll hear more realistic sound at low or high volume levels than possible without the extra power.

The crisp, sharp sound is the result of more than 71 discrete electronic components mounted in the base of each speaker. The sound is rich, clear, and perfectly balanced. Yet the low profile design of these speakers allows you to place them

in the doors or side panels of most automobiles without additional modification. As an extra bonus, each speaker can also be tuned during installation to match your taste, or your car's acoustic environment.

Take it from the experts at Jensen, don't buy your car stereo system backwards, buy your speakers first. And now you can buy the speakers with built in digital-ready power amplifiers instead of investing in additional costly components.

The new Jensen Power Amplified Speaker.

The only thing quiet about it is its price!



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JENSEN®

When you want it all

Enter No. 17 on Reader Service Card

"CARVER CD PLAYER: SUPERB SOUND PLUS THE DIGITAL TIME LENS"

AUDIO MAGAZINE

"Leave it to Bob Carver to come up with a CD player designed to please both those who love CDs and those who still have reservations about their sound quality."

—Leonard Feldman
AUDIO MAGAZINE



The Carver Compact Disc Player answers the audiophile's demand for a CD Player which provides not only the greater dynamic range and richer bass expected from compact disc technology, but also the musicality, spectral balance and spatial qualities of well executed analog high fidelity recordings.

LOGICAL

How logical it is for a physicist dedicated to delivering music with maximum dynamic impact to offer a state-of-the-art CD player. Anyone who ever wondered why Carver makes amplifiers capable of delivering hundreds of watts of power need wonder no longer after they have heard the Carver Compact Disc Player as a sound source.

There are dozens of models of compact disc players now available, many of them demonstrating little regard for the finer points of digital playback technology. Bob Carver was in no hurry. He wanted to do digital right. And he did.

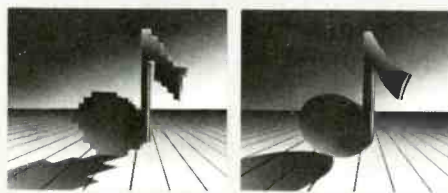
The state of the art has advanced considerably since the first players appeared several years ago. The Carver Compact Disc Player makes use of the latest **triple laser beam** pickups, **sophisticated oversampling**, **digital**

filtering technology and, very importantly, Carver's unique distortion reducing **dither signal** that effectively removes the low level quantization distortion existing in all other CD players.

Except for features like display and programming, the real determining factor in CD player quality is its ability to reconstruct music from digital information bits. And that is not an easy job nor one that can be effectively achieved while skimping on circuitry.

IMPROVED TRACKING

The Carver Compact Disc Player reads discs with more precisely focused laser power than most other models, resulting in improved tracking and less chance of drop-outs when dust or smudges are encountered on a CD.



The Digital Time Lens circuitry restores the octave-to-octave balance originally intended by the musician and recording engineer.

DIGITAL FILTERING

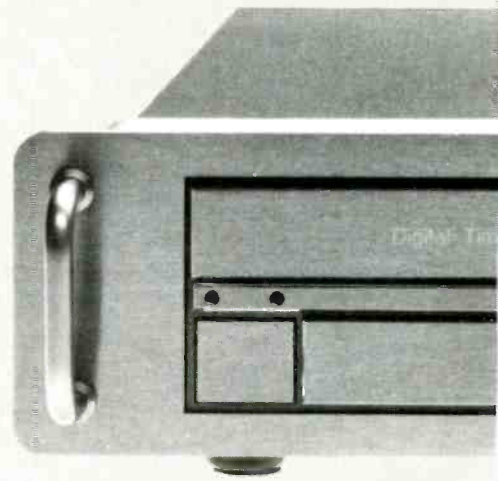
Along with a potentially audible signal ranging up to 20kHz, there are endless images of the signal at 40kHz, 80kHz and 160kHz. While they are above the range of human hearing, they must be removed from the signal to prevent harmonic problems which could turn into audible distortion. Earlier CD models placed an anti-imaging filter after the digital/analog converter stage. Carver uses **DIGITAL** filtering ahead of the D/A converter through a process called multiple oversampling. The sig-

nal is passed through a shift register which delays the samples, so that the weighted average of a large number of signals is generated. Through a complicated process, frequency bands are suppressed between 20kHz and 160kHz, eliminating harmonic distortion problems early on before the complicated D/A 16 bit translation.

The same oversampling process also distributes the same amount of noise over twice as wide a frequency range, resulting in half as much noise in the final signal. Then after translation to analog, the signal is once again filtered for a gentle roll-off above 20kHz. This yields a marvelously natural musical sound to the final output.

ABSENCE OF PHASE ERROR

One of the important tests applied to determine the effectiveness of digital-to-analog translation circuitry is the reproduction of a square wave.



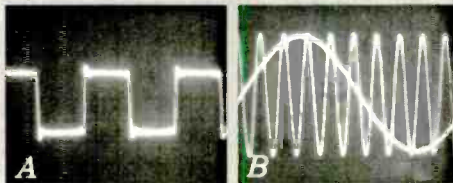
CARVER

POWERFUL

Corporation, PO Box 1237, Lynnwood, WA 98046

"Reproduction of a 1kHz digitally generated signal was as close to a true square wave as I have ever seen from a CD player that used digital filtering. (The Carver Digital Disc Player) shows a virtual absence of phase error."

AUDIO MAGAZINE



A. Square-wave reproduction, 1kHz.
B. Two-tone phase test signal (200Hz and 2kHz) with Digital Time Lens off.

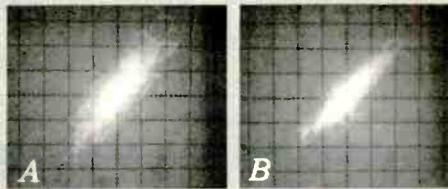
PLUS THE DIGITAL TIME LENS

On top of this unerring ability to produce natural, real-sounding music from the CD's digital bits, the Carver Compact Disc Player has the remarkable Digital Time Lens circuit to insure your listening enjoyment.

The Carver Compact Disc Player is the world's only compact disc player to address the problem of the bright, hot, harsh sounding midrange and a lack of ambience and spatial detail characteristic of the majority of compact discs currently available.

When Bob Carver obtained his first compact disc player, he was surprised at the sound derived from most of the compact discs he purchased. The three-dimensional musical perspective which his analog system provided in lush abundance on phono discs evaporated into a flat, brittle wasteland. After extensive testing, Bob uncovered two fundamental flaws in almost all compact discs: 1) An unpleasant, harsh spectral energy balance. The overall octave-to-octave energy balance was shifted on the CD towards more midrange above 400Hz; 2) The amount of L-R signal (which carries the spacial detail of the music) on the CD was inexplicably, but substantially, reduced

when compared with the amount of L-R signal found on the corresponding analog disc.



A. Lissajous pattern showing spatial detail (L-R)/(L+R) ratio from an LP record.
B. The same instant of music but taken from the CD version. Note the decreased (L-R) content, as shown by the narrowed trace.

Carver's circuitry corrects the ratio of L-R to L+R by performing one extra, but important mathematical operation on the signal stream that all other CD players fail to perform. This final operation makes all the difference.

The result is a natural sound with more of the three-dimensional information that places us in the same space with performers. You won't need the Digital Time Lens on all CD's. But it is there when you need it.

In the beginning, Carver hoped, indeed he expected, that once recording artists and engineers became more experienced with CD technology fewer and fewer CDs would require the Digital Time Lens. But both laboratory and listening tests reveal that the great majority of even the most recently released CDs benefits significantly from the Digital Time Lens.

EASY TO USE

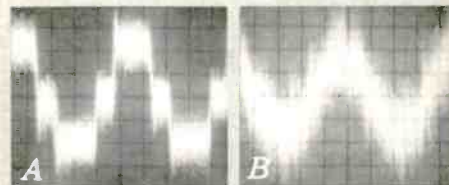
Ease of operation is a hallmark of Carver components and the Carver Compact Disc Player is no exception. A subtle but easy-to-read LCD display not only shows selection number, elapsed time and total time of the CD, but also "talks" to the user. Turn on the Carver Compact Disc Player and the display asks for a disc. When the disc tray is open, the display reminds you with an OPEN readout. When a CD has completed playing, the multi-function display reads END.

With the Carver Compact Disc Player's Programmable Random Access Playback System, track search and programming of different selections is a snap, as is automatic repeat of a previous selection or an entire CD. For classical music lovers, the Carver Compact Disc Player has complete indexing capabilities as well.

The large, easy-to-use feather-touch controls include pause, fast forward and reverse. You can even monitor music at high speed to find a certain portion of a selection.

We know you really enjoy music so, you owe it to yourself to begin your digital experience with the only full feature CD player that has the Carver touch. The only CD player that can actually improve on what is already the best playback medium ever offered.

Audition the Carver Compact Disc Player with Digital Time Lens at your Carver Dealer.

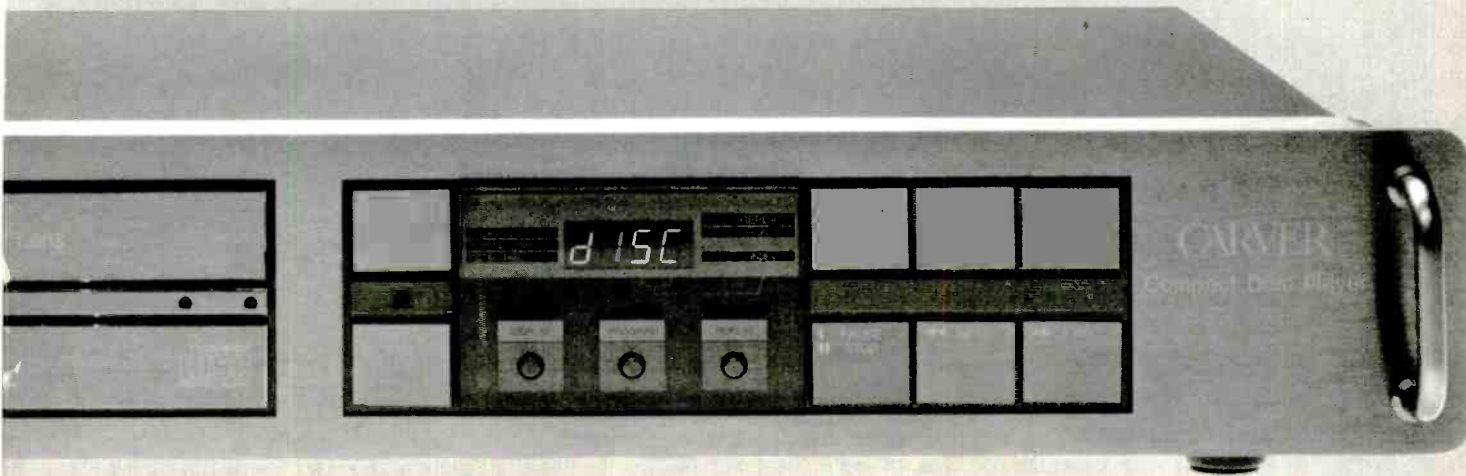


A. Ultra-low-level (4 significant bits) 1kHz signal, as reproduced by conventional CD players.
B. Same signal with dither added before D/A conversion by Carver CD player. Note that dither has caused the distorted step-wise approximation of the 1kHz tone virtually to vanish. Quantization distortion has been reduced to insignificance.

IF YOU ALREADY HAVE A CD PLAYER

By buying a CD Player you made a commitment to vastly improve your sound source, now you can go the short extra step that lets digital realize its true potential.

That step is the CARVER Digital Time Lens. Simply connect it between your CD player and your preamplifier or receiver.



2

MISSION
DAD-7000R
COMPACT
DISC PLAYER**Manufacturer's Specifications****Frequency Response:** 2 Hz to 20 kHz, ± 0.3 dB.**THD:** 0.003% at 1 kHz.**Dynamic Range:** 96 dB.**S/N Ratio:** 96 dB.**Number of Programmable Selections:** 20.**Channel Separation:** 94 dB at 1 kHz.**Line Output Level:** 2.0 V.**Power Requirements:** 120 V, 60 Hz, 30 watts.**Dimensions:** 12.6 in. W \times 3.54 in. H \times 11.8 in. D (32 cm \times 9 cm \times 30 cm).**Weight:** 15.4 lbs. (7 kg).**Price:** \$749.**Company Address:** 5985 Atlantic Dr., Unit 6, Mississauga, Ont., Canada L4W 1S4.

For literature, circle No. 91



Mission Electronics Ltd. is a British firm whose audio components have earned a fine reputation throughout Europe and North America. The company's products are distributed here by Mission Electronics, based in Ontario.

From the outset, it was clear to me that at least the mechanism of the Mission DAD-7000R was produced by Philips, co-developer of the Compact Disc. What made it clear was the inclusion of a bulletin for U.S. purchasers that

listed the service centers of NAP Consumer Electronics. (NAP, in case you hadn't guessed, stands for North American Philips.)

While the major internal assemblies may have their origin with Philips, the external layout and, in fact, the audio-output stages of the DAD-7000R are entirely of Mission's own magnificent conception and design. With as sparse a control layout as I have seen on any full-function CD player,

NO OTHER HIGH-BIAS CASSETTE CAN MATCH THESE NUMBERS:

10111000101110001101



Other Type II (high-bias) cassettes are a long way from home when it comes to reproducing the pure, dynamic sounds of digitally encoded music sources.

But, number for number, TDK HX-S audio cassettes are number one.

Their exclusive metal particle formulation reproduces a wider dynamic range and higher frequency response. This enables HX-S to capture all the crispness and purity of digital performance on any cassette deck with a Type II (high-bias) switch.

With four times the magnetic storage ability of other high-bias cassettes, HX-S virtually eliminates high frequency

saturation, while delivering unsurpassed sensitivity throughout the audio spectrum.

Additionally, HX-S excels in retention of high frequency MOL, which no other high-bias formulation attains.

And HX-S superiority is not just numerical.

To maintain its dynamic performance, HX-S is housed in TDK's specially engineered, trouble-free Laboratory Standard mechanism. It's your assurance of unerring reliability and durability, backed by a Lifetime Warranty.

For optimum results with Type II (high-bias) and digitally-sourced recordings, get TDK HX-S. You'll feel more at home with it, wherever you go.

TDK
THE MACHINE FOR YOUR MACHINE.®

Enter No. 41 on Reader Service Card

The DAD-7000R lacks the usual rear-panel output jacks; instead, it has a 3-foot cable which could cause sonic and installation problems.

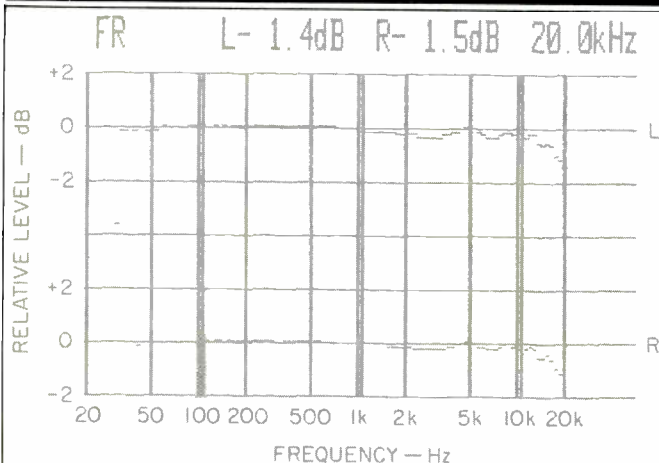


Fig. 1—Frequency response, left (top) and right channels.

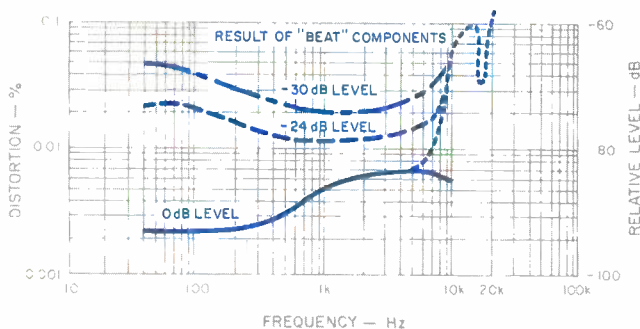


Fig. 2—Distortion vs. frequency (see text).

