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ADS CD3
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SUPERIOR SONICS
AND MECHANICS

CASSETTE QUALITY:
WHAT IS THE INDUSTRY DOING?

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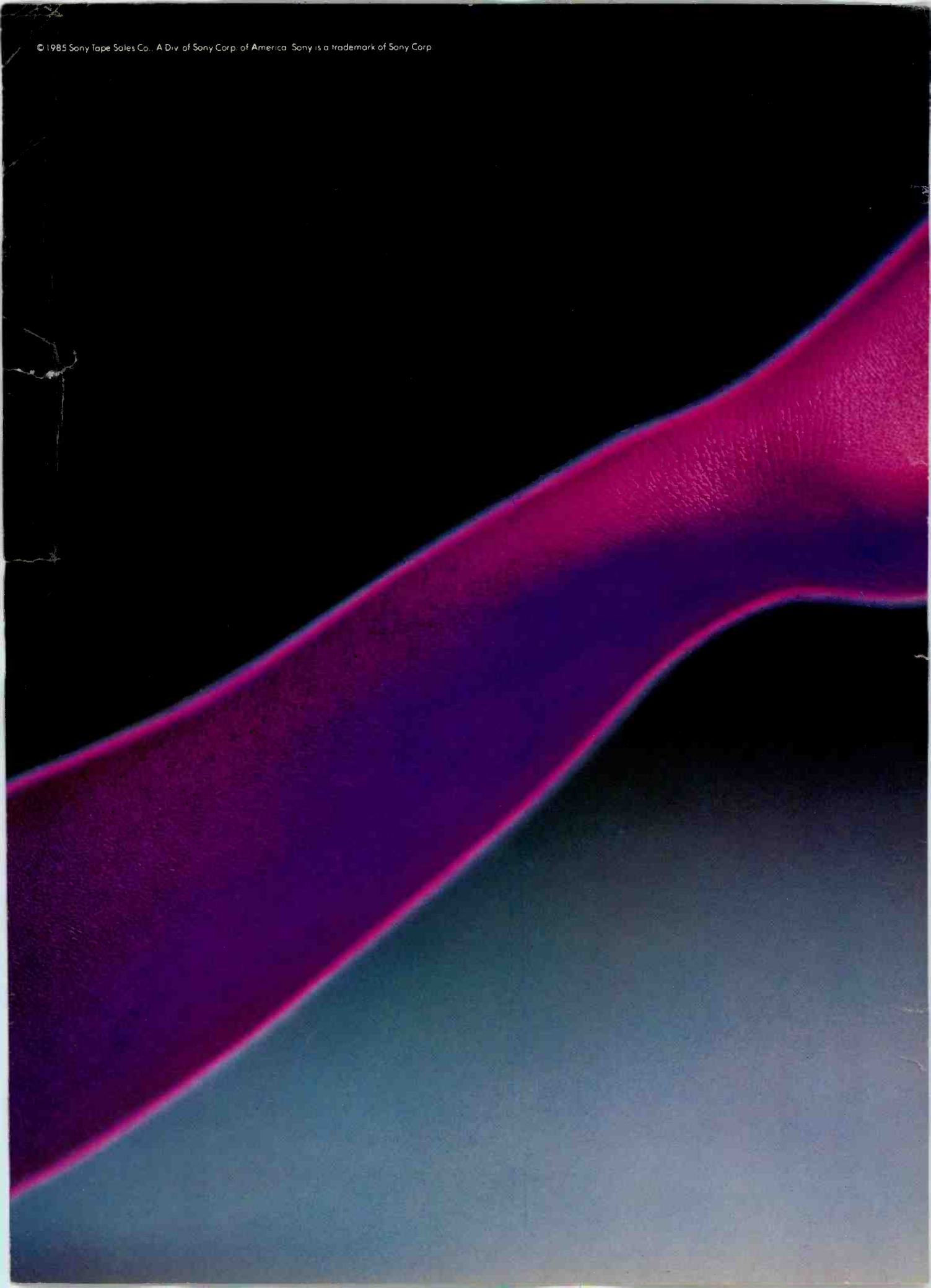
QUAD ESL-63 SPEAKER
AKAI GX-R99 CASSETTE DECK



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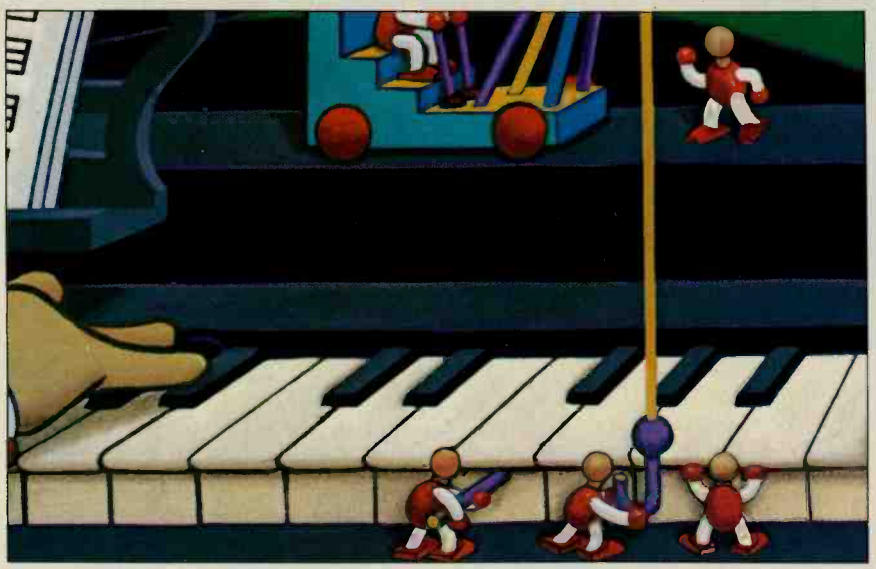

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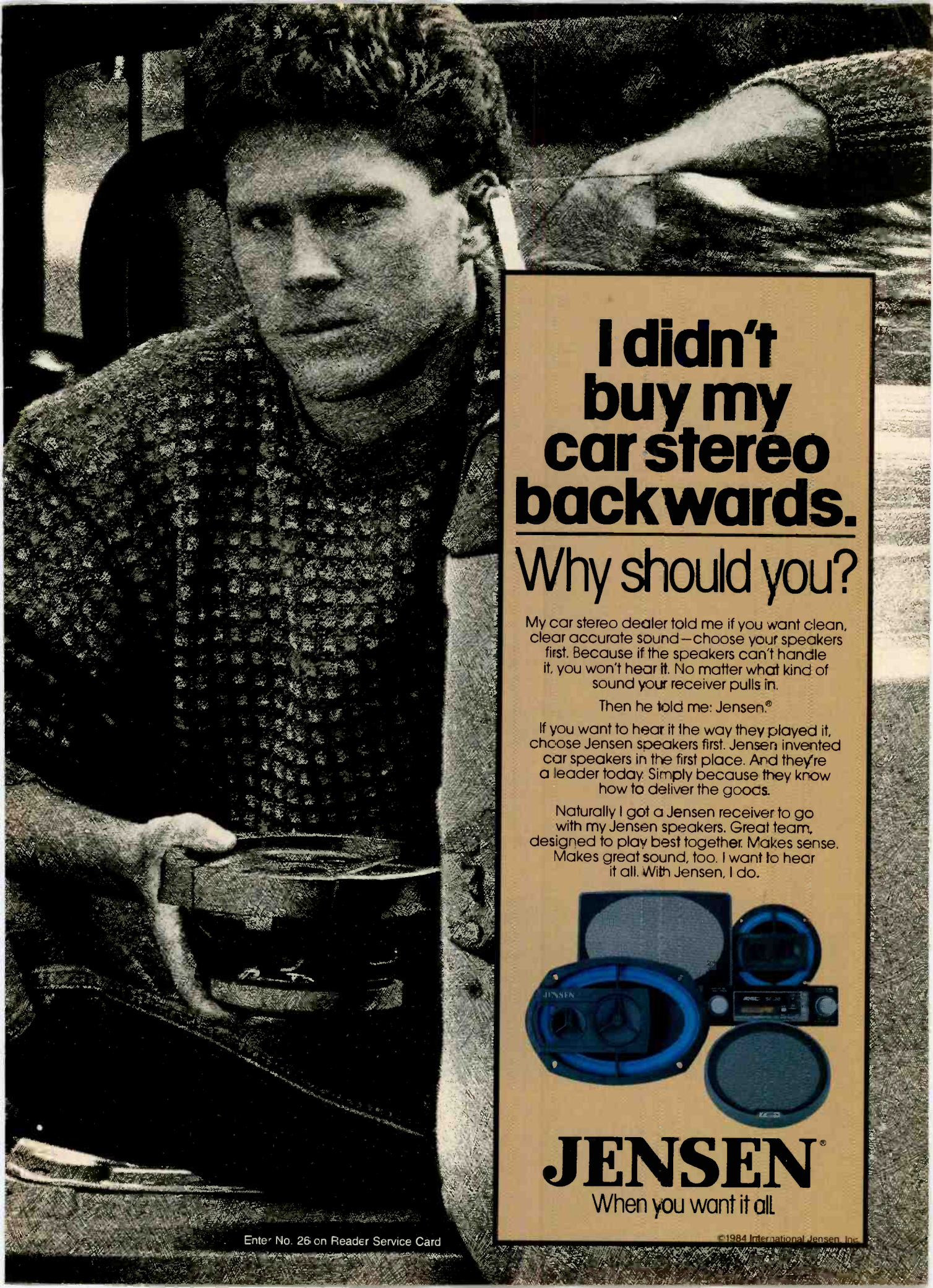

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TDK 50 YEARS OF GOLDEN ACHIEVEMENTS

TDK's Working Guide to Better Audio Recording

Introduction Many guides to magnetic tape recording prepared by recording tape manufacturers concern themselves with how fascinating and difficult tape is to make.

Somehow, though, there never seems to be enough time to share this "hands on" part of their expertise with the rest of the world. Consequently, TDK Electronics has decided to make this guide a little different from the rest. Of course, it explores the history of tape and the products that TDK manufactures, which we believe best demonstrate what tape recording products are about today. But TDK's "Working Guide to Better Recording" also probes the day-

to-day experience of living with tape and using it to its fullest potential. Some of the information our guide imparts may already be known to you, and some of its advice may come as something of a surprise. In either case, it demonstrates that TDK considers recording tape not just a product to be sold, but an experience to be enjoyed.

Some Background About TDK

It was 50 years ago that TDK scientists first developed and commercialized the use of a magnetic material called ferrite, which has become the foundation for magnetic tape products. Through the years, TDK's commitment to research and development has enabled it to expand the role of this magnetic material from use in fairly simple ferrite motor cores to highly sophisticated magnetic media such as audio and video cassettes as well as computer diskettes.

TDK's technological leadership and companywide commitment to quality have enabled it to earn its status as the leading manufacturer of audio and video recording tape worldwide. Today, on its 50th birthday, TDK boasts the industry's broadest range of technologically advanced audio and videotape products designed to meet every need.

in the TDK tradition of quality and reliability in state-of-the-art recording technology. The tapes are available in two defined levels of performance—the Professional Reference Series for professional and audiophile applications and the Reference Standard Series for non-professional uses.