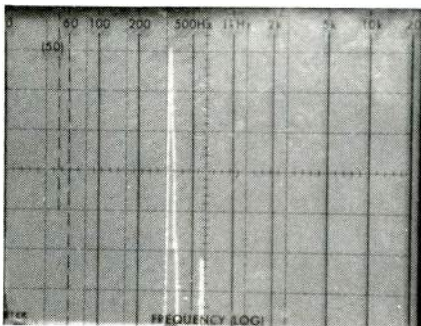


Fig. 3—Spectrum analysis from 0 Hz to 50 kHz shows 20-kHz signal (large spike) and out-of-band beat component (small spike).

Mission has managed to provide just about every programming and music-accessing feature that you would want. Furthermore, the wireless remote control supplied with the DAD-7000R is equally unencumbered by needless buttons and switches, managing nonetheless to duplicate every function of the few front-panel controls. Of course, the simplified front panel and the ease of operation did require omitting some less often-used frills and features found on other machines.

Specifically, this player can be programmed to randomly access and play up to 20 tracks. It can repeat-play an entire disc, a specific track, or a previously programmed group of tracks. You can review your programmed selections, and you can fast-search at three progressively increasing speeds, albeit without an audible cue. You can access any track manually, but there is no provision for accessing index points within a track. When a disc is first loaded, the display shows the number of tracks and total playing time until you initiate play or programming. During play, only the track number and elapsed time within that track are indicated by the display.

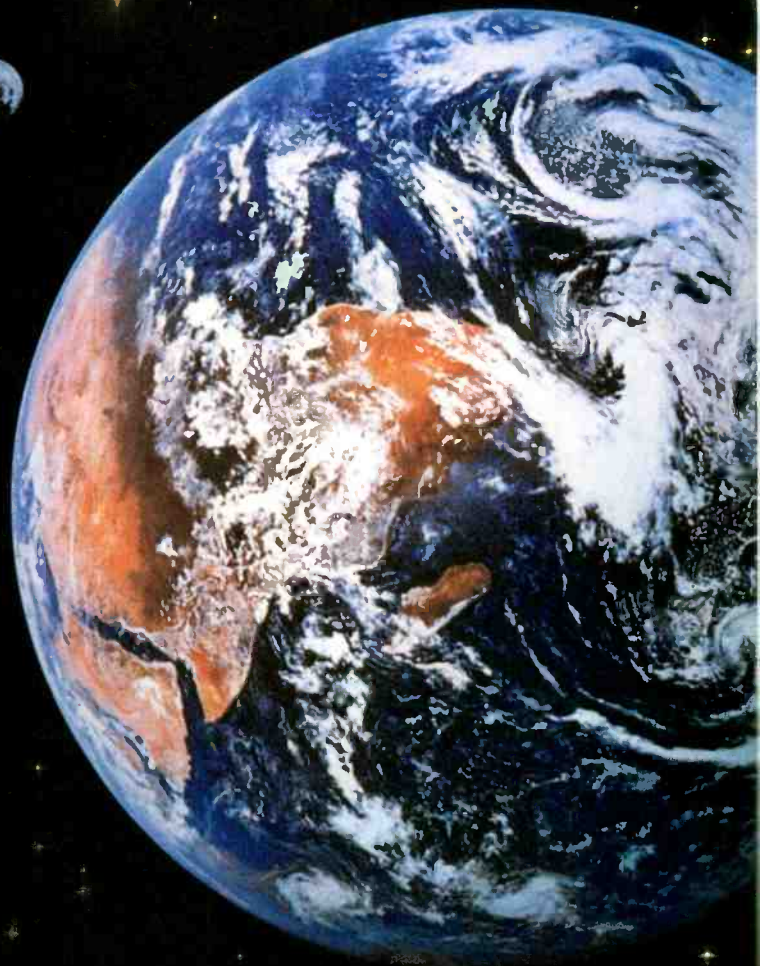
Control Layout

The left half of the Mission DAD-7000R is occupied by the very solid and sturdy disc drawer, which, when activated, moves slowly but with a solidity that is in marked contrast to the flimsy disc trays I've seen on some less costly machines. The display area to the right of the drawer, in addition to showing the track numbers and time, also indicates the tracks stored during programming and during a review of programmed steps. Two small pushbuttons below the display are used to call up previous and succeeding track numbers while programming, and a third key, centered between these two, stores the track numbers. A "Repeat" key and indicator are just below the "Store" key, and to the right is an "Error" indicator which lights up if you make mistakes while operating or programming the unit. Flanking the "Repeat" key are the "Open/Close" drawer-control and "Stop/Clear" buttons. The latter stops playback or clears the program memory.

The diamond-pattern arrangement of four keys at the right of the panel reminded me of the cursor-key layout on many personal computers. Those keys at the left and right points of the "diamond" are used for fast search or to jump ahead or back to the nearest track beginning; above them is the play key, with the pause key below. When the machine is in pause mode, an LED below the pause key illuminates.

Instead of the usual rear-panel output jacks, the DAD-7000R comes with a fixed, 36-inch twin audio-output cable which is terminated in phono-tip plugs. I can foresee problems in installations where the player is more than 3 feet from the amplifier input. Of course, audio extension cables are available, but that means two more connection junctions which, in time, can become intermittent or develop a finite resistance. The only other CD player I have run into recently that supplies such a fixed output cable is the Bang & Olufsen CD X. Is this approach peculiarly European, I wonder? Or is there some good reason why these manufacturers deny us the freedom of choosing the grade and length of connecting audio cables that we want?

**NEC's digital
experience here...**



**brings you a better
digital experience here.**



When you put a satellite in orbit, you want every possible assurance that it will perform. That's why corporations and governments all over the world ask NEC to build their satellites.

Even if you don't launch objects into outer space, it's comforting to know that NEC puts much of our satellite PCM digital technology into our Compact Disc players for the home.

While most high fidelity companies have only two or three years of experience with PCM digital audio, NEC has been at it since 1965. So it comes as no surprise that other manufacturers are now imitating the digital filtration and high-speed switching our CD players have had from the beginning. And it's no surprise that independent critics in America, Europe and Japan have awarded NEC's players top ratings.

You see, building satellites is not enough for NEC. We feel obligated to take the world's most advanced technology one step further. Into your home.

NEC

We bring high technology home.

With A-weighting, the S/N ratio could not be measured; the noise was simply too low. I'd guess that the overall A-weighted S/N exceeded 110 dB!

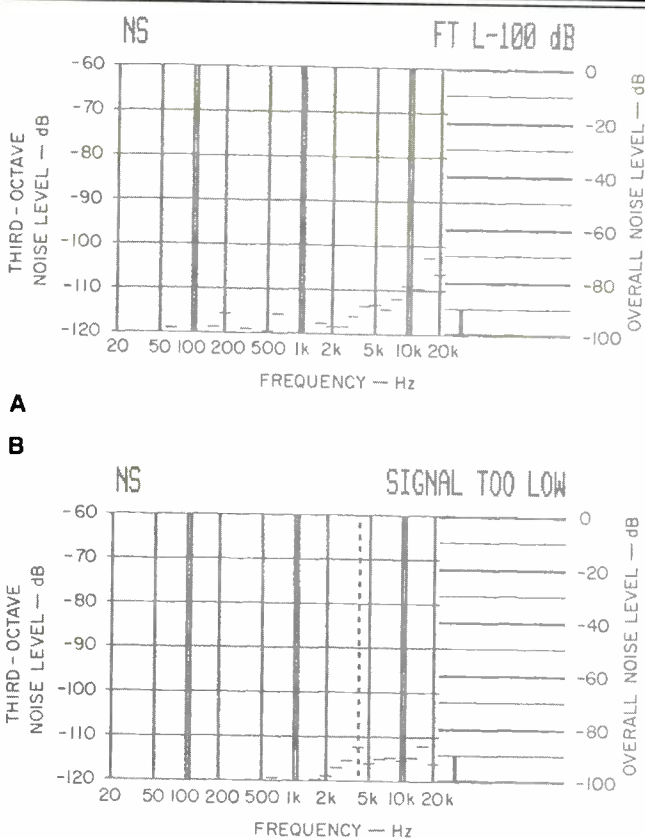


Fig. 4—S/N analysis, both unweighted (A) and A-weighted (B). A-weighted noise was too low to be measured.

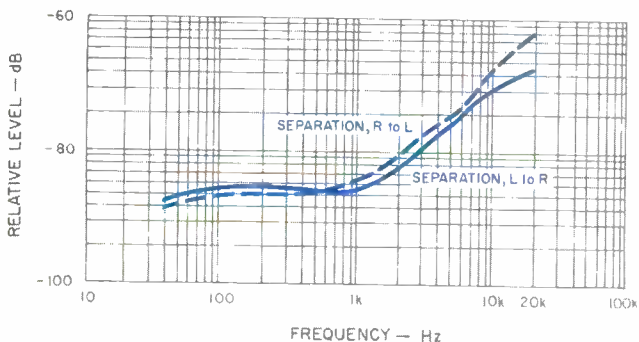


Fig. 5—Separation vs. frequency.

Measurements

Frequency response of the Mission DAD-7000R (Fig. 1) was close to flat over the entire audio frequency range, measuring -1.4 dB at 20 kHz for the left channel and -1.5 dB at the same frequency for the right channel. This is somewhat more attenuation than is typical for most CD players, but I don't consider it a serious flaw. The slight ripple in response, noticeable particularly in the left-channel curve, is probably caused by the gently sloping analog output filters, which must be present even when digital filtering is used prior to D/A conversion. Note that the vertical scale in Fig. 1 is only 2 dB per division.

As has been true of so many CD players that use oversampling and digital filtering, simple distortion readings can be deceptive. Careful observation and interpretation of the output components of the player while it reproduces high-frequency test signals is necessary. There were high orders of out-of-band components, the result of "beats" between the sampling frequency and the actual desired audio frequency. Until I introduced a band-pass filter, these spurious high frequencies were clearly visible on my oscilloscope. Once the band-pass filter was introduced, I was able to record and plot the distortion values shown in Fig. 2. Under these conditions, THD at 1 kHz for 0-dB level was a very low 0.0025%, or a bit lower than Mission's claimed 0.003%. The three plots of Fig. 2 are only meaningful up to 10 kHz because of the presence of the band-pass filter in the measurement chain. Since this filter cuts out everything above 20 kHz (the second harmonic of 10 kHz), readings of THD above 10 kHz would be erroneous. The curve of shorter dashes in Fig. 2, beginning slightly below 10 kHz, represent the out-of-band, nonharmonically related beat components. Though not as strong as those I've seen on some other players, they still contribute to the "distortion" readings above 10 kHz or so. To document what was happening without the band-pass filter in the test setup, I used a spectrum analyzer to sweep linearly from 0 Hz to 50 kHz while a 20-kHz tone was being reproduced by the DAD-7000R. The results of this sweep—the test tone and a single beat frequency—are shown in Fig. 3.

Unweighted signal-to-noise ratio measured an unusually high 100 dB (Fig. 4A). My test instrument was unable to read residual noise when the A-weighted network was added; the noise was simply too low to be read (Fig. 4B). This is one of the very few times I've been unable to measure signal-to-noise for a CD player. Based upon the individual third-octave noise "blips" seen in Fig. 4B, I would have to guess that the overall A-weighted S/N exceeded 110 dB!

SMPT-EIM distortion measured 0.004% at maximum recorded level, increasing to 0.025% at -20 dB recorded level. CCIF-IM distortion (twin-tone, using 19- and 20-kHz tones at the equivalent of highest recorded level) was a very low 0.0012% at maximum recorded level and 0.0044% at -10 dB recorded level. Stereo separation, plotted as a function of frequency in Fig. 5, ranged from 61.9 dB at the high-frequency extreme to 86.6 dB at mid-frequencies. I attribute the decrease in high-frequency separation to that 3-foot audio cable supplied by Mission; it has nothing to do with the player's digital circuitry. The cable is a twin-conductor type. Although each conductor has its own shield, the

THE NEW JBL "L SERIES" SETS THE STAGE AT HOME

JBL, the most respected name in professional sound for over 40 years, is today's speaker of choice. At live concerts, where 125,000 Watts drive over 600 speakers, and in 70% of the world's recording studios, JBL is the speaker chosen by professionals—performers, engineers and producers—who depend on the highest quality sound and reliability.

Now, for those who demand the same superior performance, JBL introduces the new "L Series." Each speaker in the "L Series" has a direct twin in the JBL professional studio monitor line. For the first time, the speakers relied on by recording engineers to mix the music, are available for your living room.

All of these speakers share the technology that is the cornerstone of JBL's Professional Speaker Systems—all use titanium dome tweeters, filled and laminated polypropylene and Aquaplas drivers, as well as cast frames for sonic accuracy, reliability and power handling.

Visit your local JBL dealer today and listen to professional sound for the home, made in the USA, by the sound professionals...JBL.

The New JBL "L Series"...Bringing Pro Sound All The Way Home.



The DAD-7000R is one of the finest-sounding players I've heard. Its magnificent, low-noise analog stages complement and enhance the digital circuitry.

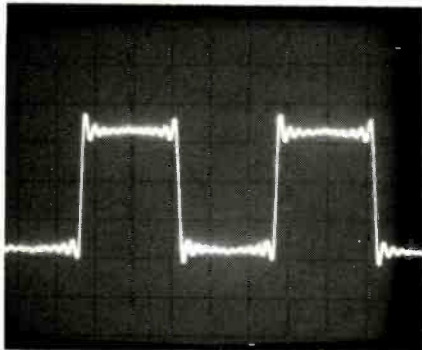


Fig. 6—Reproduction of a 1-kHz square wave.

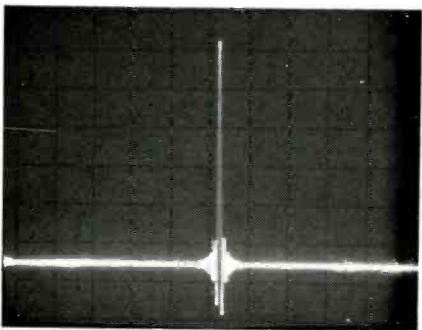


Fig. 7—Single-pulse test.

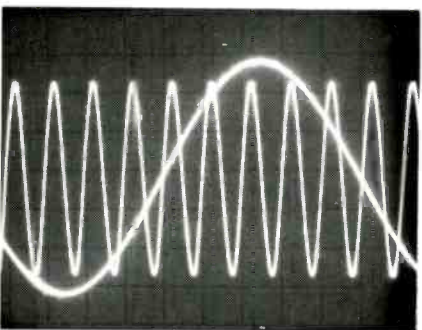


Fig. 8—Perfect phase linearity is exhibited in the phase-error test.

proximity between the left- and right-channel cables and, perhaps, inadequate shielding probably account for the obvious capacitive coupling between channels at high frequencies. I mention this only as another reason why Mission should have left the choice of output cables to the user; after all, the test result of approximately 60 dB of separation at 20 kHz is certainly nothing to mourn over.

The Mission DAD-7000R's reproduction of a 1-kHz square wave (Fig. 6) is typical of that produced by CD players

which use oversampling and digital filtering. The unit pulse in Fig. 7, as reproduced from a Philips test disc, further confirms the use of digital filtering and oversampling in this player's D/A circuitry. So does its perfect phase linearity (shown by the two curves' simultaneous crossing of the zero axis in Fig. 8).

As I have stated in other "Equipment Profiles," it is becoming almost (but not entirely) pointless to check out error correction and tracking stability using my admittedly antiquated "defects" disc. Philips created this test disc when CD players and CD technology were in their infancy. Almost every player I have tested in the past six months has zipped right through the disc's simulated scratch (up to 900 microns in width), simulated dust circles (up to 800 microns in diameter), and simulated fingerprint smudge (which extends over two complete musical tracks). The DAD-7000R joins the ranks of the most stable and shock-resistant players I have tested, as it had no trouble whatsoever playing right through these defects. The unit's resistance to rather substantial vibration and external shock was also excellent.

Use and Listening Tests

The Mission DAD-7000R, like the Philips (or Magnavox, if you prefer) players upon which its digital circuitry is based, is one of the finest-sounding CD players I have listened to. Mission has taken the best of what Philips offers in Compact Disc technology and added magnificent audio-output stages whose low noise complements and enhances the sound quality of the circuitry preceding it. Add the extremely stable disc-tracking mechanism, the sturdy chassis and the simple control arrangement, and you have a CD player that will certainly appeal to the audio purists among us. I have no hesitation in accepting Mission's suggested price for this player. While the DAD-7000R lacks a few convenience features that other manufacturers incorporate in their top-of-the-line models, it more than makes up for those omissions by its clean, authoritative sound quality and its rugged construction. This player could well become one of the cult products whose value increases with time.

Leonard Feldman



The DAD-7000R's sturdy-looking disc-loading drawer moves with an impressive, if slow, solidity.



BEYOND CONVENTIONAL A/V CONTROL

Onkyo's new TX-RV47 receiver permits the total integration of today's audio and video technologies into one control center. It combines the sonic qualities our audio products are known for with exciting, new features certain to please the most discriminating videophile.

For outstanding video sound, nothing competes with the TX-RV47. For the first time, a true theater experience is possible to achieve at home. Dynamic Bass and Stereo Image Expanders boost low end response and greatly increase sound field spatiality. Monophonic video sound can be dramatically improved with our Simulated Stereo control. Finally, an innovative 4-Channel Matrix Circuit, which when used with two additional rear speakers, effects a "surround sound" experience from any stereo video soundtrack.

Onkyo's acknowledged leadership in amplifier design forms the foundation of the TX-RV47. It features True Low Impedance Drive Capability and Delta Power, insuring maximum dynamic range from any source. Superb FM performance and tuning convenience are Onkyo hallmarks that are also standard.

The TX-RV47 offers full input selectivity. There are 8 in all, allowing connection of 2 stereo VCRs, cable TV/FM, additional audio/video source, and full complement of audio products, all controlled by a full function wireless remote.

The TX-RV47 goes beyond conventional audio/video control to reach a new level in media system performance. Discover the audible—and affordable (under \$500)—difference today at your Onkyo dealer.

Artistry in Sound

ONKYO®

200 Williams Drive, Ramsey, N.J. 07446

3

NEC T-6 TUNER

Manufacturer's Specifications

FM Tuner Section

Usable Sensitivity: Mono, 9.8 dBf.

50-dB Quieting Sensitivity: Mono, 15.9 dBf; stereo, 36.8 dBf.

S/N: Mono, 83 dB; stereo, 78 dB.

THD: Mono, 0.06%; stereo, 0.08%.

Capture Ratio: 1.0 dB.

Alternate Channel Selectivity: 80 dB.

Image Rejection: 80 dB.

I.f. Rejection: 100 dB.

Spurious Response Rejection: 100 dB.

Stereo Separation: 55 dB at 1 kHz.

Output Level: 0.7 V for 100% modulation at 1 kHz.

AM Tuner Section

Usable Sensitivity: 300 μ V/meter.

S/N: 52 dB.

Image Rejection: 50 dB.

Selectivity: 40 dB.

Output Level: 0.2 V for 40% modulation at 400 Hz.

General Specifications

Power Consumption: 120 V, 60 Hz.

Dimensions: 16.9 in. W x 2.0 in. H x 12.2 in. D (43 cm x 5 cm x 31 cm).

Weight: 8.6 lbs. (3.9 kg).

Price: \$229.

Company Address: 1401 West Estes Ave., Elk Grove Village, Ill. 60007.

For literature, circle No. 92



I tested two samples of the NEC T-6 tuner. The first one didn't work at all; the second, though it performed reasonably well in most respects, was slightly misaligned, possibly due to damage in shipping. (NEC normally ships equipment in batches, by truck; ours was a single-unit delivery via UPS.) My measurements and listening tests were conducted on that second sample, with no attempt to optimize its alignment. I am convinced that a carefully aligned unit would have been outstanding in every way, and that this model could be a real winner.

The electronic tuning system uses a digital phase-locked-loop frequency synthesizer controlled by a 4-bit microcomputer. The combination allows you to tune in stations manually, or automatically using the memory presets provided. Up to seven AM and seven FM stations can be assigned to the presets.

A low-noise MOS-FET and 4-gang, twin-type varicap diodes are employed in the FM front-end section of the tuner. The i.f. section consists of five stages of differential amplifiers and ceramic filters. A phase-locked-loop multiplex-decoder IC demodulates composite stereo signals. Ladder-type ceramic filters are used in the AM i.f. stages for wider-than-usual frequency response.

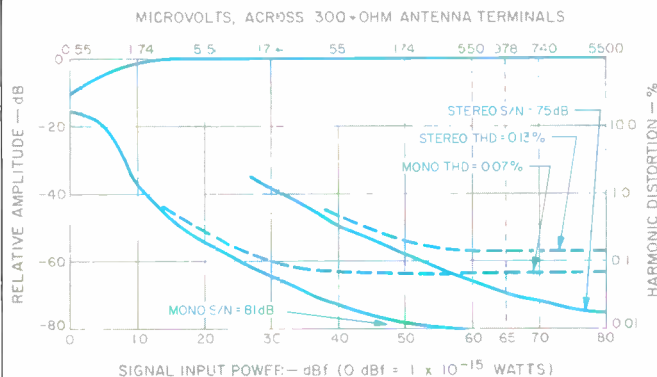
Control Layout

The very slim front panel, barely 2 inches high, nevertheless provides ample room for the few controls needed and for the visual displays which make the tuner so easy to use. A rectangular "Power" button is at the lower left of the panel. Nearby is a frequency display which changes in 200-kHz increments when tuned to FM and in 10-kHz increments on the AM band. An "FM Stereo" indicator light and a five-segment LED signal-strength indicator are positioned between the frequency display and the "Up" and "Down" tuning buttons. The seven numbered memory preset buttons and a "Memory" set button are near the center of the panel; to their right are a "Mono/Stereo/Mute" button, an "Auto/Manual" button, and the "AM" and "FM" band selector buttons. In the manual setting of the "Auto/Manual" pushbutton, one touch of the "Up" or "Down" button will change the tuned-to frequency, one step at a time. Holding either of these buttons down will advance tuning more rapidly. With the "Auto/Manual" switch set to "Auto," touching the "Up" or "Down" button will tune the T-6 to the next usable incoming signal on the dial.

The rear panel of the T-6 is equipped with an F-type coaxial connector for 75-ohm FM antenna cable connection; there are also screw-type 75-ohm, 300-ohm, and external AM and ground antenna terminals. An AM ferrite bar antenna at the center of the rear panel can be swung out and away from the chassis for best AM reception. The usual pair of left- and right-channel output jacks complete the rear-panel layout. There is no output level control.

Measurements

Although usable sensitivity of the T-6 was not quite as good as claimed, I was satisfied with the mono sensitivity reading of 11.0 dBf. Stereo usable sensitivity was limited by the muting threshold of the tuner since, in the stereo setting, low-level muting is always engaged. That muting threshold



I liked the automatic tuning, especially since the muting threshold was just high enough to eliminate stations you wouldn't want, anyway.

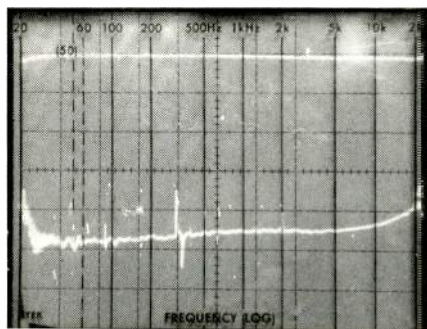


Fig. 3—
Frequency response (upper trace) and separation vs. frequency, FM section (see text).

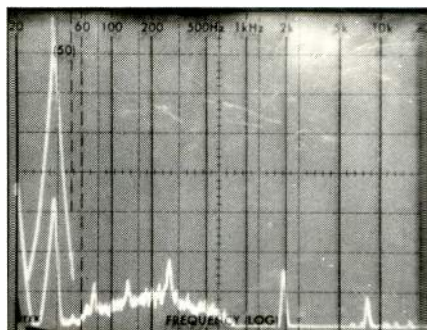


Fig. 4—
Analysis of 5-kHz distortion and crosstalk, FM section.

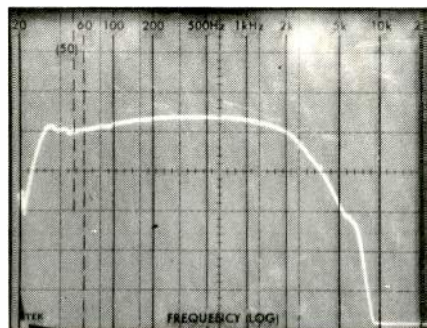


Fig. 5—
Frequency response, AM section.

frequency plots are logarithmic, and vertical sensitivity is 10 dB per division.) It was in making the separation measurements that I first suspected some misalignment of the tuner's stereo decoder section. With a signal modulating the left channel only, I read amazingly high separation figures in the right channel: 68 dB at 1 kHz, 59 dB at 100 Hz, and 56 dB at 10 kHz! Suspecting that something was amiss (these numbers are too good to be true), I switched things around so as to modulate only the *right* channel, while reading output from the left channel. Now, the separation figures were only 44 dB for the 1-kHz signal, 47 dB for the 100-Hz

test tone, and 38 dB for the 10-kHz test tone. Certainly, these are not poor results by any means. In fact, they are the results shown in the 'scope photo of Fig. 3. They merely indicate that if the multiplex decoder section had been properly and symmetrically aligned, separation for either channel would have met the manufacturer's claim of 55 dB or better for a 1-kHz test tone. Left-to-right crosstalk would have been reduced somewhat, while right-to-left separation would have increased until it was approximately equal to left-to-right separation.

Figure 4 shows the results of my spectrum analysis of the distortion and crosstalk products that result when a 5-kHz signal modulates one channel of the FM signal. The tall spike at the left is the desired 5-kHz output; contained within it is the 5-kHz signal seen at the unmodulated channel output. To the right are very small harmonic distortion components observed at the unmodulated channel output, as well as a couple of spurious but inaudible output components related to the 19-kHz pilot signal and the 38-kHz suppressed carrier signal. Also noticeable in this photo is a rising noise characteristic above 5 kHz; this may account for the tuner's inability to reach the ultimate S/N figure of 78 dB which the manufacturer claims for it in the stereo mode.

Capture ratio for the FM tuner section of this receiver measured 1.2 dB and alternate-channel selectivity was 82 dB, slightly higher than claimed. Image rejection measured 80 dB, exactly as claimed, while i.f. rejection measured 95 dB, falling somewhat short of the 100 dB claimed. Spurious response rejection measured better than the 100 dB claimed.

Figure 5 is a spectrum analyzer plot of the AM tuner section's frequency response. Despite the rather elaborate AM circuitry used, AM frequency response did not extend much beyond the usual 2 to 3-kHz cutoff point typical of most AM/FM tuners and receivers.

Use and Listening Tests

I found the T-6 easy enough to use, though I must say that when I held down the "Up" and "Down" buttons for fast tuning, the tuning was so fast that it was almost impossible to stop or let go before passing the desired station frequency. The auto-scan tuning mode operated more to my liking, especially since the muting threshold, at about 22 dBf, was just high enough to eliminate stations that you wouldn't want to listen to, anyway, because of their background hiss. The NEC tuner was certainly sensitive enough for use in my suburban location and, hooked up to a decent outdoor directional FM antenna, it would more than likely be sensitive enough to serve fringe-area listeners as well.

My reservations about this tuner stem more from my having had to test two samples to get an almost-perfect one. I don't know whether the sets are being quality-controlled only in their country of origin or whether at least some Q.C. sampling is taking place once they reach local NEC headquarters near Chicago. I've had some experience with NEC video products, all of which have performed in an exemplary fashion. NEC can expect to be a similarly serious contender in the audio product sweepstakes if they can assure customers of equally high product performance.

Leonard Feldman

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Rumors about the Scintilla, Apogee's mid-sized, \$3,500 ribbon loudspeaker, began to circulate in our local, New York group of audio buffs (the Audiophile Society) shortly after the Summer CES of 1984. Returning from the Chicago show, several claimed they preferred this "baby Apogee" to the company's top-of-the-line, \$6,600 Apogee. The Scintilla's sonic coherence and naturalness drew raves, as did its fast, tight bass. Now, more than one year later, this review confirms those first impressions.

The Scintilla is a rugged, beautifully engineered speaker which is a must inclusion in any discussion of exotic speakers configured into large, flat panels. Planar systems can sound more open and natural than many box-speaker designs, generating a highly detailed, wide sound field with great depth. The Scintilla has been carefully designed to maximize these strengths while overcoming a number of panel-speaker problems. In our tests, the Apogee design showed none of the inefficiency, low sound output, restricted dynamic range, or coloration found in too many screen loudspeakers. Deep bass response was solid, and dispersion patterns were even. Furthermore, the Scintilla, although not diminutive, does not physically dominate a room, so one can have a normal complement of furniture without a feeling of clutter or crowding.

Leo Spiegel, Apogee's senior designer, claims that the Scintilla's maximum output is very high—greater than 105 dB peak SPL at 4 meters, when driven by a stereo amplifier rated at 100 watts per channel into 8 ohms. The manufacturer also claims amplifier-quick rise-times for the Apogee's drivers, with under a microsecond speed for the tweeter, 5 μ S for the midrange and 50 μ S for the woofer! According to Apogee, speeds for the Scintilla should be similar. This performance



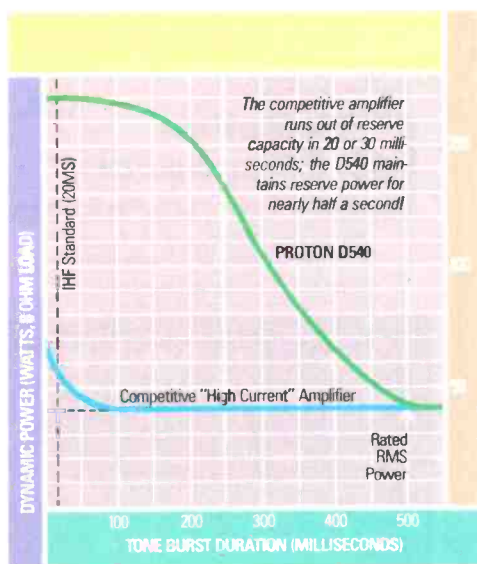
translates into very fast transient response. Crossover points are about 500 Hz for the woofer-midrange transition and 3 kHz for the midrange-tweeter, with 6 dB/octave slopes.

Technology aside, the Scintilla is a visually stunning product. Weighing in at 140 pounds per side, the system consists of two 57 x 30 x 3½-inch panels on metal baseplates, which are scaled-down versions of the "big" (84 inches tall) Apogee speakers. Decorated in beige or gray fabric, the Scintillas feature an attractive, slanted, dark trim which lowers their effective visual height. Setting up the massive panels on their baseplates is well explained in the excellent 13-page, illus-

trated manual. Other drawings depict the electrical configuration of the speaker terminals for low- or high-impedance (1- or 4-ohm) operation, and for biamplication.