Our current line of audiotapes and related accessories continues

TDK's Irvine, CA audio plant

Keep Your Deck Clean

As a vital first step, be sure that your audio cassette deck or open reel recorder is demagnetized and *clean*. For cassette decks, TDK's battery-operated cassette head demagnetizer HD-01 is a quick and effective demagnetizing device because, properly, it addresses itself not only to the heads, but also to the guides and support structure of the transport, some parts of which may carry residual magnetism. The unit fits simply into a tape deck like an ordinary cassette. A hand-held demagnetizer like TDK's HD-11 will do as well if used carefully. *Remember the job requires close attention.* The HD-11 features a plastic-covered pivoting tip that discharges magnetic buildup, even on the most inaccessible heads.

There is no substitute for careful eyeball inspection. TDK's HC-1 is a convenient cleaner for routine maintenance and provides an effective way to keep recording heads free of oxide buildup, dust and dirt. Its use is recommended after every eight hours of play, and it is also packaged in a cassette configuration.

Before every recording project, use cotton swabs touched up with a few drops of solvent (pharmaceutical alcohol is safe with virtually every modern machine, but be sure to check with the manufacturer if in the slightest doubt.) Pay especially close attention to the areas where capstan(s) and pinch rollers(s) make contact. Put the machine into the "play" mode and apply your swab to the right side (where the tape feeds out) of the assembly. Keep at it until the swab comes out absolutely clean. Don't let cotton fibers break loose from the swab and take a trip through the mechanism. When you're finished, you should be able to *see* cleanliness which, in this instance is definitely next to perfect recordings.

Align Your Tape

At this point you're clean and loaded with tape (exactly *which* TDK tape is a subject we'll get into later). You can, if you wish, run the tape through the transport for its entire length (at PLAY speed, and with record mode engaged). This is an old professional practice, unnecessary with many modern tape formulations such as TDK's, but it does give the tape a bit of polish and ensures that the tape pack is winding smoothly on *your* machine.

If you're using a cassette, flip the tape and start your recording on side B. Don't go into fast rewind, or you might pack the tape too tightly or disturb the careful alignment that a wind at play speed will give you. While you're working with side A, and if you have the patience, it's not a bad idea to record a minute or two of actual material (from FM, or anything else you've got) using normal recording practice. Then go back, using the machine in RECORD with no input, and see if you can successfully erase the signal you just laid down. If you can't, there are possibilities of machine/tape incompatibility.

If you can, you're okay so far. You should be doing all this, incidentally, as close to the time and place that you want to make your "keeper" recording as possible. Just carrying a loaded tape machine across the street can, occasionally, have important effects on the winding integrity of your carefully prepared tape pack. By the way, TDK carefully inspects each cassette and open-reel tape before it leaves the plant to ensure continual smooth-running performance.

Avoid Distortion

Now to confront the actual program material, and the ways in which your recording level meters and controls can assist you in capturing it. In this, there is one rule, and only one: you always want to record at a high level, but not so high that you can hear the effects of distortion and, in the case of cassettes, especially, the high-frequency losses characteristc of tape saturation.

Let's discuss the subject in a little more detail. First of all, the main idea with a modern tape of high quality is to avoid the distortion and/or high-frequency losses that will occur if your recording levels go "over the top." Too low a level will result in more noise than is strictly necessary, but the noise-reduction facilities provided in all cassette decks with pretensions to quality should keep you

out of serious trouble. Otherwise, a level on the tape that is lower than the maximum achievable is no problem at all. You just turn up the amplifier to compensate.

However, be constantly aware that distortion and high-frequency losses that wind up on the tape can be compensated for by nothing. They're permanent and ineradicable. The wise recordist therefore avoids incurring them at all costs.

Considering the vagaries that arise in interpreting the readings of record-level indicators (see the following section), it is essential that the recordist learn to use his ears as a guide. A bit of training is required for this, and the best way to proceed is to select a very high level musical source (big crescendoes on LP should be good, and the same on CD even better; avoid using FM for this purpose) and experiment.

Continued on Page 11

TDK

Are Meters Necessary?

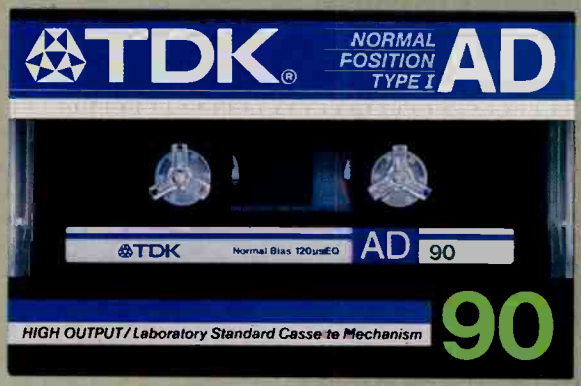
Are recording level meter systems then useful at all? Of course. Although it would take many years' experience to learn how to record well with meters alone, they do remain indispensable guides in charting your progress and getting you back to where you were a moment or a week before. It's difficult to generalize about meters because they differ so much in type and calibration, and their readings don't necessarily mean the same for one tape as for another.

However, as the general rule, modern cassette decks are equipped with either peak-reading or VU meters, and the most important thing to keep in mind about this distinction is that recording levels for peak-reading systems will, with transient material, indicate levels that read roughly 7 dB higher than VU types will. Determining which meter type your machine employs is not always obvious, but after a bit of experience you will be able to distinguish between them easily just by watching their behavior with acutal music material.

Again, this is not terribly difficult, but it is exacting. The more experience you gain with different music, machines and tape, the sooner you'll be able to copy quickly with a change in any or all of the three, and to use the meters in a fashion that will let you know what you'll probably hear in the finished recording.

Most cassette decks employing Dolby noise reduction bear markings on their meter-system faces indicating Dolby level, which by convention corresponds to a recorded level of 200 nanowebers per meter (nW/m) on the tape. The Dolby indexes are placed at +2 dB in most cases, but occasionally they turn up at 0 or even −2 dB. What this information tells you is that, in general, it may be safe and even advisable to use correspondingly higher recording levels on the average with the first type of machine, and to be appropriately conservative with the others.

However, this rule can only be approximate, and the actual results achieved will depend greatly on the overall recording characteristics of the machine, and even more greatly on the performance capabilities of the tape. Naturally we expect you'll find TDK tape able to tolerate higher recording levels without strain, and to exhibit higher maximum output levels before distortion occurs, particularly at high frequencies, than many other tape formulations.



TDK's improved AD audio cassette is ideal for high fidelity recording applications.

Today, tape is so good that level manipulations are unnecessary except in the most critical circumstances, when the recordist feels instinctively that he can't do a satisfactory job without resorting to them. Tape is also good enough to render the slightest clumsiness in a gain-riding effort immediately audible and objectionable. On the whole, it's probably better to set levels correctly for the recording project at the outset, and not meddle with them afterward. For this application, the use of metering systems is reasonably straightforward, if not competely illuminating.

Recording from LP's

It takes only a few seconds to visually inspect the playing surface of an LP and discover where the highest recorded levels are. These should be test recorded in advance, with very aggressive recording levels (don't worry; nothing will break), to determine the absolute maximum level your recording system will tolerate before audible distortion/saturation occurs. That's the optimum level. It will differ from LP to LP, and you'll find, if you're using cassettes, that the highest levels of high-frequency information will be the most useful guides. Use your meters to learn what these levels look like, and take mental notes accordingly. They won't teach you everything about recording, but they'll be a good start.

Always listen as you're watching the meters, so that you can keep track of the kind of signal they most actively respond to. Certain meters will let you know with vigorous activity when a crash cymbal is struck. Others will barely move. All will strongly register the presence of a deep organ pedal, but experience will probably teach you that you can get away with surprisingly high levels of deep organ pedal if they're not accompanied by huge outbursts of brass and/or that inevitably worrisome cymbal crash.

Beyond that, there's little to do except punch the RECORD button and go, except for a subtle problem that occasionally crops up. Some record playing systems become unstable when encountering severe record warps, and will deliver a signal too low in frequency to be heard *per se*, but strong enough to overload a recording system to the point of gross distortion, even though the rendition might sound perfectly acceptable when played with no attempt made at recording it. The symptoms, heard when you play back the recording just made, will normally be a shocking "garble" distortion recurring at the rotational rate of the record, and eyeballing that rate while listening to the result is what will let you identify the difficulty. A filter introduced somewhere between turntable and recorder will fix you up temporarily, but the only real fix has to be applied at the record player itself.

Find Your FM Levels

Most of the foregoing still stands, except that, in theory, you should be able to use the same record level for every FM broadcast you'll ever have access to; unless, of course, the signal is too weak to achieve full limiting, or you change tuners, recorders, or tape. The reason is that broadcast strength is restricted by law, and while virtually all competent broadcasters use all the strength they're allowed to the maximum, relatively few of them cheat enough to become conspicuous, and the cheating could never amount to more than a dB or so.

Therefore, your best procedure is to find the loudest, most obnoxious source of high-energy, compressed rock/disco in your locality, set your recording levels to the maximum before you hear loss of high frequencies, and use that recording level for everything thereafter, including the most delicate presentations of clavichord performances. You have to depend on the technician in the broadcast studio to take care of the rest. You don't have enough control to do much more.

An exception exists in the case of stations broadcasting Dolby FM. Because they're probably quality-conscious, their signal should be pretty good—good enough to be worth trying some tricks with that this article cannot, alas, be long enough to detail. But unless you're prepared to research and undertake serious technicalities, the best advice would be to treat Dolby FM broadcasts as you would any other (although, of course, decoding them appropriately if your tuner has the means to do so).

Dubbing Compact Discs

Some have said it can't be done, but you can indeed copy the content of a compact disc onto a cassette with excellent results. The most significant difference between dubbing an LP and dubbing a CD is that you can't locate the CD's highest recorded levels by eye. If you don't know the music (and even if you do), you're going to have to work your way through everything you want to record by ear and meter, test recording the more difficult passages as you go along. This may sound tedious, and will be the first few times, but CD's are restricted by technology to a maximum level, and you should begin to get a feeling of what that means for your recorder in fairly short order. CD's are indifferent to frequency-versus-level considerations, so expect a few nasty surprises. But also expect a few pleasant ones. At worst, recording from a CD is not any more difficult than recording from a live performance. TDK's award-winning HX-S tape, the first metal formulation which records in the high bias position, is particularly recommended for recording from digital discs, as are TDK MA and MA-R metal tapes.

HX-S, the first metal tape for the high-bias position.

Taping Live

But not always, and it remains generally true that, for live recording, cassettes may not be the medium of choice. Their great advantage is portability, which is so persuasively attractive that even professional recordists on their days off will walk around with a personal-portable cassette recorder just to see what they can pick up from clubs and street musicians. Also, demo tapes, made so a record producer can get an idea of what an unknown band sounds like, are very often in cassette form. However, for commercial release purposes, reel-to-reel still owns the business, largely because of its greater headroom and editability.

Live recording is, of course, much too large a subject for treatment in a few paragraphs. But all the above guidelines generally apply. However, you should be aware that TDK offers some exceptionally advanced tapes for the open reel format, including SA (Super Avilyn) EE tape made for high-end component systems with EE (extra efficiency) ½-speed position and GX-Pro Quality for standard speed recordings.