Sonically, the Scintilla easily competes with (and betters, in co-author Kachalsky's opinion) the best electrostatic and dynamic designs. Prior to working with the Scintillas, the authors had conducted listening tests with speakers from Plasmatronics and VMPS, and the "big" Apogee, Snell Type A/III, Vandersteen 4, and Quad ESL-63 (electrostatic) designs. The Scintillas reached and, in many cases, surpassed the performance of these excellent speakers. This favorable

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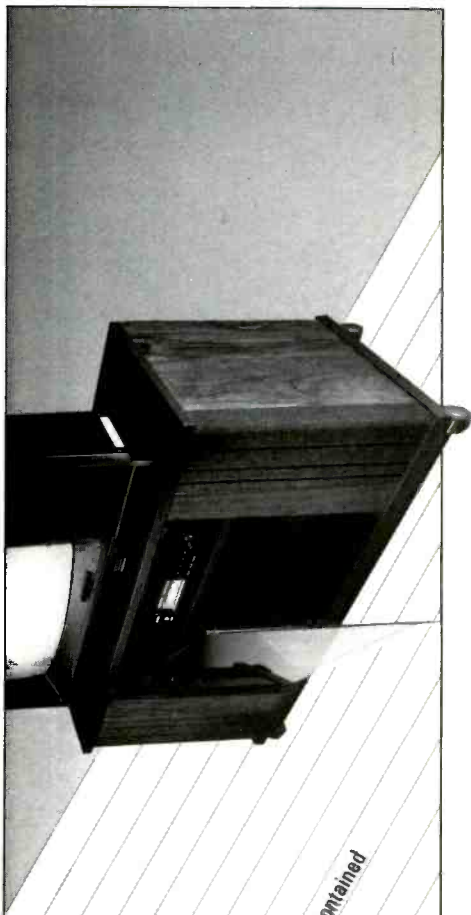
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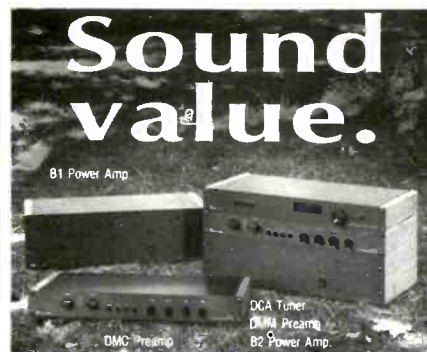


The Apogee Scintilla delivers great, deep bass. Its midrange excels, and its highs are extended and clean.

conclusion was reached after a number of intense listening sessions. Associated equipment included a Koetsu Rosewood Signature moving-coil cartridge; an Eminent Technology air-bearing, linear-tracking tonearm and Sumiko's Premier MMT tonearm; a SOTA Star Sapphire turntable; a pair of Levinson ML-6A preamps (L3A phono sections), and Discrete Technology interconnects and speaker cable. Records were used exclusively, and vertical tracking angle was adjusted to optimize the system's treble response.

Like the Snell Type A/III, the Scintilla delivers the feeling of great, deep bass power, an energy that couples to and moves the listening room. Organ and synthesizer music play with remarkable definition and no audible distortion, while possessing great solidity and mass. Bass-drum beats have natural timbre and great speed. Among planar systems, only the larger Apogees, which we have tested in the same listening room, were capable of delivering more deep-bass power.

The midrange excels in this loud-speaker. While reviewing, Kachalsky commented that he found the Scintilla's sonics had a physically relaxing effect, due in part, he felt, to their mid-range naturalness, low distortion and absence of fatiguing effects. The Scintilla's speed and detailing allowed it to pass our acid listening test: It clearly decoded the overlapping lyrics in Gilbert and Sullivan's tortuous "Mikado" trio at the end of Act II, where three male voices (Ko-Ko, Pooh-Bah, and Pish-Tush) each sing (simultaneously!) different lyrics about justice and execution. Air and reverberation were exemplary, equalling the outstanding performance of the Quad ESL-63s. For co-author Greenhill, clarity and timbre approached, but did not quite equal, the Quads. Piano music, female vocals, and male vocals emerged with a minimum of coloration and a great deal of naturalness. Dynamic range was striking, second only to that of the Snell Type A/III system. On several occasions, both authors experienced Gordon Holt's "hackle" effect (described in *Stereophile*, Vol. 7, No. 4, pg. 38) by developing "involuntary goose bumps" during loud, dramatic orchestral passages. Holt interprets this reaction as a gut-level, unconscious connection to



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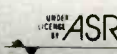
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The Scintilla's speed and detailing allowed it to pass our acid listening test, clearly decoding the overlapping lyrics of a tortuous "Mikado" trio.

the music. Incidentally, these large-scale dynamics often cause the mid-range ribbon to flap about in the enclosure, a very unusual sight!

The Scintilla's highs are extended, clean, and effortless. Ambience cues and reverberation effects of recording studios and concert halls can easily be

discerned. The Scintillas did not exhibit the apparent rise in the upper mid-range and treble often heard on other planar designs. Cartridge VTA adjustments were readily heard.

Imaging on the Scintillas was exciting, as with a number of other planar speakers. Even so, there were no irreg-

ularities in the sonic perspective—both width of field and depth of field were natural. Center-fill was excellent, and the image was evident from a number of positions in the room, giving evidence of the Scintilla's wide dispersion. Voices and instruments, on a popular album with an overdubbed female vocalist, seemed to float. Low-level, soft passages were reproduced with the identical balance and quality heard at full volume, a feature best described by Anthony Cordesman as a strength of the Quad ESL-63 (*Audio*, January 1985, pg. 120).

We were swept away by the Scintillas. They sound truly glorious, rich and romantic, with none of the sonic problems that can afflict planar speakers. No plastic, midrange graininess or glare was heard—only speed, naturalness, and effortless dynamics. They worked well in a number of listening positions in a normally upholstered room measuring 27 x 15 x 9 feet, and played at levels that would be considered very high for any type of speaker design, except a horn. For now, both authors find the speaker's technology and sonics state-of-the-art, and its visual design stunning.

The ultimate testimony to the Scintillas' quality occurred when our jaded and skeptical group of audiophiles suddenly fell into a "My-broker-is-E.F.-Hutton" silence at the first demonstration, and even listened (without talking) for the next hour. This appeal has not dimmed since that December 1984 Audiophile Society meeting.

However, this gorgeous sound comes at a price. Presented with the Scintilla's 1-ohm load, distinctly outside manufacturers' ratings, a number of fine amps took on unpredictable sonic characteristics. Greenhill's reference Levinson ML-9 stereo amplifier—which usually plays with a neutral mid-range and a big, dynamic bass—became sweeter, tube-like, and mellow (not unwelcome, by the way!) until its current limiting cut in (at clipping) with a spray of static. The dual-mono Tandberg 3009As, which Greenhill had found to be fast, detailed amps with etched highs, took on a bass emphasis and acquired a stronger midrange presence. Both amps can deliver more than 400 watts into 4 ohms, and Tandberg claims more than 800 watts out-

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We were swept away by the Scintillas. They sound truly glorious, rich and romantic, with none of the sonic problems that can afflict planar speakers.

put at 1 ohm. But neither could drive the Scintillas on peaks to more than 88 dB (at 1 meter) in Kachalsky's normally upholstered living room.

The speakers were then reconfigured to a 4-ohm load. Seven color-coded wires were repositioned on the rear of the speaker terminals and on a

separate terminal strip within the enclosure. This 30-minute procedure must be done carefully for each speaker, since the hardware can easily slip down into the nylon sock that covers the rear of the enclosure. It also helps to have good color vision (both authors are colorblind, so we acknowledge the

help of Mrs. Kachalsky) to place the purple, green, and gray wires on the correct terminals. At 4 ohms, the authors heard no sonic aberrations in the amplifiers, but the Scintillas lacked the ultimate naturalness, air, openness, and midrange clarity heard with the 1-ohm configuration. You won't realize this unless you have heard them driven at the lower impedance setting.

We preferred the very expensive Krell mono KMA-100 (\$4,900/pair) and 200-watt KMA-200 (\$7,500/pair) amplifiers for driving the Scintillas. We used them in a bi-amplified fashion (a pair of KMA-100s for midrange and tweeter, a pair of KMA-200s for the woofers), which produced the widest dynamic range. At 1 ohm, the KMA-100 is claimed to deliver 800 watts per channel and the KMA-200 puts out 1,600 watts per channel. A single pair of Krells were "bi-wired" (two speaker cables connected to each amplifier output terminal) to each Scintilla's double set of speaker posts; SPL measurements showed Scintilla output peaks of 94 dB (KMA-100s) and 98 dB (KMA-200s) at audible clipping. No change in tonal character or sudden presence effects were heard at 1 ohm—just sweet, open, detailed sound. Dan D'Agostino, the Krells' designer, uses the Apogees as a test load. The Classé Audio DR-3 amp also performs beautifully at the low-impedance setting.

Although the Scintilla works well at its 4-ohm setting, it really shines when the speaker is configured as a 1-ohm load. A number of companies (including NAD, Adcom, and Belles Research) are now offering less expensive solid-state designs that can deal with this load. A few tube amplifiers can drive the Scintilla at its 4-ohm setting, but they were not available for our review. The consumer should audition several amps to find the one he likes best with these speakers.

For now, we have to go with the Krells or the Classé Audio. Is it worth spending so much on the amps for this speaker? We think so. After all, if you own a Ferrari, you should not be surprised at the high prices for parts and repairs. But every audio buff must decide how far to go with a beautiful and exotic product like the Scintilla.

*Laurence L. Greenhill
and Hy Kachalsky*

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you owe yourself a listening session with this gear. I don't mean by this that Krell lacks competition for the top of the heap; I know from personal experience that the latest Klyne, Threshold, Audio Research, and Conrad-Johnson gear is equally worth a trip to one of the few high-end dealers who can properly demonstrate it. Nevertheless, these two Krell units are a unique sonic statement by a top designer and make the high prices of the high end worthwhile.

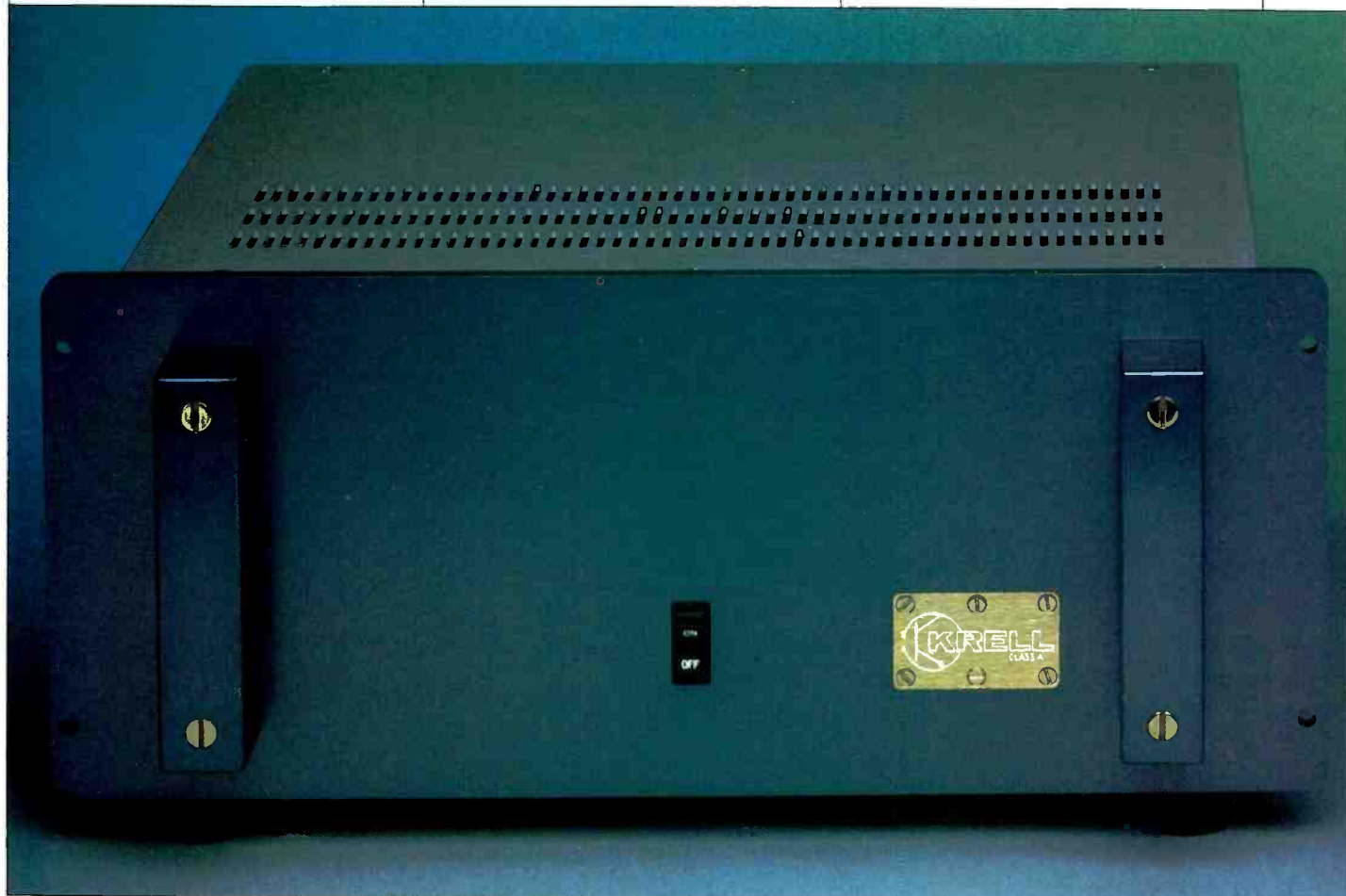
Krell PAM-3

The PAM-3 preamplifier sells for \$2,850, and is a pure Class-A, dual-mono design. It is a basic preamp only in that it has no tone controls. It uses two separate external power supplies, has an extraordinarily flexible set of inputs that can accommodate even the most complex system, has the gain for low-output moving coils, provides a very wide range of internal adjust-

ments to load cartridges with various impedances, and has an adjustable phase filter to improve the sound of CD players. The construction is beautiful, both internally and externally, with a unique mix of gray finish and brass screws and logo panel.

The sound is not perfect, but it is so neutral and detailed that I find it difficult to say much about the sound character of the PAM-3. There is no trace of upper-midrange hardness, tizziness or hardness in the highs, or alteration in timbre. The Krell passes unchanged virtually every nuance and detail in the input signal; its only "fault" is that it lets so much detail through that it demands superb source material. Good or bad, you get the music you put in, with remarkably little alteration.

In fact, the only way I can put the overall sound character of the Krell PAM-3 in any perspective, without drowning you in superlatives, is to



compare it to the SP-10 II from Audio Research. The PAM-3 and SP-10 II illustrate the difference between top transistor and tube designs. The solid-state Krell is more extended in the highs and benefits from its superior signal-to-noise ratio. It can be used with virtually any low-output moving-coil cartridge, while the SP-10 II prefers a minimum of 0.2 to 0.5 mV. The dead silence of the Krell is apparent, however, even on high-level inputs and particularly in very low passages. You can listen down into the noise floor of analog source material better on the Krell than on the Audio Research SP-10 II or on any other unit I have yet heard.

Both preamps have excellent bass and upper octaves, but listening solely to a subwoofer shows that the Krell PAM-3 is slightly superior in the deepest bass. The SP-10 II has a slightly more open sound stage, is a little bit warmer in the midrange, is somewhat

more "holographic" in its imaging, and handles transient detail in a way that gives it a more forward or front-of-the-hall character. The Krell PAM-3 has rock-solid imaging and sound-stage stability that I have never heard equaled, a mid-hall sound, and an almost uncanny purity. Both the Krell and Audio Research preamplifiers are superb vintages, but they come from different vineyards.

The Krell's phono stage is also worth special mention. It allows a wide range of different impedance and capacitance settings, using easily adjustable, internal DIP switches. Coupled to the Krell's purity, it virtually demands long listening sessions to choose the exact adjustment suited to your system. The PAM-3 also has the kind of purity that makes you all too well aware of a moving coil's rising high end or a moving magnet's tendency to blur transient detail. The Krell PAM-3 can get the

best from any cartridge, but it definitely demands the best cartridge.