TDK

The Right Audio Tape

Different tape formulations and types co-exist, not only to give you the most cost-effective choice for your needs, but also because there is such a huge population of recorders in the world that no one tape, no matter how good, could possibly be perfect for all of them. With all these choices, how do you pick the one to fit your deck? First, right away, we have to understand what "fit" means. Take some FM interstation noise and record it at a level of perhaps −10 dB on the meters. If the ideal "fit" is there, the recording on playback should be an audibly perfect facsimile of the original. In practice, the recording will tend to be a little brighter or a little duller. This is no necessary reflection on the quality of either your tape or your machine. It simply suggests that the two don't quite fit each other, and that there will therefore be some mistracking problems with certain popular noise-reduction systems, and possibly a few other difficulties, not obvious at first, but upsetting to discover down the line.

When you don't have a precise fit, the readiest tactic is to try another tape presumably, but not necessarily, from the same IEC group you've selected for your application. (Normal Bias, Type I; High Bias, Type II; or Metal Bias, Type IV.) If the results of the FM-noise test are discernibly different, even though not perfect, there is cause for optimism, because your recorder is showing signs of being in good condition. If every tape you try is, say, a little duller than the original, the time to think about repairs or a new machine has come.

When you get a satisfactory fit (and you might very well get it with a number of tapes), then the sorting for actual performance quality begins. Record all the tapes, at very high record levels, with musical test passages that include both very loud cymbal activity and very soft material. Listen for lack of distortion with the former and lack of noise with the latter. Do not hastily jump to conclusions for one tape begins to distort at levels of +3 dB while another seems impossible to overload. Select your levels for what seems to achieve the best (or avoid the worst) from each individual tape, and then listen to the results as if you were just playing music for enjoyment.

With some tapes you'll be conscious of more noise during quiet moments. With others you'll be aware that distortion on high-level passages is more difficult to avoid than you suspected when you made the recordings. On a number, you'll discover that cymbals you thought you were capturing fully have somehow become more subdued.

What you'll learn from this test, if carried out exhaustively, will tell you more about the right tape for your machine than ten thousand more words. It should not, however, dissuade you from performing the same test next year, and the year after, as new tapes emerge. AT TDK, the understanding of the tape/machine interface is acute, and a tape that fits most machines and otherwise performs with true distinction is probably more easily found within the TDK product line than any other.

TDK's NEW IMPROVED "SA" SUPER AVILYN audio cassette is the newest generation of TDK's premium "SA" formulations. SA, which made its debut nearly 10 years ago, continues to lead the way in premium high-bias audio tapes.

A Tape For Every Need

TDK has developed the two reference levels to help users evaluate and choose the best tape for their particular needs. Although both levels have been developed using the same concern for quality that goes into all TDK products, there are differences in the performance capabilities of each product that make it best suited to more specific applications.

The Professional Reference Series, with a variety of products to meet all professional requirements,

represents the highest level of achievement in recording-tape technology. Each tape sets a standard for sonic excellence. That's one reason they're the choice of the most discriminating audiophiles as well as most hardware manufacturers, who use TDK as a reference for bias calibration.

The TDK Reference Standard Series provides outstanding premium quality for a wide variety of recording needs. Each cassette is a product of TDK's advanced tape technology and offers maximum reliability, performance and value.

Bias and Its Variations

Your present tape recorder undoubtedly has a tape-type switch that adjusts the machine for the tape formulation you wish to use, but that doesn't guarantee that the IEC Type II position will be right on the button for every Type II tape you'll ever buy. Minor variations exist between brands of tape, and even between production batches of the same brand. The "facsimile recording test," discussed in "The Right Tape" section of this article, is the logical way to find out if the bias provided by your recorder is correct for the tape you are using. Employ that test faithfully.

There is something more that it's useful to know, however. For various reasons, some tapes are less sensitive to the effects of minor bias errors than others, and this can be a comfort when you're forced to choose between unfamiliar tapes for a rush recording project. For example, the effect of underbiasing a tape will be both a rise in high frequencies and an increase in distortion and modulation noise. There's not to much that can be done about high frequencies and distortion, but if the tape is carefully designed for physical and magnetic uniformity such as the way TDK tapes are, the modulation noise will be low to begin with, and it won't be subject to catastrophic increases when the recording conditions are not quite right.

The importance of a good tape is an overriding consideration for any recording project, but it is an especially crucial consideration if there's any doubt at all about the match between bias and tape characteristics. If you ever encounter such doubts, choose a premium tape such as those by TDK which excells in overall characteristics. These tapes will come through for you, no matter what your application.

TDK Bias Selector Guide

Cassette	Recommended Bias/Eq	Recommended for: General Purpose	High Fi Recording	Mastering
MA-R	Metal/ 70μS		●	●
MA	Metal/ 70μS		●	●
SA-X	High/ 70μS		●	●
HX-S	High/ 70μS		●	●
SA	High/ 70μS		●	●
AD	Normal/ 120μS		●	
AD-X	Normal/ 120μS		●	
D	Normal/ 120μS	●	●	

The Audiophile and the VCR

Almost all audiophiles know more about VCRs than they think they know. Even if they don't know all of the theory, they know the basic rules: The higher the frequency response needed for a signal, the faster the tape must travel past the tape head; a signal that is close to the saturation point of the tape will be less troubled by noise than a signal recorded at a lower level; etc.

Video signals do require a very large bandwidth of at least 3 megahertz for a picture as good as a standard color TV, so the tape-to-head speed must be in the order of 6 meters per second. To achieve such speeds, it is more efficient to move both the tape heads and the tape. One way of doing that is to put the heads on a rotating drum. The color signal is broken into two parts: color and brightness. In consumer VCRs, the brightness (luminance) is put on the tape as an FM signal at about 3 to 5 megahertz and color signal (chroma) is recorded as an AM signal at about 600 kilohertz using the FM luminance signal as bias. The exact frequencies are slightly different in Beta and VHS recorders, the two widely used consumer formats.

When you buy a machine, the characteristics of the machine are already set but you can still exert some control over the quality of the recordings you make by the tape you select. It is there that TDK's 50 years of experience in making magnetic tape helps you. Audiophiles are already accustomed to the idea of choosing from many types of tape for the best match between the material to be recorded, the recorder speed and the type of tape. TDK offers five grades, in both Beta and VHS formats, and the best one to use for a particular task can be made on the basis of manufacturer, application, and cost.

That the quality of the tape you get depends on cost should come as no surprise. Since you seek the highest quality, buy the best grade you can afford for your most important application. For video recordings chroma and luminance, (usually called video) S/N, and the dropout count are the most important criteria in choosing a grade. The S/N determines the graininess of the recorded picture and dropouts (areas where the magnetic particles are missing) cause the white or black streaks of missing picture on playback.

TDK tapes are renowned for their already low dropout count which gets even better as the grade gets higher. The S/N also improves as the grade gets higher. Each step-up grade offers a S/N about 2 dB better than the one below it. There are similar increases in audio quality as you step up. So the difference between the lowest and the highest grade is about 10 dB. The grades we offer (from lowest to highest) are: Standard Super Avilyn, HS High Standard, EHG Extra High Grade, Hi-Fi, and HD-Pro.

TDK

Digital Audio and PCM Recording On Your VCR

For some years now recording audio in digital form, PCM (Pulse Code Modulation), has been available in recording studios. Two years ago it became available to the audiophile with the introduction of the PCM adaptor for video recorders. PCM samples the audio signal 44,000 times a second and records that instantaneous voltage as a number in digital form. Those numbers have 14 or 16 bits each in their binary form and whatever machine is used to record them must have a frequency response greater than 16 times 44,000 at minimum. No recorder commonly available to the videophile has that type of frequency response except VCRs, so they've been pressed into double duty.

As always, the system is not perfect. For perfect replication the number must be identical, but two problems arise. First the numbers may be misread, mutilated or mistranslated, but the encoding scheme allows for elaborate error correction. However, the numbers may be entirely missing because of dropouts on the tape. There are similar error correction devices (dropout compensators) in a VCR which minimize the effect of dropouts, but they cannot be relied upon to function effectively for digital audio purposes. So the only reasonable solution is to use a tape with the lowest dropout count. Over the years, TDK has earned the reputation for the lowest number of dropouts.

In PCM recording uniformity is of paramount importance. The digital information must be a constant uninterrupted stream with 1's always having the same value and 0's must maintain theirs. In spite of how critical these values are, the uniformity of TDK's tapes ensures that the signals will maintain their vital integrity. TDK tapes are made with unusually small magnetic particles that permit a higher number of them to be contained in the same volume than with other tapes, yielding a generally higher BET value. This dense packing of the magnetic particles also yields a higher RF output, further reducing the probability of erroneous reading. Normal noise levels are not likely to cause erroneous readings, but a higher signal level makes such readings a remote possibility.

You may make PCM recordings at any VCR speed, but the fastest available speed, Beta II or VHS-SP, will yield the best results. The reasoning is simple. With the tracks closer together, actually overlapping, at VHS-SLP speed the likelihood of having the same dropout affect adjacent tracks is greatly increased.

Among TDK tapes, the higher grades have the lowest dropout counts, highest outputs and highest BET values. (The higher the tape's BET value, the more particles packed per square inch, which means improved clarity.) They also have lower S/N. As with video, use the highest grade you can afford for digital recording. But remember that every dropout is a problem. Choose the grade of tape for digital work carefully, based on how critical the material you record is. HD-Pro has the fewest dropouts among TDK's tapes, and with TDK's EHG Hi-Fi a close second, both are an admirable choice for the critical task of recording PCM.

Uniformity from tape to tape throughout production is also a TDK strength. The same high performance level is maintained with each new batch of binder (particles, adhesives, etc.), and the result is a tape of consistent properites from batch to batch. The result is predictability. You can be sure of the performance of a tape with the TDK name on it.

Avoid Distortion...

Using the same passage for each sequence of the test, make a recording at a moderate level (perhaps around 0 dB on peaks) and listen carefully to it. It should sound fine, if perhaps a bit noisy. Then, using a recording level that is one or two dB higher, record the passage and listen again. Raise the level a bit more and do the same, and so on, until the point arrives when you can hear the raspy harshness of distortion and the dulling of the sound on high-level cymbal material. At this point you've gone too far, so back off on levels to find the point where acceptable becomes unacceptable.

This is about where you want to set your final record levels for music of this type; but if you find you can't quite identify the precisely right point by ear, err on the side of undistorting (that is, lower) levels.

Incidentally, this experimentation will also teach you the value of a good tape (such as TDK) in its properties of forgiveness. A small error in setting levels will be tolerated by such a tape because the maximum output levels afforded, especially at high frequencies, provide a cushioning margin to keep you out of trouble when musical events get a little more violent than expected.

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REMOTE POSSIBILITIES

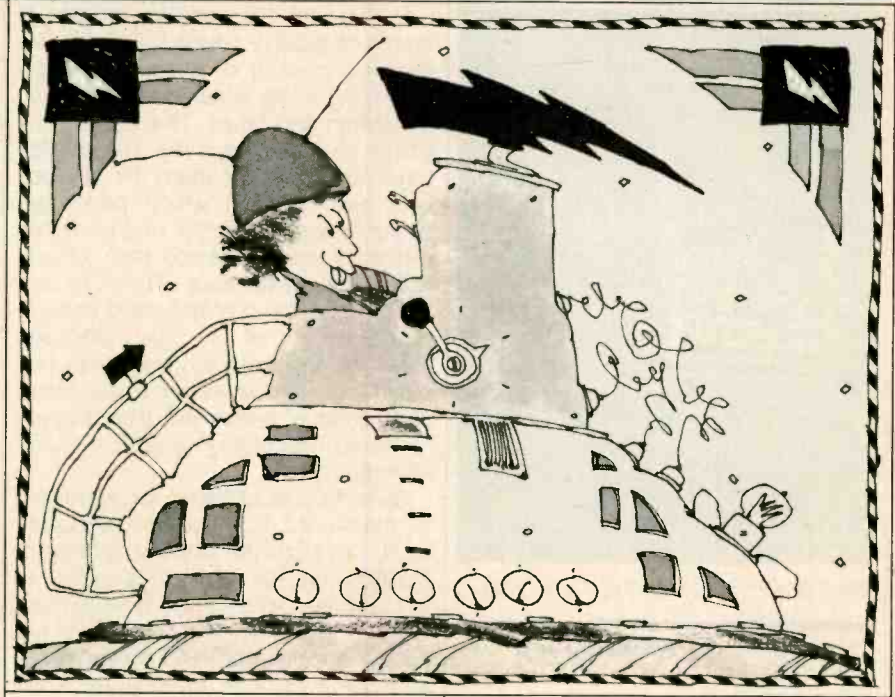

Illustration: Thomas Waters

Everything Under Control

As I've mentioned here before, manufacturers of remote-controllable audio and video equipment never cooperate on control standards. If you build your entertainment system up from several companies' components (and who among us doesn't?), then the only ways to control things remotely are to hold a poker-hand of control transmitters or have a semi-custom control system built by someone like Audio Command Systems.

Or so I thought, 'til reader Charles Browder of Deerfield Beach, Fla., told of his research on the dimensions of the problem and how he had managed to solve it.

"I don't like having more than one remote control," he says, "and prefer all components to be on one wireless remote. But, like most serious readers of *Audio*, I'd rather choose the best (at least for the money) from each company. So I bought a combination tuner/preamp/controller from a Technics rack system, together with its matching remote control, and hooked it to my Technics turntable and Akai cassette deck by making custom adaptor cords for them."

To do so, Mr. Browder bought the service manuals for his components to check out how their rear-panel remote jacks worked. "Akai, Technics, and (probably) Pioneer, having identical, eight-pin DIN connectors, all use open-collector, or sinking, logic. That is, grounding a pin on the receiving device's connector simulates the pressing of a corresponding front-panel switch. Sony is more unconventional (as usual), converting their logic to analog to reduce the number of wires in the cable to the cassette deck."

Components of different makes which use the same kind of remote-control connectors rarely wire them alike, though. To make your own multi-brand remote-control system, you must first determine which pins each component uses for which function and whether all units use the same type of control logic and switching (normally open or normally closed), then set up a table of this data. The Table shown here was developed by Mr. Browder to compare the pin assignments of his Technics controller with those for his other equipment.

Mr. Browder feels the results are worth the trouble. But he'd also rather have a single, industry-wide controller standard (as would I). Is anyone in the industry listening? (Now, that would be a worthwhile EIAJ or DIN standard.—*E.P.*)

None of my own equipment is remotely controllable in any form, so Mr. Browder's system wouldn't work for me. The AR remote control, however, could work with my equipment. I failed to be properly impressed with the unit when I plugged it into my living-room system, but that wasn't the AR's fault: I had the forethought to put my system where I could usually reach its controls anyway.

Then, Norman Eisenberg's comparison of stereo remote controls with those for TV ("Auricle," *Audio*, January 1985) gave me an idea—to put the AR in my bedroom system, with the video equipment. Both my TV tuner and my VCR have remote controls, but there's no remote control of volume when I play my VCR . . . or wasn't, 'til I put the AR there.

Remote-control jack pinouts for four components.

DIN Jack Pin	Akai Cassette Deck	Technics Cassette Deck	Akai Turntable	Technics Turntable
1	FF	Pause	N.C.*	Start/Stop
2	Play	Ground	N.C.	Ground
3	Reverse	Rec Mute	Start	Cueing
4	Rewind	Play	N.C.	
5	Stop	FF	Cut	
6	Pause	Record		
7	Record	Rewind		
8	Auto Mute	Stop		

*No connection

UPTOWN SATURDAY NIGHTS

The Apollo Theatre in the early '50s.

Photo: © 1985 Frank Driggs Collection

Showtime at the Apollo by Ted Fox. Holt, Rinehart and Winston, hardback, 322 pp., $16.95; Holt/Owl Books, paperback, $9.95.

For more than 40 years, from January 1934 until the end of 1975, and sporadically after, the Apollo Theatre on West 125th Street in Harlem was the most important black theater. Offering live talent, its presentations reflected all the changes that took place in show business.

Ted Fox's well-written book, *Showtime at the Apollo*, is the first serious effort to go backstage and get the entire story of this unique American institution, whose premises have been granted landmark status. Related by marriage to the Schiffman family, who owned and operated the theater from 1935 until it closed, author Fox had the complete cooperation of Bobby Schiffman, the Apollo's last manager, whose shrewd methods produced the biggest grosses in the theater's history. Bobby is the youngest son of Frank Schiffman, who'd taken over the Apollo in 1935.

From the '30s to the later '40s, the Apollo presented a genuine mix, underscored by the best big bands and featuring top vocalists, vocal groups, dancers, a chorus line, comedians and acrobatic acts. This blend carried on a carefully nurtured tradition that dated back almost to the beginning of black show business.

In the late '40s, smaller combos of lesser musicality offered up a highly rhythmic mixture of blues and often-maudlin ballads, which became known as rhythm and blues. This led, as Fox points out, to groups like The Orioles (one of the first of many hit combos with bird names), which performed only the most elemental kind of music, without a band, making their effects with vocal gymnastics. These in turn led to the slick, professionally choreographed acts of the '50s, '60s and '70s, which eventually became tied down to a formula as one vocal group after another performed their current recorded hits, often mimed to a taped soundtrack.

By tying itself to the hit-record formula, the Apollo sounded its own death knell, because the popular groups of the '60s and '70s were crossing over to sell to white audiences; they were playing Las Vegas, getting occasional exposure on television, and making films, and many became millionaires. Their agents could demand—and get—large sums, sums too large for a theater like the 1,700-seat Apollo to come away with any real money after paying the guarantees.

The book tells the colorful story of how, in the 1920s, Frank Schiffman, manager of the Lafayette Theatre on "Black Broadway," on 132nd Street, undercut and squashed his competitors like the Alhambra Theatre (the first to offer live shows in the 125th Street area), which went under in 1931. Schiffman had his own problems when, in 1932, another operator began running shows with the best big bands at the 900-seat Harlem Opera House on West 125th Street. Schiffman, in desperation, dropped his morning prices at the Lafayette down to 10¢. In 1933, Connie's Inn, a famous nightclub next to the Lafayette, closed its doors, and "Black Broadway" no longer seemed as viable a thoroughfare as it had been.

Schiffman and his boss Leo Brecher, owner of several other theaters in Manhattan, decided to come down to 125th Street after the operators at the Harlem Opera House moved to the Apollo, a former burlesque house which had been dark for several years. They took over the Harlem Opera House and, for a year, ran superb shows in direct competition with the Apollo. In mid-1935, after the death of one of the Apollo's owners, Schiffman and Brecher bought out the Apollo, and decided to only show movies at the Harlem Opera House. They were now home free, with Harlem's only black theater using live talent.

Dozens of people—including bandleader Andy Kirk; singers Ruth Brown, Gladys Knight, Anthony Gourdine (of Little Anthony and The Imperials), Nancy Wilson, Dionne Warwick, Leslie Uggams, and Johnny Otis; behind-the-scenes producers like Leonard Reed and Honi Coles, and dancer Sandman Sims—were interviewed for this book. They detail how the theater was run, how artists gradually became stars, and how the Schiffmans held due bills on many stars who no longer needed to play the Apollo, but would do so when the theater needed a strong act to make a given week pay off.

The tragic ends to the careers of Frankie Lymon, Sam Cooke, and Jackie Wilson are all detailed in *Showtime at the Apollo*. The account of James Brown's arrival in New York in the mid-'50s as a penniless down-and-outer who rose to become the Apollo's biggest earner throughout the '60s, until his bewildering endorsement of Richard M. Nixon nearly destroyed his career, makes fascinating reading.

Bobby Schiffman is quoted early in the book as saying, "Black people don't care what happened yesterday, they want to know what's going to happen tomorrow." That statement goes a long way in explaining how ready black audiences were to accept the formula-ridden shows heard at the Apollo from the '60s until its closing. I went to the Apollo quite often, beginning in 1955, but in the mid-'60s I stopped going, save for an occasional blues show offering T-Bone Walker, Bobby "Blue" Bland and others, or one of those which had Ellington or Basie. It is a long, long way from Bessie Smith, who was one of the Apollo's opening acts in 1934, to Donna Summer, the disco queen whose $5,000-per-night fees amazed Bobby Schiffman in 1975. It's a path I'm afraid too many of us who've had a chance to hear the best are no longer willing to travel.

Showtime at the Apollo gives a vivid

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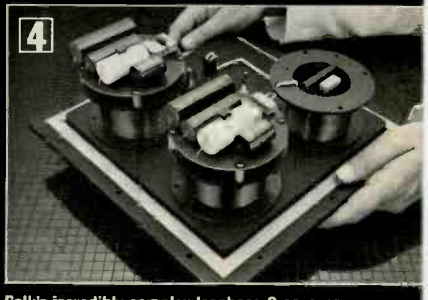

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By tying itself into the hit-record formula, the Apollo sounded its own death knell, as the most popular acts crossed over into TV and films.

impression of the famed theater in all its four exciting decades. The theater is currently owned by Percy Sutton's Inner City Broadcasting Corporation and is undergoing extensive renovation with an eye to a future reopening. I, for one, hope Mr. Sutton can bring off a revitalized Apollo once more; in the meantime, Ted Fox's book will serve very well indeed. *Frank Driggs*

(*Editor's Note:* Good news—Ted informs us that the Apollo is due to be reopened about the time we go to print.)

New Rock Record by Terry Hounsome. Facts on File, hardback, 720 pp., $17.95; paperback, $9.95.

New Rock Record is a guide to 40,000 rock LPs, telling who the players are, what instruments they play, date of issue; most important, the players are cross-referenced as well. To say that it is incomplete would be unfair, since a book like this should, by rights, be updated at least on a yearly basis, and it hasn't been reissued since 1983. But despite some gaps, it is a staggering collection of facts that serious rock musicologists (rockologists?) should have by their bedside. There are some misspellings, but Hounsome obviously has an extensive record collection and has done most of his homework. *Jon & Sally Tiven*

Slowhand, The Story of Eric Clapton by Harry Shapiro. Proteus Books, $5.95.