The Krell's special CD input produces some fascinating improvements in CD sound. This is not just a renamed AUX input; it includes a high-voltage buffer and a phase filter which can be adjusted to match various players, or defeated altogether. This input configuration cannot soothe the savage CD player, but it does add a marvelous coherence to a good one and eases the upper-octave pain of a mediocre one. The upper octaves in a good CD player like the Meridian come into much better focus with the midrange, rather than leading the midrange with a slightly irritating edge. The sound stage widens, and depth is significantly improved. Once again, you will probably want to experiment with the various adjustments you can make by using the internal DIP switches. Don't expect dramatic differences, but do



The Krell is the first pure Class-A power amp I've heard that delivers the full promise of Class-A design. It sounds consistently natural and integrated.

expect to end up with a much more natural sound stage and less listening fatigue in the highs.

You also, incidentally, should pay careful attention to the placement of your speakers and the interaction between this placement, cartridge loading, and the combination of vertical tracking angle (VTA) and stylus rake angle (SRA). The Krell PAM-3 will sound a bit "closed in" if you place the speakers as close together as is desirable with most other equipment. I suspect this is partly due to its exceptional silencing and image stability. In any case, widen the spacing between your speakers to open up the image. You will find that the Krell has exceptional center fill, and that it provides a sound stage that combines both openness and stability.

Similarly, the Krell is exceptionally revealing of the imaging and sound-stage impact of VTA/SRA and cartridge loading. You can take advantage of this to adjust VTA/SRA and loading to get the most natural sound stage possible from your listening room and speakers. Lowering the tonearm base tends to move your listening position slightly back in the hall, while raising the tonearm base, so the cartridge tilts slightly up in the rear, will move the sound stage forward. Higher loading impedances on moving coils open up the sound stage, while lower impedances improve center fill.

I should probably stress that moving the speaker is the superior means of adjusting the sound stage. Ideally, VTA/SRA and cartridge loading should be set for maximum upper-octave detail at the point where upper-octave timbre is most natural. Nevertheless, these adjustments are an important alternative to getting just the right sound stage in the many rooms where there simply aren't that many options for speaker location.

As for other details of the PAM-3, the only thing missing, other than tone controls and filters, is a second phono input. The control functions have the smooth touch of luxury; the quality of the RCA jacks is superb; etc., etc. In short, this is one of those vintage high-end products that convinces you that the high end is not simply hype and money. It also has the kind of sonic merit you really need to hear for your-

self—even if you can't afford one tomorrow. The PAM-3 is one of those few reference-quality units around which you can build the rest of your system with absolute confidence.

Krell KSA-50

The Krell KSA-50, which sells for \$2,300, is an excellent match for the PAM-3. It has the same superb workmanship and styling, and is definitely a luxury-class power amplifier. At the same time, it is a true Class-A design, rather than one of the host of quasi-Class-A circuits. Its nominal 50 watts per channel turn into 100 watts at 4 ohms, 200 watts at 2 ohms, and enough power at 1 ohm to drive a pair of Apogeos. No matter how hard you drive it, the KSA-50 will get warm but not hot.

This Krell amp rivals the Audio Research D-250 Mk II and Conrad-Johnson Premier 5 in terms of its ability to resolve detail from the music. It is similar to the PAM-3 in that its sound-stage perspective is one-third back to mid-hall, as well as extraordinarily stable and well controlled. By comparison, the Audio Research and Conrad-Johnson have a slightly more open sound and give the impression of slightly faster handling of transients—although any technical measurement probably would disagree. The Krell has a more liquid sound that suits its hall perspective, but has the "air," or fine musical detail, that is normally found only in tube equipment.

The Krell is also the first pure Class-A power amplifier I have heard that delivers the full promise of Class A. Normally, there is always something wrong in the integration of the highs, and the purity at low levels does not hold up as the volume increases. The Krell has a rare quality in any power amplifier: It sounds consistently natural and integrated in all its sonic characteristics.

The KSA-50 is also one of the few transistor power amplifiers that lets you listen to the faintest musical information on lowest level sounds without having the feeling that the room has suddenly grown smaller or a veil pulled across the music. This seems to be part of signal-to-noise ratio, which makes the Krell a remarkably unobtrusive and neutral design. It outperforms

any tube or other transistor power amplifier I have heard in this regard. This means the Krell is exceptionally pleasant to listen to at low volume levels or with softly played solo instruments.

Speaking selfishly, the Krell KSA-50 joins the Futterman OTL-3 and the Audio Research D-250 II as one of the three basic amplifiers I have auditioned that allowed my Quad ESL-63s to reproduce what really sounded like live music in my home. I should note, however, that I used different records in each case, and that the Krell KSA-50 benefits from a slightly warm moving coil such as the Kiseki Purple Heart or one of the new Koetsus. Within its power range, the Krell KSA-50 is by far the best basic power amplifier in the deep bass I have heard in the last year.

I have been playing around with subwoofers recently, and it is amazing how few transistor amplifiers can really drive them properly (no tube amplifier can). Most transistor amplifiers that do manage to perform well have at least 100 watts per channel. With a good low-impedance speaker cable, the Krell locks in a good subwoofer and offers an extraordinary combination of power and control.

The Michelin Guides rate best restaurants as "worth a detour." The Krells definitely qualify as that kind of audio cuisine. In an ideal world I would ask the chef for more power (he has 100- and 200-watt designs on other burners), and a slightly more open sound. I would also ask that this sound be seasoned with the transient speed of tubes while retaining all the unique virtues listed above. I have this sudden taste for a transformerless Class-A tube amplifier with at least 40 tubes and with the tube filaments replaced by transistors. . . .

More seriously, however, this is the kind of equipment that is worth a serious appointment with a high-end dealer, to whom you can bring your own records, tapes, or CDs and listen long enough to see just how much really good electronics can do for music. Once you have sampled Krell and the best competing brands, you may find you have vastly improved your taste for music. Be careful, however; few converts to gourmet living can ever go back to a steady diet of junk food!

Anthony H. Cordesman



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INTRACLEAN S-711 HEAD CLEANER AND C-911A CASSETTE CLEANER

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For literature, circle No. 95

With all the excitement over the introduction of trend-setting major components, it's easy to overlook those minor accessories which we all need. And sometimes it's difficult to make the best choice among them.

Anyone who uses a tape recorder, even if only on rare occasion and even if high-quality recording is not the primary goal, must accept cleaning the various parts along the tape path as a regular chore. The format of the recorder and its quality make no difference: Cleaning is a necessity to ensure good tape motion and to get the best record and playback performance.

The advertised claims for the various cleaners available are quite similar, even though there are chemical differences. A large group of cleaners is based upon isopropyl alcohol, which can do quite a good job provided it is nearly pure and does not include additives that might leave deposits on the heads or elsewhere. Alcohol-based cleaners are not good to use on pinch rollers, however, and they may leave residue that most users would have difficulty detecting. Another sizable group of cleaners is based on DuPont Freon TF solvent. These are very good cleaners which do not attack pinch rollers (or plastics, for that matter).

When I first got the Intraclean S-711 head cleaner, identified as a halogenated hydrocarbon, I mistakenly considered it a TF type. The chemical makeup is different, however; the manufacturer emphasizes its low surface tension and "excellent wetting," and cautions that Intraclean S-711 should *not* be used on PVC or styrene plastics. (If your deck has plastic parts, make a test application on a small, unimportant area. Intraclean also makes S-721, a TF-type cleaner, for use where S-711 should be avoided.)

Not having any such plastic parts to



worry about, I ran a series of comparisons of Intraclean S-711 versus my best TF-type cleaner. At the time, I was making a number of copies on open-reel recorders using a mediocre tape formulation that left noticeable deposits with each pass of the tape. This required careful cleaning after each of the four tracks was recorded. I felt that my TF-type cleaners had done a good job in the past, and I didn't really expect to see superior results with the Intraclean product—but I did.

To compare the two cleaners, I used both for each head cleaning. When I used S-711 first, the cotton swabs obviously removed much more of the deposits, and the pinch rollers improved in appearance, leading me to conclude that even subsurface contaminants had been removed. There was no additional benefit apparent from re-cleaning the same head with the TF-type cleaner. When I cleaned the tape path with the TF-type cleaner first, I could always remove more from the heads, guides and rollers if I then re-cleaned with S-711.

While I caution potential users that

this product might damage certain plastic parts, my own experience showed it to be the most effective cleaner at all points along the tape path. In a way, I was even more impressed by the way S-711 revived the appearance of pinch rollers that I had thought ready for replacement.

Intraclean S-711 is available for home use in a two-ounce size at a list price of \$6.95. (This is somewhat more expensive than the TF-type cleaners, but Intraclean is very effective per application.) It is also available in larger sizes, for studios and duplicators.

Intraclean also makes the C-911A cassette-cleaning device, which has a list price of \$11.95. It is built in a cassette shell for direct insertion into any cassette recorder or player. The cleaning shell contains three basic elements: A cleaning tape that runs for about 15 S in play mode, two reservoirs that supply cleaning fluid to the tape, and two pairs of capstan/roller cleaning pads, one set for each possible capstan position. A half-ounce bottle of S-711 with a special, easy-open top is used to dampen the two reser-

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S-711 definitely does the best cleaning job of anything I've tried, both in direct use and with the C-911A in cooperative tape decks.

voirs and the capstan/roller cleaning pads before the C-911A is placed in a deck. The left pinch-roller pad is normally positioned out, but it can, and should, be retracted for use with three-head cassette decks that place the erase head at this spot.

Intraclean makes the valid point that

such an in-shell cleaner is particularly good for use with car tape players, where there is no access for direct cleaning. I ran my checks, however, with several standard decks of various designs to observe the cleaning cycle. I determined in the first few tries that I needed to saturate the reservoirs and

the pads to ensure that the transport would move the cleaning tape. The C-911A always ran well with the Technics RS-B48R and the Akai GX-R99 decks, automatically reversing and cleaning in the second direction. The cleaner worked most of the time with the Aiwa AD-M700 and the Teac V-500X. It was most uncooperative with the Nakamichi 582Z, usually dropping out of play after just a second or two of cleaning. With the last three decks, the reservoirs and pads had to be soaked to get a complete cleaning cycle; I judged that the somewhat higher tape drag during use with less fluid actuated the end-of-tape sensors. The results for all of the decks were the same with each of the three cleaning cassettes which I tested.

I found that with some three-head decks, it was important to retract the movable left pad, as expected from the caution in the instructions. There were some problems at the right-side pad because the cleaning tape does not follow a straight path in front of the capstan, but actually cuts across part of the shell opening. When the cleaner did not work on one of the problem decks, I saw that the pad had been pushed in and it looked as if the tape might even have ended up behind the capstan.

On the decks where it worked consistently, the C-911A cleaner did an excellent job of removing all sorts of residue along the tape path. I expect that the device would work well on most car decks, but I recommend a trial to make certain that the cleaning tape makes its full run. To check this, manually rewind the tape to the beginning, saturate the pads, insert the cleaner and put the deck into play. If it is an auto-reversing unit, the change in direction should occur after 15 S. If the deck does not have auto reverse, it should stop after the same period of time. Remove the C-911A and make certain that the cleaning tape travelled its full length.

Intraclean's S-711 head cleaner definitely does the best job of anything I have tried, both in direct use with cotton swabs and with the C-911A in cooperative decks. After my checks, I have concluded that S-711 is the best cleaner to use, where the deck's materials permit it. *Howard A. Roberson*

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The Heat: Nona Hendryx
RCA AFL1-5465, \$8.98.

Sound: B Performance: B

Nona Hendryx stood out as the wild creature in the group Labelle, and on her own she's continued in the same high-intensity vein. Although she hasn't had a huge hit yet, she has established herself as a highly visible personality. With this album, she's aiming for a somewhat wider audience. Nona's always sung well and projected a strong image, but her albums have suffered from weak material and indulgent production. Most of *The Heat* has been produced by Bernard Edwards and Jason Corsaro, with a few cuts done by Arthur Baker. Nona wrote most of the songs on *The Heat* with a bit of help from Ellie Greenwich, Jeff Kent, and Jean Beauvoir.

Much has been made of the fact that Keith Richards plays guitar on one track, and it's a rather amusing contribution. The rock/funk groove is cooking on "Rock This House" when all of a sudden a classic Keith Richards riff—with shades of "Brown Sugar"—chimes in as if the song was written around it. Then this digitally delayed solo blares out a blues feast, and you know that Mr. Richards is having a great time putting his distinctive stamp

Scarecrow: John Cougar Mellencamp
Riva 824 865-1 M-1, \$8.98.

Sound: B Performance: A

As one who has not been critically kind to John Cougar Mellencamp, it is especially satisfying to report what a fine piece of work his *Scarecrow* is. He has been very careful to follow through on all the elements that made his previous outing, *Uh Huh*, one half of a great album. Picking up courage from his own experience and, I dare say, from the success of Bruce Springsteen's *Born in the U.S.A.*, John speaks his mind more freely and pointedly than he ever has before. Even more important, he has shed the snotty-rich-kid image which was the undoing of the weak half of *Uh Huh*.

The cast and crew on *Scarecrow* is the same as last time, as Mellencamp has the same band and, in Don Gehman, the same producer. The album, recorded in Mellencamp's home state of Indiana, away from distractions, has a gritty, raw-boned feel that suits the singer's material well. There is a lot of life to the recorded sound here.

The chief concern of the songs on side one are small-town and rural America, things Mellencamp saw firsthand while growing up. "Small Town" celebrates the peculiar joys of life there, while "Rain on the Scarecrow" is

about small farmers being forced off their land by foreclosures. He sings, "When you take away a man's dignity he can't work his fields and cows." "Minutes to Memories" is one of the best cuts. It is about coming of age and learning to do your best in the face of adversity. I only hope that this song doesn't get co-opted for a U.S. Army ad campaign.

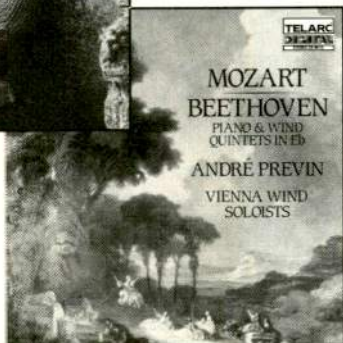
Concerns widen on side two as "R.O.C.K. in the U.S.A." salutes the music John grew up on, and "You've Got to Stand for Somethin'" recapitulates the pivotal events in politics, rock 'n' roll and culture that helped shape the singer/songwriter. "Justice and Independence '85" is a bloated allegory that spins a tale of America corrupting itself. "Between a Laugh and a Tear," featuring guest vocalist Rickie Lee Jones, is about life after paradise has become the real world and childhood has gone. And of course there is the hit single, "Lonely Ol' Night," which quite simply is one splendid song.

The big difference on *Scarecrow* is the strength of conviction John Cougar Mellencamp can muster. He doesn't indulge in dumb songs to fill out the album; his material has muscle. He shows real maturation both as a songwriter and an artist. What I hoped he'd do after *Uh Huh* he has done—and done well.

Michael Tearson

Nona Hendryx





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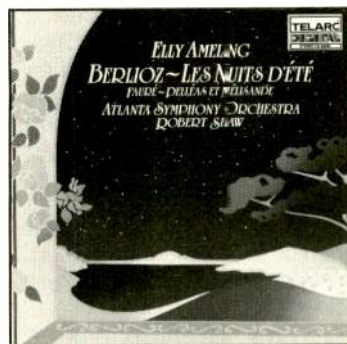
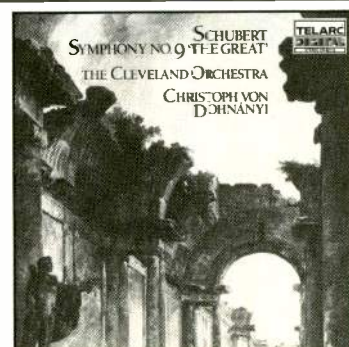
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Eddie Kendrick, John Oates,
Daryl Hall and David Ruffin



on the song. Yeah, the song's pretty good, too, but it's Keith's moment as much as Nona's.