This book fails to deliver a personality portrait of Eric Clapton or tell us much about the Guitar God's extramusical life. What *Slowhand* is, basically, is a Clapton discography. Historical information puts each recording in context, detailing who Clapton was listening to, playing with, and in awe of. But within this little scenario, Clapton himself seems almost a minor player, with Jack Bruce, Ginger Baker, and Robert Stigwood emerging as far more dominant. The only time we get a good look at his personal life (aside from his period of heroin addiction) is the soap opera of how the guy fell in love with his best friend's wife (Patti Boyd Harrison, wife of George), was rebuked by her, and finally married her years later. Perhaps there's not much of a personality there, but Shapiro failed even to get an interview with Clapton, something which might have put some life into this pamphlet.

This is the first book to be written about Clapton since 1976. Harry Shapiro has done some of his homework, and new information does emerge—Clapton had a short-lived band in Greece called The Glands after he left John Mayall and formed Cream—but the book can only be recommended for the most diehard Clapton freak who already knows everything else and has read every interview. And when it comes to the matter of the writing style, this book could be called *Slowread*.

Jon & Sally Tiven

THE RESULT OF FIVE YEARS OF RESEARCH–A NEW TECHNOLOGY:

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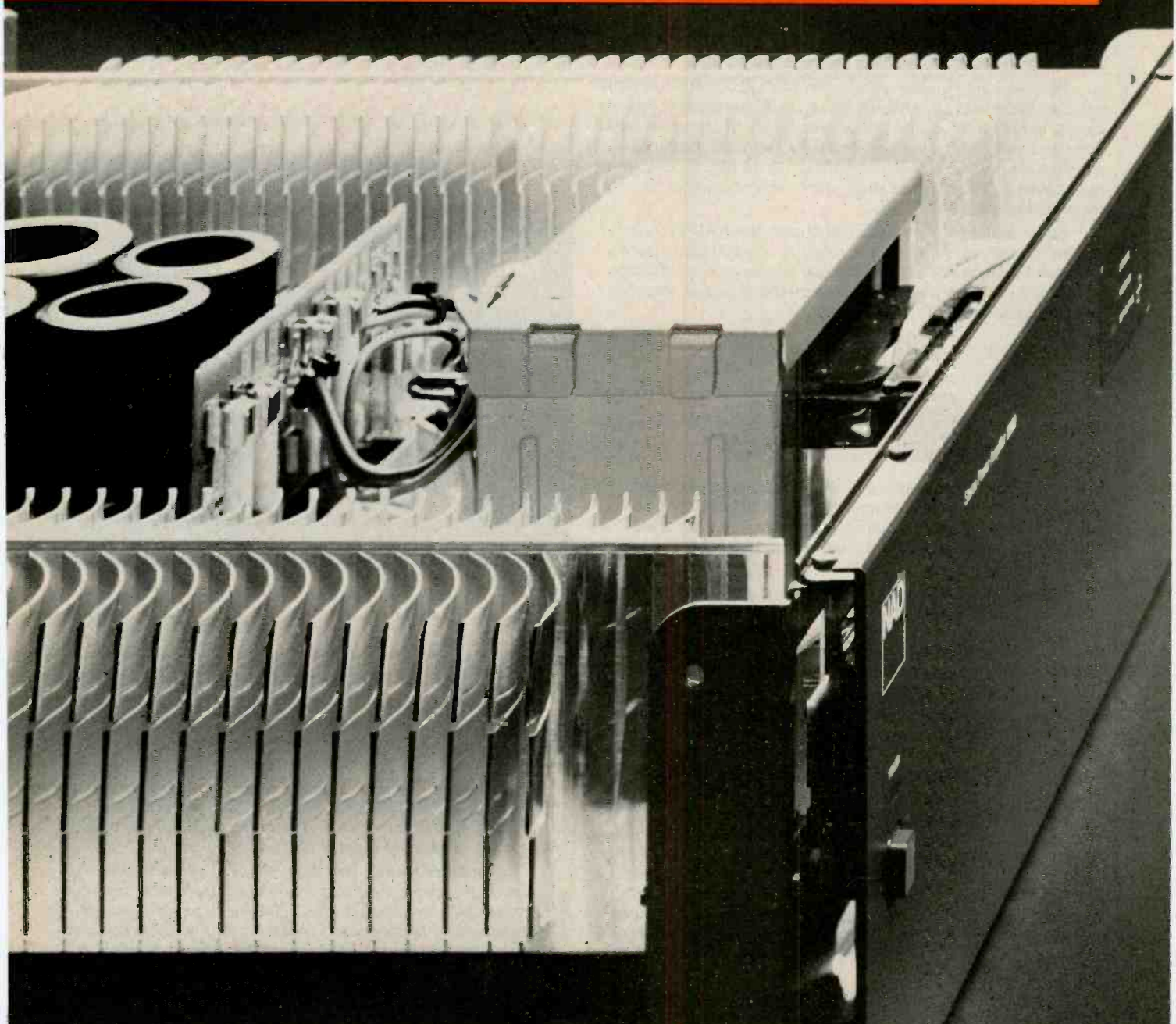


THE 2200 POWER AMPLIFIER FROM NAD

Enter No. 37 on Reader Service Card

Since 1978 NAD has led the world in the production of affordable amplifiers that produce unexpectedly large amounts of real speaker-driving power for the reproduction of music. With the arrival of digital (and other) recordings that capture the full dynamic and frequency range of live music, the advantages of NAD's approach to amplifier design have been widely applauded.

The Model 2200 PowerTracker™ amplifier is the first of a new generation of NAD amplifiers destined to set new standards for musically useful dynamic headroom. It is the most powerful amplifier NAD has ever built—and, in real terms, one of the most powerful amplifiers on the market today.

Reproducing musical signals, the NAD 2200 routinely delivers over 500 watts per channel into typical loudspeaker impedances. In actual measurement with speakers of complex impedance and lower-than-average sensitivity, the 2200 produces peak sound pressure levels exceeding 115 dB SPL (Sound Pressure Level) in a medium to large room, with no audible or measurable distortion.

But in size, heat dissipation, *and cost,* the NAD 2200 is similar to many other amplifiers rated at only 100 watts per channel. For audiophiles who can use and appreciate its capability, the 2200 is unquestionably the best-buy power amplifier ever manufactured.

THE KEY: REAL-WORLD DESIGN

Examined from one perspective, the 2200 is a very conservatively rated 100 watts/channel power amplifier that has an extraordinary +6 dB of dynamic headroom, meaning that it can produce more than four times its rated power during musical transients.

Looked at another way, the 2200 is a super-amplifier that produces between 400 and 800 watts per channel for music (depending on speaker impedance), but contains an "intelligent" power supply that gives it the modest size, heat dissipation, and cost of a conventional 100 W/ch amplifier.

The key to the design of the 2200, as with all NAD amplifiers, is that its design goes beyond conventional specifications and laboratory tests to provide optimum performance under the conditions of everyday use. NAD amplifiers are designed, first and foremost, to reproduce the dynamically varying waveforms of music—not just sine-wave test tones. They are designed to deliver undistorted power to loudspeakers of any impedance—not just to an 8-ohm test resistor. NAD's engineers have always recognized the importance of supplying high levels of output current to drive the low and complex impedances of real loudspeakers. NAD premiered the use of Soft Clipping™ in solid-state amplifiers to prevent harsh distortion when the demands of the musical signal exceed the amplifier's limit. All NAD amplifiers feature high dynamic headroom for the transient sounds in music.

The NAD 2200 is a truly "dynamic" power amplifier. Its heart is the unique PowerTracker™ control circuit (patent pending), which automatically adjusts the amplifier's maximum power output according to the dynamic character of the signal that is being amplified. As befits a product designed for the reproduction of *music,* the NAD 2200 achieves its maximum power output of 400 to 800 watts per channel when amplifying wide-range musical signals that contain peaks 10 to 20 dB above the average level. But when the amplifier is fed a high and *constant* signal (i.e. a sine-wave test tone instead of a musical waveform), its maximum output automatically declines to avoid overheating, and eventually levels out between 100 and 200 watts per channel.

The 2200 virtually re-defines the concept of dynamic headroom. Its high power reserves are available, not only for the short 20-millisecond bursts used in the standard IHF dynamic headroom test, but also for musical surges and climaxes lasting ten times longer. Even with compressed recordings of rock music in which the peaks may be only 8 dB higher than the average power, that may be enough variation to allow the 2200 to operate at high efficiency and maintain a clipping level above 500 watts per channel into the 4-ohm impedance that is typical of real speakers.

SPECIAL FEATURES:

The appeal of the NAD 2200 may be based mainly on its combination of high dynamic power and low cost, but there are other noteworthy aspects of its design, too.

Transparent sound. The audio circuitry of the 2200 is based on the same principles that gained worldwide praise for other NAD amplifiers. In the 2200 the circuitry is scaled up substantially in speed and power, using the finest selected parts available today—individually tested filter capacitors and ultra high-speed transistors for wide bandwidth and extremely low distortion. The output stage is a fully complementary parallel circuit using high-gain 25MHz transistors with over 10 times the "safe operating area" of transistors used in typical 100 watts/channel designs.

High-voltage, high-current design. Current flowing through the voice-coil is what causes a speaker to produce sound, and NAD was the first manufacturer to emphasize the importance of high output current capacity—unrestricted by so-called protection circuits—to cope with the complex, reactive impedance that many speakers present. The NAD 2200 can produce peak output currents exceeding ±50 Amperes on demand, together with peak output voltages of ±95 volts to handle the most dynamic signals.

☐ **Continuous sine-wave output conservatively rated at 100 watts per channel.**

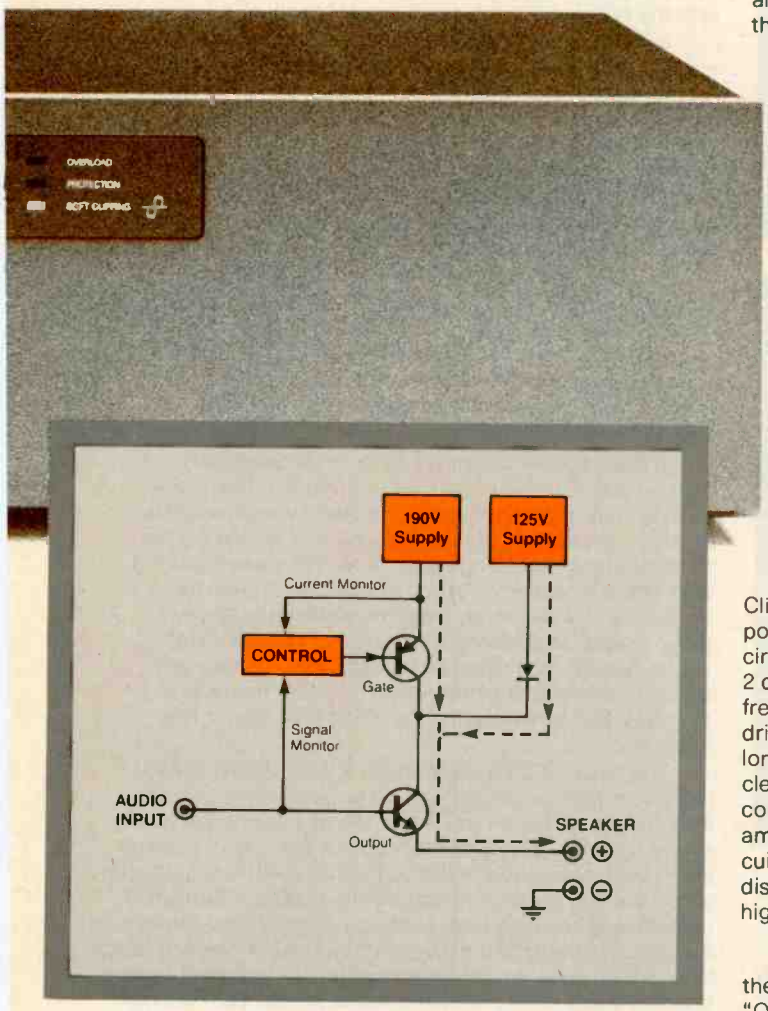
☐ **Produces 400 to 800 watts per channel of dynamic power for music (depending on impedance).**

☐ **Generates peak sound pressure levels above 115 dB with most speakers.**

☐ **Bridging circuit yields 400 watts continuous sine-wave output, over 1200 watts dynamic power for music.**

☐ **High-current output stage delivers peak currents up to 50 Amperes for precise control of voice-coil motion.**

☐ **Similar in size, weight, *and cost* to conventional 100-watt amplifiers.**



The dashed line in this simplified PowerTracker™ diagram shows the flow of current from the power supplies to the loudspeaker. At normal signal levels the 125-volt supply provides all current. When the audio signal rises above the 140-watt level a controller turns the "gate" transistor on, lowering its resistance nearly to zero so that maximum current can flow from the 190V supply. If the demand for current remains high, a second controller gradually shuts off the flow from the 190V supply to prevent overheating.