As for the rest of the album, the tracks produced by Edwards work; the ones by Corsaro are okay, though they have been mixed in a way that doesn't really suit the material, and Arthur Baker's production is trendily vacuous, as usual. The multiple-producer method may work for Tina Turner, but in Bernard Edwards, Nona has found a producer who works for her. She should've completed the record with him. Maybe next time.

Jon & Sally Tiven

Daryl Hall & John Oates Live at the Apollo with David Ruffin & Eddie Kendrick

RCA AFL1-7035, \$8.98.

Sound: B Performance: B

One can't really question Hall & Oates' motives in wanting to familiarize the public with their version of Hall's "Everytime You Go Away," but in all fairness, this is one time they should've kept quiet. When Paul Young decided to cover it, he truly made the song his own. Hearing H & O once again, it calls too much attention to the fact that Young not only came up with an interesting arrangement, but his phrasing on the chorus is what made it a number-one hit.

Now let's get to the point of this project, which is not just to release yet another live greatest-hits album (it wouldn't be the first for H & O). The point is that The Temptations' two lead singers (who were idolized by Daryl and John) are now buddies with America's white-soul sweethearts. And what better way to cement a friendship than

to bring up Eddie Kendrick and David Ruffin to render updated versions of their greatest Motown moments?

Sound familiar? What worked with Springsteen/Gary U.S. Bonds and Melencamp/Mitch Ryder can work again for Hall & Oates. Why not? Shouldn't the millionaires of today be responsible, at least to some extent, for maintaining the natural treasures that helped them sharpen their craft? Chances are Ruffin and Kendrick made next to nothing from their hits, and now they'll finally get a shot at collecting a decent royalty. Gestures such as this remind us all that, for some, the music business can be a gentleman's pastime.

As for the music itself, it is inspired but technically far from flawless. Even taking for granted that these are live performances, the amount of bum vocal notes gets embarrassing after a while. You wish that they'd cranked up the Harmonizer in post-production and brought the clinkers up a half-tone. And if this is a farewell package from Hall & Oates (as is the rumor), they could have come up with more exciting tunes. Only on "Adult Education" is there any indication that the band can rock. Daryl and John have put together a hot group, but unfortunately they are afraid to be known for it. They are fearful of a repetition of the first reviews, which glorified the backing musicians more than the front people. Not even a picture of drummer Mickey Curry appears on the package, and this is a bit annoying considering what a star drummer he is (Bryan Adams, Elvis Costello, and Marshall Crenshaw are but a few of the artists he's played for recently).

If Hall & Oates produce a studio al-

Live at the Apollo is inspired but technically far from flawless, with an embarrassing number of bum vocal notes.

bum by Kendrick and Ruffin, as they may, it would be infinitely more interesting than what we have here. This album is okay as a souvenir of their performances, but not a memorable recorded statement per se. They have been capable of making great records, so why not do it again, fellas?

Jon & Sally Tiven

The Power Station

Capitol SJ-12380, \$8.98.

Sound: B Performance: B

For an album from the oft-disappointing supergroup genre (like The Firm, for instance), *The Power Station* delivers the goods, though not consistently. Core members John Taylor and Andy Taylor of Duran Duran have producer Bernard Edwards to thank for the album's share of hits, including "Some Like It Hot," "Murderess," and "Bang a Gong." Although Nile Rodgers is popularly considered the mixer with the golden ears, it was as a creative rhythm section/production team that he and Edwards pioneered a sound and style for their group, Chic, which every pop artist soon wanted for his or her own, it seemed. Edwards deserves mucho kudos for the sound of this record, a powerfully conveyed presentation of a heavy pop band filtered through the Chic sensibility. His golden gloves are largely responsible for the punch of all these songs, which, though minimal as compositions, are squeaky-clean.

Drummer Tony Thompson, or at least his gated snare sound, is the solid foundation (and in the case of the more marginal tunes, the *raison d'être*) of a very drum-oriented LP. Robert Palmer sings well, though he falls a bit



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Bob Marley's children, The Melody Makers, have made one of the best reggae albums I've ever heard. They take up social issues right where Bob left off.

flat as a lyricist, while the axe-playing Andy Taylor sets out to prove that he's learned a Van Halenism or two. Luckily there's a magician at the console (and, if you saw this group's performance on *Saturday Night Live*, you know how pertinent the old fix-it-in-the-mix theory can be). For the brilliance of selected tracks on this album we can only say of Bernard Edwards that no fee's too much for him to ask.

It's quite appropriate that members of Duran Duran, which was primarily a Roxy Music-influenced band, are now working with former members of Chic, also a musical aggregate highly indebted to Bryan Ferry and company. But one wonders if poor Bryan is laboring hard on his new album (recording at the studio for which this group was named), trying to sound more . . . like this?

Jon & Sally Tiven

Play the Game Right: Melody Makers
EMI America ST-17165, \$8.98.

Sound: B- Performance: B+

It was with trepidation that I began listening to the debut album of Bob Marley's children. I figured that the Marley brood, super-rich kids by Ja-

maican standards, must have been perverted by American rock, and removed from the kinds of daily experience that annealed Bob Marley into a firebrand of social justice. I expected some kind of nightmarish, bubble-gum reggae, especially after seeing that the back cover of the album was printed with a board game.

After hearing the first few songs, my doubt gave way to amazement: *Play the Game Right* is one of the best reggae albums I've ever heard. The songs, aided and abetted by some of reggae's top sidemen, including Earl Chinna Smith and Sly Dunbar, cover the bases of reggae styles. There's the gospel-rooted "Revelation"; the up-tempo "Reggae Is Now," with a stop-and-go horn break that would make Stevie Wonder proud; the tastefully modulating title track, and one of Bob Marley's songs, "Children Playing in the Streets," which features a poignantly placed a cappella choir. The backup vocals, performed by young Cedella, Sharon and Stephen Marley, owe a lot to the I-Threes and have the same effect—angelic smoothness that's like a sheer curtain fluttering within a solid but sinuous framework.



Mitch Ryder

Bob Marley certainly made some concessions to Anglo-pop, and The Melody Makers, with their crack arrangers, make many of the same ones. There's the expanded role of guitar, which is given bluesy leads along with rhythm duties. Hooks are given as much attention as grooves, and they're accentuated with various keyboards. The band uses a lot of synthesizers but is careful to keep them atmospheric. As with all great reggae, nothing contends with the rhythm section; lead singer/songwriter Ziggy Marley's voice is an urgent counterpoint to the rhythmic roots.

As a lyricist, Ziggy takes up with social issues exactly where Bob left off, focusing on basic social problems with one eye on those responsible and the other eye fixed firmly on a heavenly vision of peaceful justice. The board game, as it turns out, is like *Revelation Parcheesi*, with goals labelled Ethiopia, Jerusalem, Babylon and Zion. Its true point, and that of the album, is expressed by Ziggy in the title track, where he insists that "this time we're not playing for a trophy, we're playing for a life . . . We've got to play this game right."

Susan Borey



The Melody Makers

On *Like a Rolling Stone*, Mitch Ryder sings up a storm. He deserves credit for shining up an old chestnut with great style.

Like a Rolling Stone: Mitch Ryder
Personal P49820, EP, \$6.98.

Sound: B Performance: A

Ever heard that a good song could be covered any number of ways by any sort of artist, as long as that composition was a sound one? Mitch Ryder seems to be out to prove that publisher's maxim with his current EP version of the Bob Dylan tune, "Like a Rolling Stone." Not that his rendition owes much to the original. Only the lyrics escape adaptation, and it's quite possible that the song's identity could escape the first-time listener who would naturally be caught up in this version's awesome groove.

Imagine James Brown doing this song and you'd get the drift of Ryder's dance extravaganza. With state-of-the-art sound courtesy of producer Don Was, a rhythm track that would do dance-rock *Wunderkind* Nile Rodgers proud, and heaps of punctuating R&B guitar riffs that sound straight from the chitlins circuit, this is the most inspired arrangement and production to come across our turntable in months. Ryder as usual sings up a storm and should be credited for shining up an old chestnut with great style.

Jon & Sally Tiven

Greatest Hits: Billy Joel
Columbia C2 40121, two-record set.

Sound: B Presentation: A

This retrospective is a reminder of several things. First, it shows just how consistently good a songsmith and performer Billy Joel has been for the last 12 years. It shows how very fine a producer Phil Ramone is, too, and how much Billy has benefited from their collaboration. Ramone's hallmark is excellent, technically meticulous sound, and it's evident here.

Two new songs are included on the album, in order to generate some new hits, I suppose. "You're Only Human (Second Wind)" addresses the tragedy of teenage suicide, and "The Night Is Still Young" is an autobiographical reflection.

This is an excellent hits package. Just one consumer alert: The CD version offers a bonus, as it increases the song count from 21 to 25.

Michael Tearson

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The Rhythm shows Stewart Copeland's skill with atmospheric sound, as he links Western rock with African tribal music.

The Rhythmist: Stewart Copeland
A&M SP 5084, \$8.98.

Sound: B Performance: B

Documenting the primal rhythmic secrets of African tribes must have been thrilling for Stewart Copeland, who helped push an extended range of acceptable rock rhythms into the pop mainstream. The purpose of his pilgrimage, charted on this album, was to discover patterns of rhythm—from the cycle of life he observed on the Serengeti plains to the modern African pop form known as lingala—and to link them with his own Western sensibility to show the universality of the Beat.

To the recorded drumming and chants of the tribes, Copeland says he "couldn't help but add some drums of my own, and a little electric guitar." His additions also include sundry keyboards, percussion, and computer-generated sounds. But the marks of high technology are invisible here; most of the instruments were recorded dryly, without effects.

This album, also a soundtrack, shows Copeland's skill with atmospheric soundscapes. He draws from an extensive range of notes, blending the brittle high end of cymbals with very low, near-subsonic bass or synthesizer tones, especially on "Brazzaville," which opens with tribal chanting and lumbers off into one of several lingala collaborations with Ray Lema, a musician from Zaire. On "Kemba," Copeland uses the lingala form to stretch his reggae sense a few steps further; amidst typical calypso keyboard rhythms, he punches up and around the beat to produce an even more sprightly, insistent pattern.

To cement his linkage of Western

rock and African tribal music, Copeland neatly dovetails the two forms in a few songs. In "Gong Rock," the call and response of tribal voices sets the pace and forms the song's core, which is built upon by a loping lead guitar.

It's amazing how Copeland can turn virtually anything into an instrument of rhythm. In his hands, voices, synthesizers, strings and birdsong all reinforce the pulse. Even his articulate acoustic guitar sound is percussive, with no sustain leaking through. He demonstrates how rhythm can usurp the role of melody on songs such as "Coco," where the shifting balance of patterns set forth by the players' dynamics catches the listener's attention much more than variations in pitch.

Although the recording is quite clear and cohesive, perhaps the greatest compliment that can be paid to the composer/player/producer has nothing to do with technical acumen. It's often impossible to distinguish Copeland's drumming from that of the African tribesmen, which means that his understanding of these rhythmic roots goes beyond what was captured by his tape recorder.

Susan Borey

No Lookin' Back: Michael McDonald
Warner Bros. 25291-1, \$8.98.

Sound: B Performance: B

Every one of The Doobie Brothers' songs I like was written by Michael McDonald and sung in that sexy, honey-and-smoke voice of his. After The Doobies broke up, Michael did well with his first solo album, *I Keep Forgetting*, although it left me cold.

No Lookin' Back, his second effort, does more for me. Produced by McDonald and Ted Templeman (who pro-

duced The Doobies from the beginning), it has a *big* sound with a hot mastering job that really hits hard. Nearly any record that follows *No Lookin' Back* onto my turntable sounds puny by comparison. The tracks have a lot in them, adding up to a full, sophisticated sound. They get better the louder you play them.

The album starts with the title track, a hard-charging, aching song that immediately charmed me. While nothing else quite matches the lead-off's urgency, other songs have other kinds of appeal. This is one classy album, with solid songwriting buttressed with excellent instrumental support, especially from the exemplary rhythm section of Jeff Porcaro and Willie Weeks. From the hard charge of "No Lookin' Back" to the sweeter, softer touch of "Any Foolish Thing" and "Our Love," they are the base upon which the album's sound is built.

This album figures to wear well over time; it's the kind you like more and more as you get to know it. Class acts work that way.

Michael Tearson

A Secret Wish: Propaganda
ZTT/Island 90288-1, \$8.98.

Sound: B Performance: A

Intellectualism is a risky enough stunt without trying to put it onto vinyl. But these crazy guys 'n' gals of Propaganda—so serious! So Hegelian! So ... so ... melodic and lyrical. You at home shouldn't attempt this on your own; these folks are professionals. So much so that by the time you finish listening to *A Secret Wish*, you'll be humming the dialectic.



Now obviously, very few bands are adept at turning a thesis into an antithesis and letting you savor the synthesis, not to mention the synthesizer. Even more amazing is that this German quartet (stable-mates of Frankie Goes to Hollywood on impresario Trevor Horn's ZTT label) makes its American debut LP so accessible. Synthesizers and drum machines predominate, but they don't overwhelm. This means that voices, blues saxophones and some serious trumpets splash all the more forcefully, and producer Steve Lipson scrapes and shapes all these layers into what seems like a brooding metallic sculpture.

"Jewel," for instance, is that no-no of popular music, an instrumental—and one with a seemingly found-sound, industrial-noise melody line, at that. Yet that line is so captivating and the choice of sounds so appropriate, you don't even notice "Jewel" is wordless until it's over. When Propaganda does turn its collective hand toward lyrics, it draws blood with something between a stab and a probe. "Dr. Mabuse" reincarnates that German cinematic villain as a metaphor for what women's groups sometimes call "the allure of the rat." "P-Machinery" begins with futuristic steel-town noises before ascending into a robotic world that recalls lie-detector tests, personal-data warehouses, urine checks—not in the future, we suddenly realize, but all around us now, here, today.

This concern with present realities separates Propaganda from other, far more science-fictiony high-tech bands like The Alan Parsons Project. Propaganda is closer to a European Talking Heads, neither warning nor predicting but simply observing and metaphorically commenting. Yet the effect is almost undercut by the philosophical ramblings printed on the album sleeve. Not only did some of them show up previously on a Frankie album cover, but ask yourself: Who takes his philosophy from a record jacket?

Propaganda seems strong enough to overcome such posing, though I can't see *A Secret Wish* cracking AM radio. Just as well. The album's sonic depth turns its nose at the midrange, and its lyrical and musical depth turns its heel on the middle-brow.

Frank Lovece



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EDWARD TATNALL CANBY

LOST & FOUND SOUND

Brahms: Clarinet Quintet, Op. 115; Mozart: Clarinet Quintet Fragment, K.91/516c. The Sequoia String Quartet; Michele Zukovsky, clarinet.
Nonesuch 79105, digital, \$11.98.

The *big* news on this record, for all Mozart fans, is the unpretentious inclusion, at the end of side two, of the first movement of *another* Mozart clarinet quintet, out of his very late period; this now joins the incomparable music of the "Quintet in A for Clarinet and Strings," K.581, and the equally memorable "Concerto in A for Clarinet," K.622. This fragment is like many an unfinished work, complete up to the development, the beginning of the second half. The music has been completed, admirably and faultlessly, by Robert D. Levin. This was possible because most of the necessary material was already there, by the very nature of the Mozart-period musical construction, the "sonata form" that dominates much of the music of that time and later.

The musician who finishes the job, of course, must be consummate in his hearing of the Mozart idiom, not merely the style (as in too many supermarket Mozart imitations!) but the exacting means of construction, the keys and the sequence of ideas, the use of the instruments. Astonishingly, Mr. Levin did this work as part of his undergraduate music thesis at Harvard. Talent, even genius, flourishes at all ages and in all specialties!