Inverted channels for powerful bass. The greatest power demands commonly occur at low frequencies. Bass signals are inphase (and virtually monophonic) in most recordings; thus when the bass waveform is strongly positive in the left channel, it usually is strongly positive in the right channel at the same time. As a result both channels draw current simultaneously from the positive half of the power supply, while the negative half sits idle. During the negative half of the waveform, both channels draw from the negative supply while the positive supply sits idle.

In the NAD 2200 the right channel is internally inverted in polarity. When a bass waveform causes the left channel to draw current from the positive supply, the right channel draws its bass power from the negative supply, and vice-versa. This efficient usage halves the instantaneous drain on either supply, allowing much stronger bass to be reproduced without draining the supply.

Bridging. The NAD 2200 is so powerful in the normal stereo mode that few listeners will ever need more. For special situations the two channels of the 2200 can be bridged to form a mono amp of truly immense power. Its rated continuous sine-wave output is 400 watts, while its dynamic power output exceeds 1200 watts into 8 ohms and 1600 watts into 4 ohms. Two 2200s in bridged mode (delivering over 3 kilowatts into a pair of 4-ohm speakers) would cost about the same as an ordinary 400-watt amplifier.

Quiet circuitry. The delicacy and purity of low-level musical information is as important for realism as the power to handle climaxes. The signal-to-noise ratio of the 2200 (relative to its rated 100 W/ch output level) is greater than 111 dB.

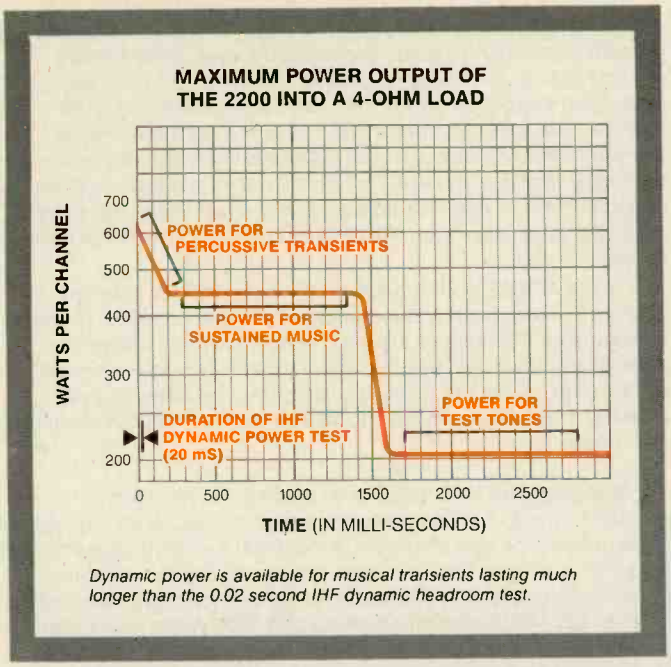
No fan noise. In most power amps that are capable of the same 500 W/ch output on musical signals as the 2200, a noisy fan must be used to dissipate excess heat from the circuitry. The efficient 2200 is totally, blissfully silent in operation.

Close-tracking Soft Clipping.™ The newly improved Soft Clipping™ circuit in the 2200 accurately tracks the available peak power, regardless of speaker impedance. Older Soft Clipping™ circuits tended to reduce the available dynamic power by 1.5 to 2 dB in order to ensure that continuous output would always be free from harsh distortion (even when the amplifier was overdriven). With the new PowerTracker™ circuit, this limitation no longer applies. Now the amplifier's sound remains subjectively clean and transparent right up to the maximum output level. It continues to sound good even at levels 2 to 3 dB above the amplifier's rated maximum output, since the Soft Clipping circuit gently rounds off the waveform corners and prevents any distortion due to power-supply modulation as well as reducing high order harmonics which may damage tweeters.

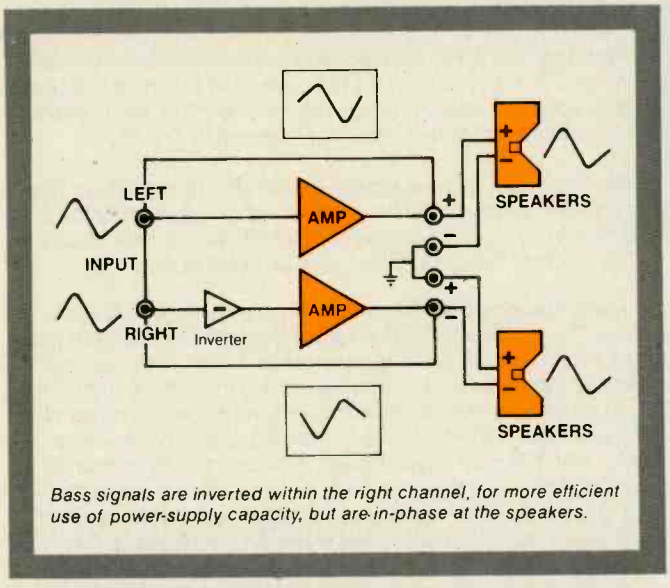
"Audible Clipping" Indicator. To enable the user to make the fullest use of the dynamic power of the 2200, a front-panel "Overload" LED indicator illuminates whenever the amplifier is driven into clipping (or exhibits any other distortion) for a long enough time to be audible. Its calibration is based on psychoacoustic studies showing that the audibility of clipping depends not only on the severity of the resulting distortion but also on its duration. (If an intense but brief transient overloads the amplifier for less than a thousandth of a second, you can't hear it.)

The indicator works by comparing the output signal with the input, instant by instant. Ideally the amplifier's output signal should be an exact replica of its input, scaled up by a factor of 40 in voltage. The comparator circuit divides the output signal by 40, subtracts it from the input signal, and flashes the LED if there is any potentially audible deviation from perfect linearity.

NAD



Dynamic power is available for musical transients lasting much longer than the 0.02 second IHF dynamic headroom test.



Bass signals are inverted within the right channel, for more efficient use of power-supply capacity, but are in-phase at the speakers.

Bjørn-Erik Edvardsen, Director of Research, and principal designer of the Model 2200. Mr. Edvardsen holds 3 patents in the field of amplifier design and has worked for several years on perfecting the concept behind the 2200's unique circuitry.

The NAD 2200 is a "commutating" power amplifier. i.e., it has two power supplies, switching to the high-voltage supply when maximum power is needed, and switching to the lower-voltage supply for cooler operation at average power levels. (The switch is called a commutator; hence the name for this type of amplifier.) By itself, the basic idea is not new. What makes the NAD 2200 unique is how dramatically it overcomes the two problems that other commutating amplifiers suffer from: (1) poor efficiency, resulting in high heat dissipation in the power supply and consequently high cost; and (2) switching transients, which can become a form of audible distortion.

Basically, any power amplifier consists of two parts: a power supply and an audio circuit. The audio circuit functions as a valve, opening and closing to feed current from the power supply to the loudspeaker in accordance with the demands of the audio signal.

In the case of the 2200, the audio circuit is a fully complementary DC-coupled class A/B circuit designed for 500-watt output, operating in class A for distortion-less sound at low levels and moving into class B for clean, efficient operation at higher levels. It has a fast, high-capacity output stage equipped for the high peak currents (> ± 50 Amperes) and the large peak-to-peak voltage swing (190 volts) that are appropriate to a well designed 500-watt amplifier.

The high-voltage power supply in the 2200 provides the 190-volt swing needed for full-power operation, but it is deliberately designed to be self-limiting, able to supply high current for only a brief period. The lower-voltage supply provides a 125-volt swing and has ample capacity to run the amplifier comfortably at 150-watt levels all day long.

If the amplifier were built for a *continuous* 500-watt output, it would require an enormous power transformer, special-order high-current filter capacitors, plus an elaborate system of heat sink fins and ventilating fan to dissipate the resulting waste heat. The manufacturing cost of the amplifier would be doubled or tripled, for no purpose. Music rarely requires an average power much greater than about 50 watts (even for very high volume levels), and very few loudspeakers can absorb a continuous output of 500 watts for more than a few seconds. Music is dynamic, requiring high power only in bursts.

The NAD 2200 PowerTracker™ circuit is designed to reproduce music. Its high-voltage power supply contains a solid-state memory device that stores information on the recent history of the amplifier's output current and consequent heat dissipation. If the output has been fluctuating up and down (i.e. playing music), then the average current is modest, and the high-voltage supply continues to operate at full capacity, ready to supply high power when needed. But if the average goes up, reflecting a constant output of several hundred watts for more than a few seconds, then the high-voltage supply gradually shuts itself down, forcing the amplifier to derive its power mainly from the lower-voltage supply.

Thus while the NAD 2200 functions as a 500-watt amplifier with musical signals, it cannot be made to overheat. And when fed continuous sine-wave test tones it becomes, in effect, a 150-watt amp. Its operation is so efficient that the size, heat dissipation, and manufacturing cost of the 2200 are nearly the same as an ordinary 100 to 150-watt amplifier.

If commutator switching occurs at low power levels, the switching transients can become a form of audible distortion. This doesn't happen in the NAD 2200, for two reasons.

(1) The changeover to the high-voltage supply occurs only at rather high power levels (around 140 watts). Relative to this level, even an ordinary switching transient would represent an inaudibly small percentage of distortion. In

most music there is no switching at all; the high-voltage supply is used only during those brief transients and climaxes that demand the top 6 dB of the amplifier's dynamic range, when peak sound levels typically exceed 110 dB (6 ohm speaker, 88 dB sensitivity).

(2) The 2200 does not abruptly switch from one supply to the other. The output stage is permanently connected to the lower-voltage supply. The commutator is simply an electronic gate that opens when needed to allow current to flow from the high-voltage supply—quickly enough to supply the power needed for sudden full-power transients, but smoothly enough to guarantee that no switching transients are ever detectable in the output signal.

Chief Engineer Peter Bath analyzing signal path at NAD Electronics' research lab in London.

ABOUT NAD:

NAD is the world's leading manufacturer of affordable high-quality stereo equipment. Since 1978, NAD stereo components have won universal praise for their sophisticated engineering, excellent sound, ease of use and superior price performance value. NAD products are sold by a carefully selected network of dealers in twenty-nine countries around the world. If you haven't seen the name before, it is because NAD invests most of its money in engineering rather than advertising—relying on enthusiastic word-of-mouth publicity and an unbroken string of rave reviews in magazines to spread the news of the superiority of NAD's designs. In keeping with its dedication to high value engineering and innovative product design, NAD is proud to introduce the Model 2200 Power Amplifier.

NAD manufactures an entire line of home electronics, including stereo and video components, loudspeakers and accessories. Above, the 2200 is featured with the 1155 Preamplifier and 4155 Tuner.

Specifications
NAD 2200 Power Amplifier

Measured in accordance with EIA Standard RS-490 (IHF A-202).

Stereo Mode

CONTINUOUS AVERAGE POWER OUTPUT INTO 8 OHMS (Min. RMS power per channel, 20Hz–20kHz, both channels driven, with no more than the rated distortion)		**100 W** (20 dBW)
Rated distortion (THD, 20Hz–20kHz)		0.03%
Clipping power (maximum continuous power per channel)	**8 ohms**	140 W
	4 ohms	200 W
IHF dynamic headroom at 8 ohms		+6 dB
IHF dynamic power (maximum short-term power per channel)	**8 ohms**	400 W (26 dBW)
	4 ohms	600 W (28 dBW)
	2 ohms	800 W (29 dBW)
Slew factor		>50
Slew rate		>35 V/usec
Damping factor (ref. 8 ohms, 50 Hz)		100
Input impedance		R=25K ohms C=1.0 nF
Input sensitivity for 1W/100W out		70 mV/700 mV
Voltage gain		40× (32 dB)
Frequency response, LAB input		3 Hz to 80 kHZ +0, −3 dB
Infrasonic filter, NORMAL input		−3 dB at 15 Hz, 12 dB/octave
Ultrasonic filter, NORMAL input		−3 dB at 40 kHz 12 dB/octave
Signal/Noise ratio, A-weighted		>91 dB re 1 W >111 dB re 100 W
THD (Total Harmonic Distortion, 20Hz–20kHz, from 250mW to rated output)		<0.03%
SMPTE I.M. (Intermodulation Distortion, 60Hz+7kHz, 4:1, from 250mW to rated output)		<0.03%
IHF I.M. (CCIF IM Distortion, 19+20 kHz at rated output)		<0.03%

Bridged (Monophonic) Mode

CONTINUOUS AVERAGE POWER OUTPUT INTO 8 OHMS (Min. RMS power per channel, 20Hz–20kHz, both channels driven, with no more than the rated distortion)		**400 W** (26 dBW)
IHF dynamic headroom at 8 ohms		+5 dB
IHF dynamic power (maximum short-term power per channel)	**8 ohms**	1200 W (31 dBW)
	4 ohms	1600 W (32 dBW)

Physical Specifications

Dimensions (width × height × depth)	42 × 12.3 × 37 cm. 16.5 × 4.8 × 14.5 in.
Net weight	12.5 kg./27.6 lb.
Shipping weight	14 kg./30.8 lb.
Power consumption	50/60 Hz at 110, 120, 220, or 240 VAC 770 watts

NOTE: All specifications are those in effect at the time of printing.
NAD reserves the right to change specifications or designs at any time without notice.

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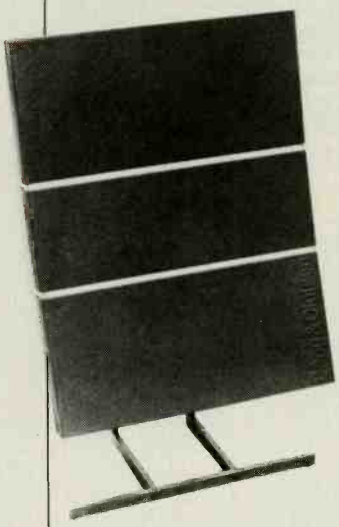
BOSTON/LONDON/TOKYO



Bang & Olufsen Speaker

The front of B & O's new Red Line RL 60 speakers looks fairly conventional: A grille cloth covering twin, 5-inch woofers and a 1-inch dome tweeter. The back is a molded, complex-curved surface of ABS plastic with reinforcing ridges, designed to eliminate parallel interior surfaces. According to B & O, the 7-inch-deep cabinet has 10 dB less cabinet sound radiation than traditional wood designs. The RL 60's sensitivity is 93 dB for 1-watt input, yielding 102 dB of sound pressure from only 8 watts, and up to 115 dB with higher power. The speaker is designed to handle 60 watts continuous power and 90 watts peak. Frequency response is 45 Hz to 20 kHz (+4, −8 dB). The Red Line speaker has a charcoal-gray cabinet with a thin, red outline; a matching, red-and-black coiled cable is also available, as are floor stands and both fixed and swivelling wall brackets. Price: $500 per pair.
For literature, circle No. 100

Dual Turntable

The 505-2 is a single-play, semi-automatic, belt-drive turntable. Its chassis suspension, four foam-damped springs in a solid wood base, was developed from the one used on earlier 505-series turntables. The straight, ULM (ultra-low mass) arm is made of an alloy said to be rigid and resonance-free. It is dynamically balanced in all planes within a four-point, gyroscopic gimbal. Features include a 16-pole motor, calibrated anti-skating, 6% pitch control, and damped cueing. Price: $199.95.
For literature, circle No. 102

Koss Headphones

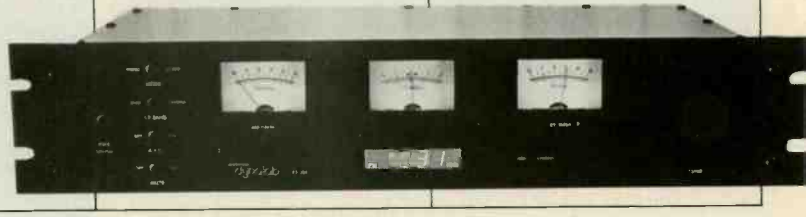
The KSP II headphones rest on the user's temples as well as ears, for firm fit without undue ear pressure. The ear cushions are of acoustically transparent foam, and the headset collapses for easy storage in a tote bag. The cord has a 3.5-mm plug for portable players, with a ¼-inch plug adaptor for home use. Frequency response is rated at 20 Hz to 20 kHz. Price: $34.95.
For literature, circle No. 101

CWD Cabinet Accessories

Wooden roll-up doors are now available for Custom Woodwork & Design's 21- and 30-inch-wide Woodmore cabinets. The razor-sliced doors roll into a 3¼-inch pocket in the upper section of the cabinet. Also available is a drop-leaf door for 24-inch-wide Woodmore cabinets. Prices for oak: 21- and 30-inch roll doors, $155; 24-inch drop-leaf, $52.
For literature, circle No. 103

Magnum FM Tuner

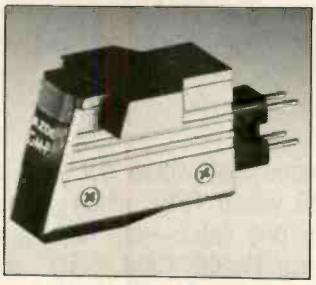
Best known for its Power Sleuth FM antenna booster amp, Magnum Electronics has just produced its first home component, the Dynalab FT-101 tuner. Built around a 4-stage, MOS-FET front-end, the FT-101 features three meters (signal, multipath, and center tuning), switchable bandwidth, and defeatable AFC. Specifications include 34.0 dBf sensitivity for 50-dB quieting in stereo, and 30-dB *adjacent*-channel rejection. Price: $495.
For literature, circle No. 104



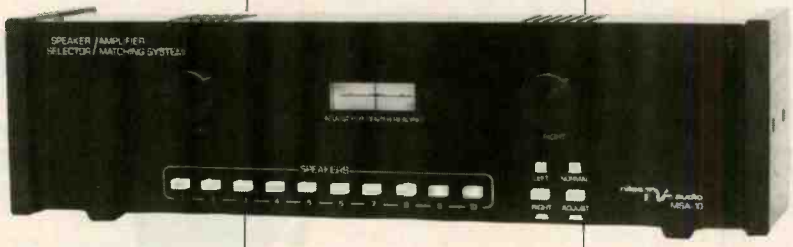
Recoton Record Brush
The bristles of the RBM-64 brush are actually carbon-fiber filaments which drain away static charges as they reach into the record grooves for dust. When the brush is not in use, its handle flips down to act as a storage base. Price: $7.95.
For literature, circle No. 105

Ariston Turntable
The semi-automatic RD20 turntable features an integral record-clamping system, decoupled suspension, and a 2.2-pound platter machined to 0.0004-inch accuracy. Rumble is rated at less than −74 dB, and wow and flutter less than 0.07%. Price: $250.
For literature, circle No. 106

Azden MC Cartridge
The GM-P5L moving-coil cartridge can be used in both P-mount and standard arms. Its stylus is a nude, line-contact diamond on a boron cantilever with a one-point suspension system. A high-energy, samarium-cobalt magnet keeps the cartridge's mass low (5.9 grams; 8.8 grams with standard-arm adaptor) while maintaining normal MC-cartridge output level (0.2 mV). Frequency response is rated at 10 Hz to 60 kHz. Price: $250.
For literature circle No. 107



Ohm Loudspeaker
The Walsh 3 is a two-way system combining Ohm's exclusive Walsh inverted woofer/midrange unit with a conventional, ferrofluid-cooled tweeter. The Walsh 3 features low, high, and perspective controls, each with three positions, and a floor-standing cabinet on casters. Specifications include rated frequency response of 39 Hz to 16 kHz, ±4 dB, and sensitivity of 87 dB at 1 meter, for 2.83 V input. The cabinet comes in walnut or oak veneer, with rosewood and lacquer available on special order. Price: $1,395 per pair.
For literature, circle No. 109



Niles Speaker Switch
Up to 10 pairs of speakers with nominal impedances of 2 to 16 ohms can be hooked up to any amplifier with the Niles Audio MSA-10 switch, and that amplifier will still see a nominal 8-ohm load. The matching transformers, less wasteful of amplifier power than resistive matching networks, can be set for proper adjustment with the built-in meter. Power-handling capacity is 250 watts per channel, and the rear-panel screw terminals are able to accommodate up to 14-gauge wire. The MSA-10 is a.c.-powered and draws 5 watts. Price: $550.
For literature, circle No. 108