What Mr. Levin had to do came in two parts. He had to write a development section, the central moving-key portion of the structure, not long but furnishing contrast for the return to the beginning. Then he had to reorder the opening (exposition) section so that the second idea comes not in the dominant key, F, but in the "home" key of B flat. Not really difficult for the mind that hears that kind of music. In this case, Mozart wrote out three measures of the development on the last existing page (more may have been lost), indicating exactly what idea he was going to use subsequently, before returning to the opening key. Thus, the gist of Mr. Levin's work was already in hand—again, for the ear that can understand. His development is perhaps a bit Beethovenish in the sequence of keys, but



Mozart was often Beethoven-like (without knowing it, of course) in his last period—rather, Beethoven was Mozart-like in the following years. Both men followed the august precedent of Franz Joseph Haydn.

This "new" Mozart, then, can be taken as 99% the real thing. Those few who may carp are merely jealous, I'd say. As the somewhat ponderous musicological evidence now suggests, it is evidently later music than even Alfred Einstein, the re-evaluator of the Mozart catalog back in the '30s, decided when he assigned it the new K.516c. Anyone with a Mozart ear will know it in a moment. This is from those priceless last months of Mozart's life, along with *The Magic Flute*, the Masonic music, the music for mechanical clock, and more.

Michele Zukovsky is a warm and human clarinetist, neither too "romantic" nor of the hard and squealy school often heard today. She presides at the Los Angeles Philharmonic, plays plenty of modern music, and clearly understands the classics, too. The Sequoia String Quartet is similar. In the Mozart, the first violin is occasionally a bit wavery, sort of fading in and out, but it doesn't seem to matter.

Brahms? Well, of course! It is the main part of this recording and a major new addition to a celebrated recorded repertory going back to the earliest

years of our business. This, too, is the essential, very late work of a master, since (curiously) Brahms, too, discovered a favorite clarinetist in his last years and composed a burst of music for him, just as Mozart did. The near-impressionism of this work—as near as Brahms could come to that French idiom—is not emphasized by these players; it is more matter-of-fact, less morbid. No criticism! There is room for a warm, relaxed, less frowning interpretation. I liked it.

This is no speaker-buster disc. But for those who want both splendid music and splendid engineering, tops in both fields, this is it. Digital—and let us hope it will be out in CD soon.

Lukas Foss Baroque Variations: Music of Bach, Scarlatti, Handel. The Buffalo Philharmonic conducted by Lukas Foss; Baroque ensemble conducted by Joshua Rifkin; John Finney, organ; Sergiu Luca, violin; John Gibbons, harpsichord.
Nonesuch 71416, \$5.98.

This is a rebottling of a wonderfully fizzy 1960s extravaganza, out of the well-remembered times of Happenings, Woodstock, sing-ins—don't think that pop music was all of it! Mod classics were just as wild and zany, from John Cage & Co. to Lukas Foss. It may seem distant already, but that was a

time of real breaking away in every area. Even the normally stodgy pro musicians concocted a name for it—aleatoric. A professorial way of saying that you made it up as you went along; what happened was (maybe) pure chance. The “pure chance” in this Foss music looms mightily, but it is very well calculated, let me tell you. The performance, of course, is unique—it could never be done quite the same again. Hence this reissue of the only “score,” the actual sound of that performance! Odd role for the art of recording, at least among the supposed classics.

Foss takes three well-known Baroque pieces, fortuitously by the three 1985 300th-birthday composers (why else reissue the recording?), and plays 1960 games. He “erases” much of the Handel, writing out small notes which the players are to bow but *not actually* play—except here and there, faintly. He adds weird echoes of the music in the typical mod sounds, including chimes, as well as macabre dissonances. Yet throughout, if one knows that Handel piece, it can be heard, in and out—as though doors were being opened and closed in a large recording studio, emitting familiar bits of sound, mixed with other bits at random. Could anything be more typical of our century? Or, if you wish, imagine the haphazard turning-up and turning-down of volume controls on the components in a large hi-fi store.

Then there is Bach’s familiar “E Major Prelude” for solo violin, and its reincarnation by the old composer as an orchestral intro, with organ, to a large-scale cantata, complete with trumpets and drums. Old Bach could turn anything into anything else (so why shouldn’t we?). The “Prelude” gets a marvelously complicated Foss treatment. Fragments of the Bach are flung around in the wildest, zaniest confusion and yet the old piece is always audible somehow or other. This is the ending segment; it could be a sequel to Ravel’s “Bolero.” But here the conductor (and composer, of course) points at random, aleatorically, to this group of players and that, who read bits off a “Bach sheet”—no score. It is beautifully calculated for a sense of ordered total destruction! What else, in our times?



WHERE EVER WE LOOK in Jack Daniel’s Hollow, there’s a bit of Christmas in the air.

Jack Bateman (he’s the boss of our rickyard) is getting a nice gift from two of his barrelmen friends. And if we know Mr. Bateman, he’s got a gift for them somewhere close at hand. It’s just another sign that the Christmas spirit has arrived. And, no matter where you live, we hope you’ve got it, too.



This recent work from William Schuman is more uncompromisingly complex and dense than ever, very dissonant and full of dry, academic syncopation.



George Crumb: A Haunted Landscape; William Schuman: Three Colloquies for Horn and Orchestra. The New York Philharmonic, Arthur Weisberg and Zubin Mehta.
New World NW 326, digital, \$9.98.

New World is no small label, though it is of the sort that depends on grants from all over. This company is very much in the Lincoln Center and Juilliard league, the high-prestige Performing Arts milieu, and it already has some hundreds of releases, a large part of them in the nonclassical "Americana" area. You will note the participation not only of the New York Philharmonic but of its present conductor, Zubin Mehta; also note the fact that William Schuman has been president of both Lincoln Center and Juilliard. So—as an audio person you can take it or leave it.

I suggest you take it, if only for the George Crumb, on side one. This composer is a well-known sonic radical of

Between these Handel and Bach mayhems comes a gentle Scarlatti sonata for harpsichord, heard offstage, which the annotations fail to say is the "Cortège" sonata once made famous by Wanda Landowska, the first harpsichordist of modern times. I was brought up on the glories of that processional music, and still own a (cracked) 78-rpm Landowska recording made in Paris. Lukas Foss understands and is affectionate, for all the tomfoolery going on. I loved it. The faint tingle of the original music off-stage is a marvelous effect.

Alas, Nonesuch's bright thought in this reissue was to devote side two to the original music—Bach (two versions), Scarlatti, and Handel. A fine idea, but the result is a shambles, a ghastly mismatching. The Bach cantata opening is played outrageously fast in a ham-fisted, bang-bang manner under conductor Joshua Rifkin, but the violin solo by Sergiu Luca is poetically Romantic. You will scarcely recognize

it as the same music. Harpsichordist John Gibbons' Scarlatti is also poetic, seeming to deny the "Cortège" idea entirely, though a valid performance on its own. And the gentle Handel is played in a series of shapeless waves, minus melodic line, by Rifkin's Baroque ensemble.

It should be noted that these recordings, spread out from 1967 to 1985, are remarkably equal in sonic quality, the best perhaps being the earliest, the Foss variations. That shows where the industry has been these last years, digital or no.

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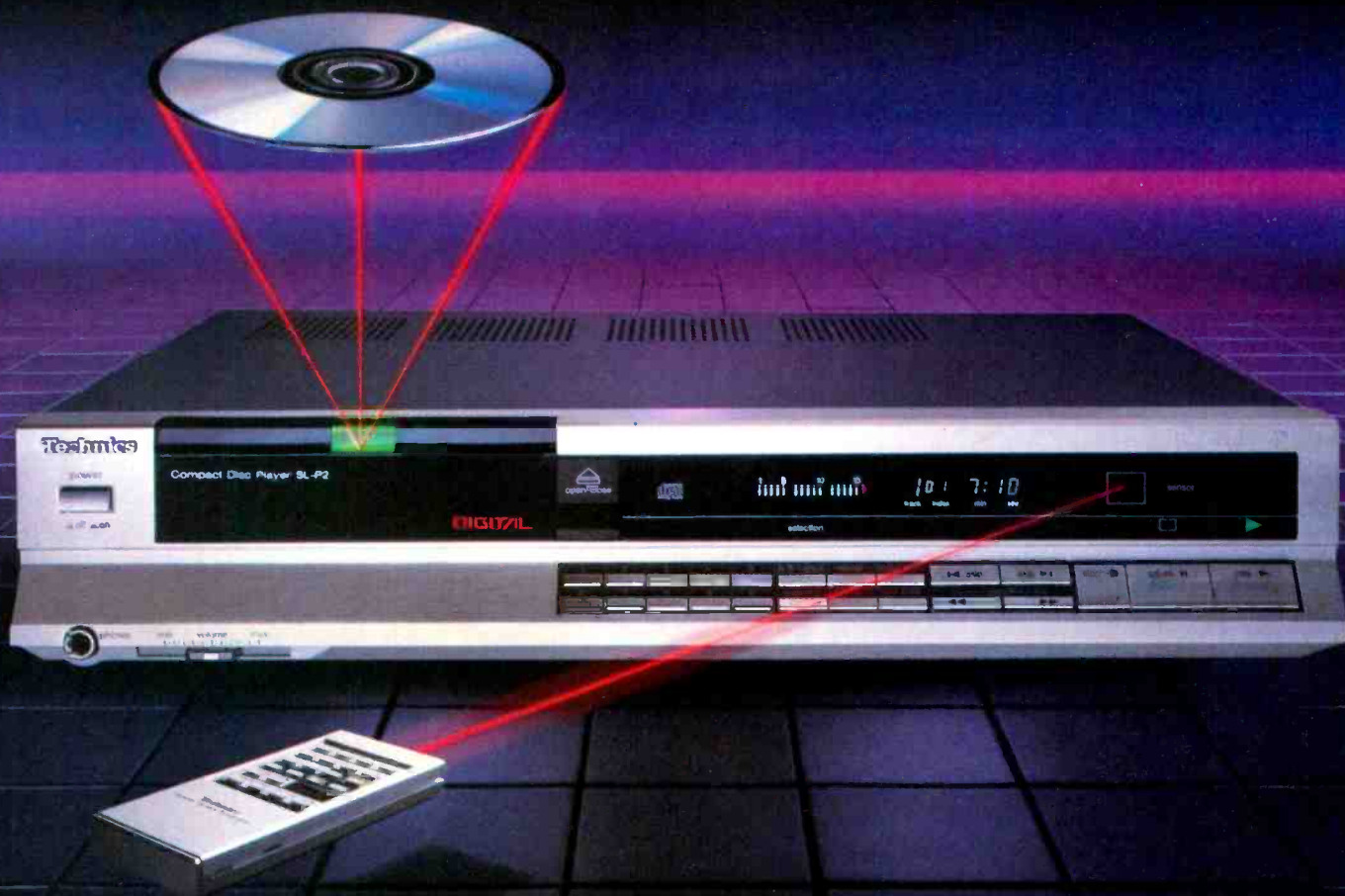
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George Crumb's wispy traces are stunningly contrasted with sounds that explode like cannons. Phew! What a recording.

the provocative sort—what a man for sounds! And they are beautifully recorded here. Now George, one of your tricks here is *really* provoking to any audio fan! Outrageous, indeed. *What* is that faint sound I keep hearing all the way through? Don't tell me—my hi-fi is acting up again? Worse, is it possible that New World's engineering has slipped? A 60-cycle hum? From start to finish.

You know what it is? This devil composer has set up two acoustic double-bass players who alternate and overlap, first one and then another, to *deliberately* produce a continuous 60-cycle tone throughout this piece. Howzat? Haven't I always said that "classical" music was bound to borrow, sooner or later, from the new electronics? Well, there's nothing like starting at the bottom.

Actually, there is much more, and to interesting effect. Crumb's idiom here borrows a lot from old Edgar Varèse, but Crumb tends toward very faint

sounds. I have never heard fainter than here (on an absolute acoustic scale, of course), but these wispy traces are stunningly contrasted with sounds that explode like cannons—they'll blow your audio mind and perhaps your speakers, too. Phew! What a recording job. Only digital, I expect, could have done it quite so faultlessly. I found this all-acoustic piece remarkably interesting in recorded form, though apparently that was not the thought; it is a concert piece. I liked the expert but fairly simple and open organization, and I was fascinated by the extremely faint sounds, so nicely audible—even via a (very quiet) LP—and neatly located at various distances in space. George Crumb may write "live"; nevertheless, he has the ear for our kind of sound.

William Schuman has always been what you might call a musical achiever and long ago achieved just about everything, as a composer and a big-time administrator. Frankly, I have never found his earlier music easy to listen

to. It is enormously competent in every technical sense but somehow chilly and academic—10 symphonies, for instance. But in this mature and recent work—the man is 76—could there be a skillful mellowing? It often happens.

If so, I do not hear it. This music is more uncompromisingly complex and dense than ever, extremely dissonant (though ending on a near-platitudinous batch of plain old chords) and full of the same dry, jazzy, academic syncopation that has dominated so much professional composing hereabouts. Not necessarily a criticism, I'll admit. Those who approve of such music will not find it lacking, but I couldn't keep my mind on it. Lincoln Center elite, that's what I heard.

Moreover, there is in this music absolutely no hint of other than straight concert-hall composing. *Recorded* music? What's that? As usual, the engineers have done nobly to transfer that sound to these grooves. But the George Crumb transfers a lot better.

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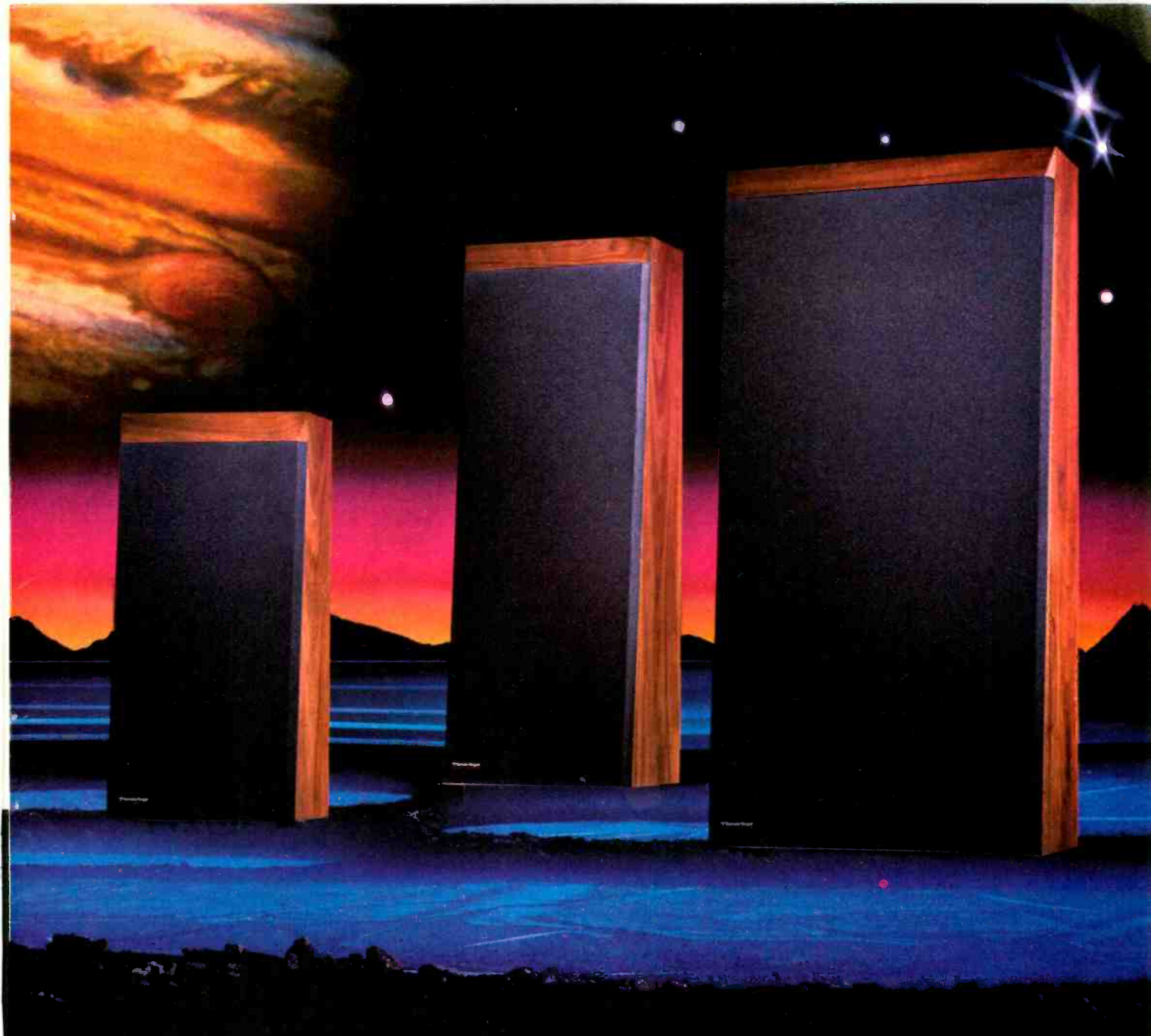
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ELECTRONIC TONICS

Structures from Silence: Steve Roach

Fortuna Records FOR-LP024. (Available from Fortuna Records, Box 1116, Novato, Cal. 94948.)

Sound: B Performance: A-

M'Ocean: Michael Stearns

Sonic Atmospheres 109. (Available from Sonic Atmospheres, 14755 Ventura Blvd., Suite 1776, Sherman Oaks, Cal. 91403.)

Sound: B Performance: A

Mosaic: Richard Burmer

Fortuna Records FOR-LP025.

Sound: B Performance: A+

There was a time when most creative electronic music was coming out of Europe. Tangerine Dream, Klaus Schulze, Jean-Michel Jarre, and Vangelis seemed like emissaries from another world of sound. Their synthesized excursions often fell under the rubric of "space" music because of their electronic instruments and science-fiction imagery.

Now in the 1980s we have a surge of electronic music in the United States. Here it oscillates under the banner of New Age music, but the same elements are present: Lengthy compositions, sequencer-derived ostinato rhythms, new sounds, and cosmic themes. There are hundreds of New Age artists and thousands of their recordings. Just breaking the water's surface are California musicians Steve Roach, Michael Stearns and Richard Burmer, who are united in an aesthetic that brings warmth and expression to synthesized keyboards.

Steve Roach's *Structures from Silence* is like riding the perfect wave in slow motion. Though his last album, *Traveler*, was a high-energy, sequencer-rhythm foray, *Structures* operates on a more meditative level. The side-long title piece has the lumbering movement of the earth's rotation as Roach builds a methodically directed, inward spiral of sweeping chords. His "Reflections in Suspension" is a heroic threnody. As if sculpting liquid, Roach carefully shapes his sounds into a stately crescendo for an eternal dawn.

Michael Stearns also operates on the panoramic scale of Roach, but with more sonic detail. His music has ma-



Michael Stearns

tured immeasurably since his 1977 LP debut, *Ancient Leaves*. That record's monochromatic drones and added natural sounds only hinted at the depth of his more recent work.

M'Ocean (as in "motion") was originally released as the cassette *Lightplay*, but it's been digitally remixed and mastered for CD and LP on the audiophile Sonic Atmospheres label. It accentuates the depth of "Marriage Chords," composed for Stearns' own wedding and a long way from "Here Comes the Bride." Rather than a walk down the aisle, this sounds like a step off the edge of the world. Based on a simple, four-chord progression, it grows in intensity with sympathetic overtones, synthesized cascades and grumbling eruptions. It's a harrowing yet ennobling performance.

Both Roach and Stearns seem to slow down time. Their music evolves rather than changes. The pristine cycles of Stearns' "Lightplay," the Möbius strip patterns of "Fireflies Delight," and the symmetry of "M'Ocean" have within their layers subtle variations and audio treats.

Richard Burmer, on the other hand, compresses time, filling each moment with a carnival of sights and sounds. His LP, *Mosaic*, is one of the most impressively conceived debuts I've ever heard.

Mosaic is subtitled "Electronic Vignettes," a phrase that gives no indication of the broad scope of Burmer's music. True, he doesn't work in the extended forms of Roach and Stearns, but rather compacts it all into a briefer time span. These aren't vignettes, they're miniature symphonies.

In "Physics," Burmer creates a mandala of metallic cycles that suddenly explodes in a rush of whispering voices and thudding bass chords. Just as suddenly, it returns to the peace of the mandala as if the chaos was only a brief rupture in time.

Burmer is a master of modern synthesizer technology, including the deft use of the Emulator, an instrument that digitally records natural sounds so that marimbas, percussion, and flutes all emerge from his keyboard. On "The Hill" he takes an uncanny flute solo that's filled with nuance. The spacious dynamic range of the recording presents a contrast between the Emulator's natural flutes and the smoky flute choirs of the hoary Mellotron.

On "The Serum" he pulls out all the stops. An explosion and screaming voices send you careening on a roller coaster of voodoo electronic rhythms and clanking melody. Arabic flutes twist in the background while voices whisper in your ears. There is another explosion, then peace and the calm of

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Al Di Meola's undeniably masterful guitar technique makes *Cielo e Terra* a very satisfying album.

a pulsing rhythm and sustained strings. Voices weep as in the aftermath of a disaster. But hold on, because another explosion sends you off on a stalking sequencer line with Dennis Baglama wailing an avenging saxophone solo.

So much New Age music mistakes harmony and atmosphere for meditation and substance, but Burmer is not afraid to bring some aggression into his tone poems. "The Serum" is cathartic, yet it makes the quiet calm of "Winter on the Wind" and "Under Shaded Water" all the more soothing. The element that sets all of these artists apart is a maturity of vision and experience that goes beyond the wide-eyed wonder and rhetorical pabulum marring so much of the New Age. Steve Roach, Michael Stearns, and Richard Burmer are creating the instrumental soundtracks of an era. *John Diliberto*

Unaccountable Effect: Liz Story
Windham Hill WH-1034, digital, \$9.98.

Sound: B Performance: A

The second Windham Hill album of Liz Story's piano music is a wonderful piece of work. Her compositions and performances radiate a warm friendliness, and the selections become old friends quickly. As on *Solid Colors*, her excellent debut album, her music is for solo piano, but there are two deviations. At the album's open, Mark Isham adds airy synthesizer effects to the title track, and on the finale, "Deeper Reasons," Story and Bob Conti add percussion.

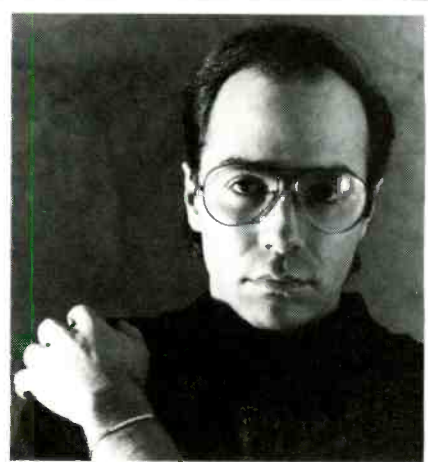
The sound is as excellent as Windham Hill sound almost invariably is. All solo pieces were recorded direct to digital two-track; the other two were done on digital multi-track and mixed to digital two-track. Though digital recording has been known to give piano a brittle, almost metallic sound, the piano sound here is naturally wooden and resonant.

Unaccountable Effect is one lovely album. *Michael Tearson*

Cielo e Terra: Al Di Meola
Manhattan ST-53002, \$8.98.

Sound: B Performance: A

Al Di Meola's first album for EMI's new Manhattan label, his first new re-



cord at all in two years, still displays his flying fingers, but the music is quite different from the flashing fusion that his name brings to mind.

Cielo e Terra is a quiet, reflective album, definitely a change of pace for the veteran of Chick Corea's best edition of Return to Forever. Here he plays acoustic guitars and Synclavier guitar, upon which he synthesizes the album's voice effects. Of the nine selections, four are solos, two are duets with himself (via overdubbing), and the others feature Di Meola on his various guitars with Airoto Moreira supplying percussive effects. It is true that Di Meola's technical mastery receives its share of display space, but what really endears the album to me is how much heart Di Meola has been able to invest in the music. This is most evident in the silences. Playing fast is one thing; it always works as a crowd pleaser. However, to be effective when playing slowly, you must play from the heart, and Di Meola shows more of that than he ever has before. The cover photo of desert, rocks, and sky is a perfect indication of the coloring of the music found inside.

Coproducer/engineer David Baker has done a wonderful job on *Cielo e Terra*. The sound is luminous and warm, and his miking has brought out the richness of the classical guitars which Al is using.

Al Di Meola's guitar technique, always undeniably masterful, wedded to soulful playing and lovely sound, has made this a very satisfying album, one that I expect to play a lot.

Michael Tearson

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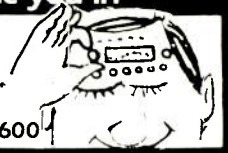
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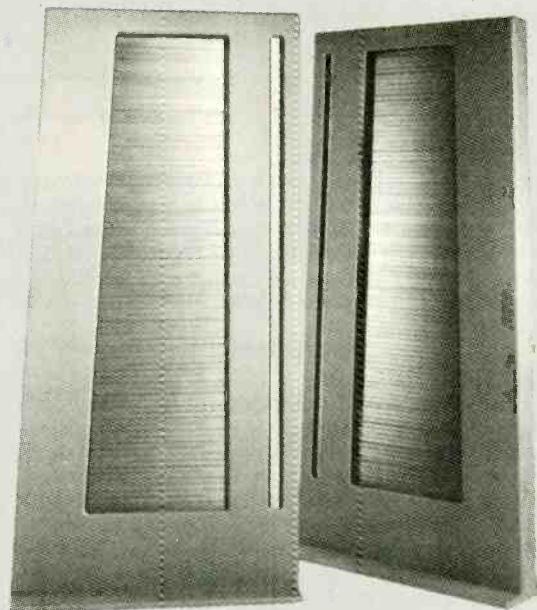
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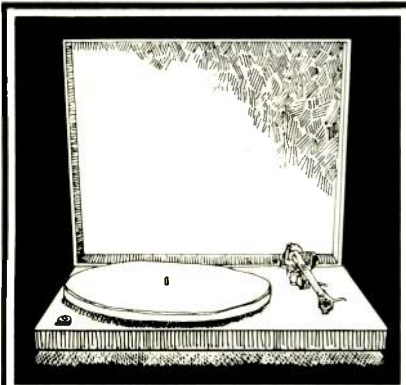
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The Absolute Sound, No. 34 (Summer '84)

Issue 39 Is Out

The second American audio revolution: Transparency (HP reports) . . . Special Digital Supplement: The lowdown on CD players, why they are so bad and what the new generation of High End players will do to make them better; the strengths and weaknesses of digital sound; finally, an explanation of digital you can understand, one that tells you why it can really be better than analogue and why, for now, it isn't; the economics of digital and how the big boys are using it to eliminate the small companies that still make good-sounding recordings. . . J. Gordon Holt reviews *Church Windows*; Tom Miiller reviews arms, including the dazzling Eminent Technology II; the high tech Luminescence preamp; a showdown between the highly touted Meridian and Mission CD players; the classic Mercury Living Presences and so much more that we can't fit into this ad.

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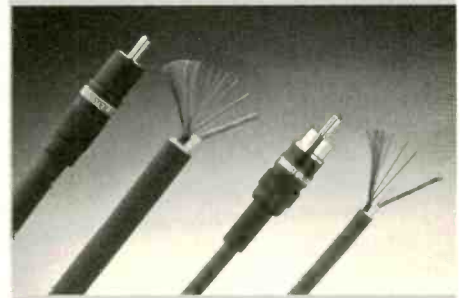
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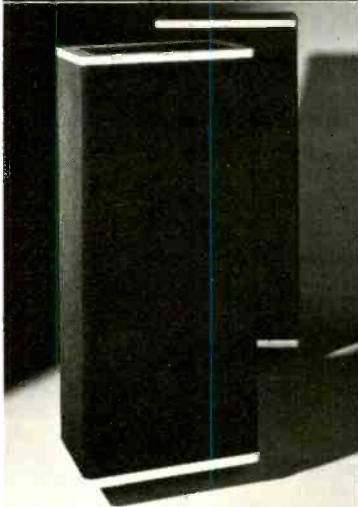
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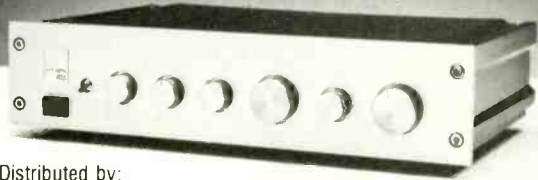
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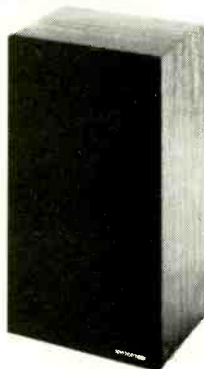
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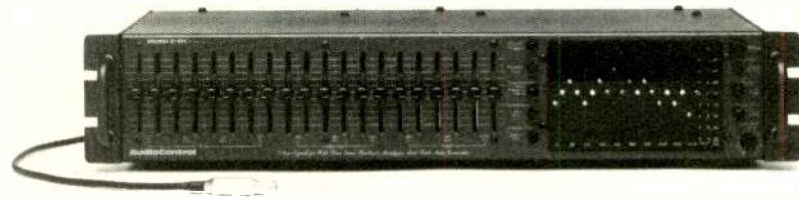
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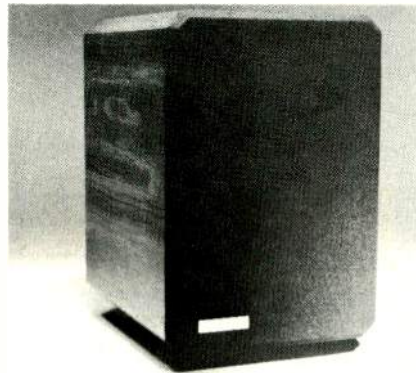
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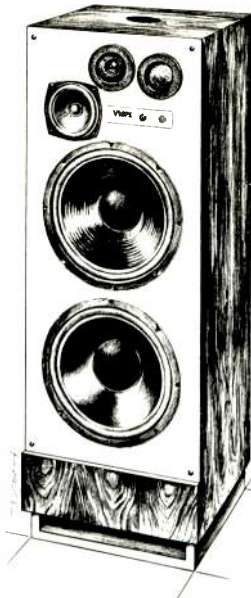
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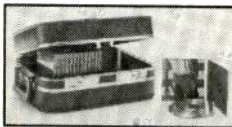
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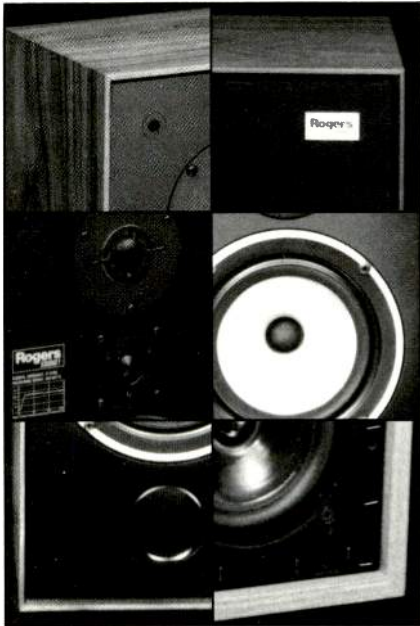
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