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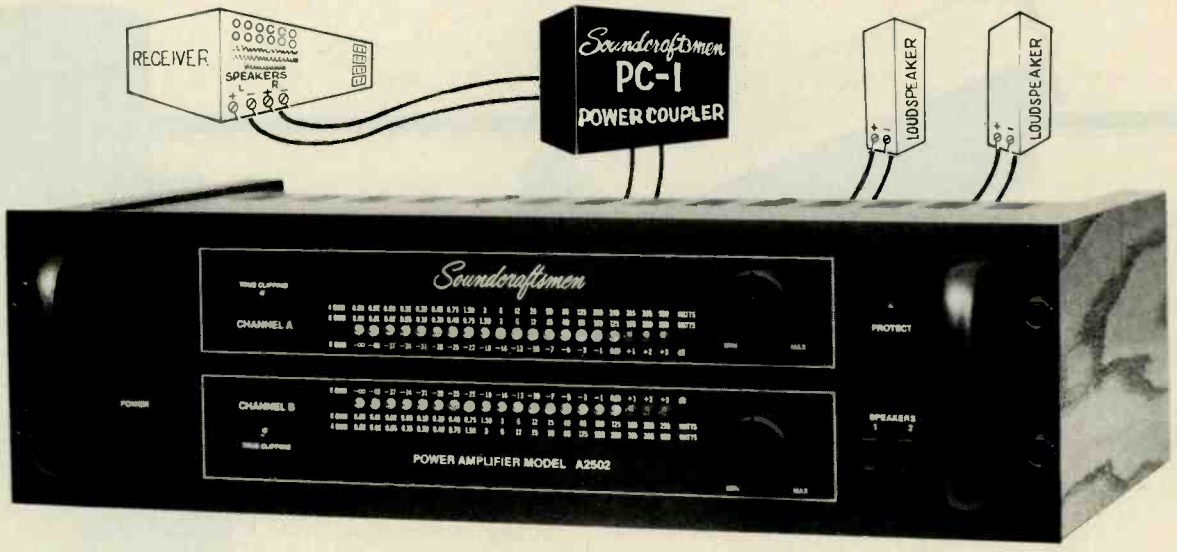
or "How our new MOSFET amplifier and *your old receiver* can make beautiful music together"



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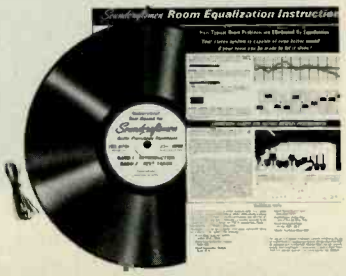

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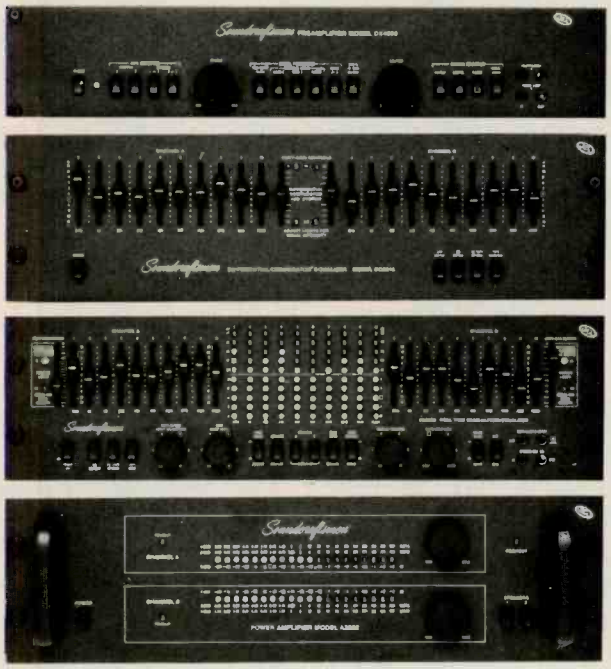

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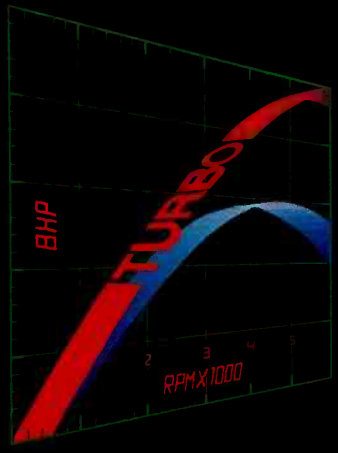

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KEN POHLMANN

FISHING THE DOWNSTREAM BIT

Illustration: George Blume

A Compact Disc is a thing of beauty, especially if you angle it just right so you can see your own reflection. When you see that mug smiling back at you, it's hard to believe that you're looking at 10 billion pits spiralling around that mirrored surface. Actually, they're pretty hard to see—don't even bother trying with a conventional microscope. Just to make sure there is really something there, I recently put a disc under a scanning electron microscope and even it had a hard time seeing the pits.

The pits, as we saw last month, are only a physical manifestation of some complicated data coding, including multiplexing, interleaving, parity, error protection, and EFM (eight-to-fourteen modulation). That coding takes place when the CD master tape is made, and the pits are derived from it at the lathe when the master disc is cut. But the task of deciphering everything falls to your CD player every time you listen to a tune. Let's jump back into the bit stream and examine decoding.

The CD player must read the channel bits from the disc, process them, and deliver an analog audio signal to its output jacks. This requires a hefty amount of signal processing, and the complexity of the task accounts for the design differences among players, but the overall scheme is always about the same. The story begins at the player's optical pickup . . . .

When the laser beam is reflected or dispersed at the disc surface, the varying intensity of the returned beam is detected by a four-quadrant photodiode sensor. It is the voltage from the sensor which is ultimately transformed into the analog audio-signal output. However, important signal processing must first occur to properly convert the encoded data to an analog signal, as illustrated in Fig. 1. The signal encoded on the disc utilizes EFM, which specifies that the signal be comprised of not less than two or more than 10 binary zeros between 0-to-1 transitions (pit edges). This results in pit lengths expressed in a variety of combinational patterns from three to 11 units long, which, in turn, sets the frequency limits of the EFM signal read from the disc. Sometimes, this range is referred to as a 3T-11T signal, with T representing the period of one bit.

The photodiode and its processing circuits produce a signal resembling a series of high-frequency sine waves, called the EFM signal, in which the minimum time for 3T is approximately 700 nS; it is sometimes referred to as the r.f. signal or the eye pattern. The information contained in the eye pattern is shown in Fig. 2. Whenever a player is tracking data, the eye pattern is present, and the quality of the signal may be observed from the pattern. For example, a skewed disc would result in a distorted eye pattern. Although this signal is comprised of sine waves, it is truly digital; in fact, it undergoes processing to convert it into a series of square waves more easily accepted by the digital circuits which follow. This does not affect the encoded data, since it is the width of the EFM periods which hold the information of interest. Following conversion of the eye pattern to square waves, the signal is in NRZ (nonreturn to zero) form, the classic representation in which a high level is a one and a low level is a zero.

The first data to be extracted from the NRZ signal are synchronization words—frame-synchronization bits which were added to each frame during encoding. This information is used to synchronize the 33 symbols of channel information in each frame, and a synchronization pulse is generated to determine whether the digital information in each bit is a one or a zero.

The EFM signal is now demodulated so that every 17-bit EFM word again becomes eight bits. Depending on player design, demodulation is accomplished by logic circuitry or by a look-up table—that is, a list stored in memory which uses the recorded data to refer back to the original patterns of eight bits. Since interleaving was the last signal-processing step prior to modulation, de-interleaving is the first processing step after demodulation. A random-access memory is used to properly delay and de-interleave the data; following this operation the data again exist in proper sequence, as audio data words with error protection. During decoding, a buffer is used; a disc's rotational irregularities might make data input to the buffer irregular, but clocking ensures that the buffer output is precise. To guarantee that the buffer neither overflows nor underflows, a control signal is generated according to the buffer's filled level at a given moment and is used to control the disc's rotating speed. By varying the rate of data from the disc, the buffer is maintained at 50% capacity. It's

like water behind a dam being released at a controlled rate through the turbines, except we also have control over how fast the snow is melting in the mountains.

Following demodulation, data is sent to a Cross Interleave Reed-Solomon Code (CIRC) decoder for error detection and correction. The CIRC is based on the use of parity bits and an interleaving of digital audio samples. Because of interleaving, data lost from one frame can be reconstructed from information contained in another frame. The correction circuitry thus contains an internal memory able to work with many frames at once. The CIRC permits complete correction of burst (continuous) errors up to about 4,000 bits, and recovery through interpolation (approximate correction) of up to about 12,000 bits. If the error count exceeds the correctable limit, a second circuit provides for muting of the audio signal.

We'll reserve exhaustive explanations of error protection for future columns; meanwhile, a quick summary will do. The CIRC strategy uses two decoders, C1 and C2. During encoding, two kinds of parity bits were added, P and Q (not to be confused with the PQ subcode!). During reproduction, P parity is checked first during C1 decoding; random, short-duration errors are corrected, and longer burst errors are flagged and passed to C2. In C2 decoding, Q parity and longer interleaving intervals permit correction of burst errors, and errors which might have occurred in the encoding process itself (rather than in the medium) are corrected. As in C1, uncorrected errors are flagged and passed on.

Interpolation and muting circuits follow the CIRC in a Compact Disc player; in this stage, uncorrected words are detected via flags and dealt with, while valid data passes through, unprocessed. Interpolation is the technique of using valid data surrounding an error as a basis for an approximation of the erroneous data; errors are thus not corrected, but concealed. However, because of high correlation between music samples, concealment by interpolation is generally quite successful. Methods vary from player to player according to the degree of interpolation used. In its simplest form, zero-order interpolation holds the previous value and repeats it to cover the missing or incorrect word. In first-order interpolation, the erroneous word is replaced with a word derived from the mean value of the previous and subsequent data words.

For continuous errors, muting is employed as a last resort; bad data passed on to the D/A converter could result in an audible click, whereas muting is almost always inaudible. Muting is accomplished smoothly by beginning attenuation several samples before the invalid data, muting the invalid data, and then smoothly restoring the signal level.

It should be noted that CD players are not created equal in terms of error protection. Any player's error-protection ability is limited to the success of the strategy chosen to decode the CIRC code on the disc and to perform interpolation. It is hoped that manufacturers will begin to publish meaningful specifications for error-protection performance.

Following error correction, the bit stream must undergo one final manipulation. Left and right audio channels must be delineated and their respective samples joined together in the same sequence and at the same rate in which they were recorded. Following this process, the data has been reconstituted to the player's best ability. After a quick trip through the D/A converters and low-pass filters, the signal is ready for amplification.

The Compact Disc bit stream is, obviously, a little trickier than one might assume. In the interest of density and robustness, the data must undergo some sophisticated processing during both encoding and decoding. I guess that's all the more reason to appreciate the sound your CD player delivers. So next time you are listening to the Trout Quintet, remember the bit stream it came from.

Fig. 1— CD decoding system.

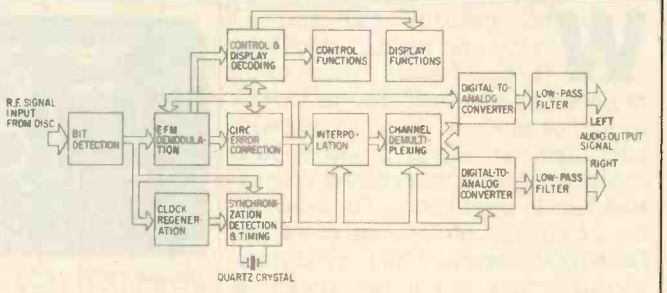
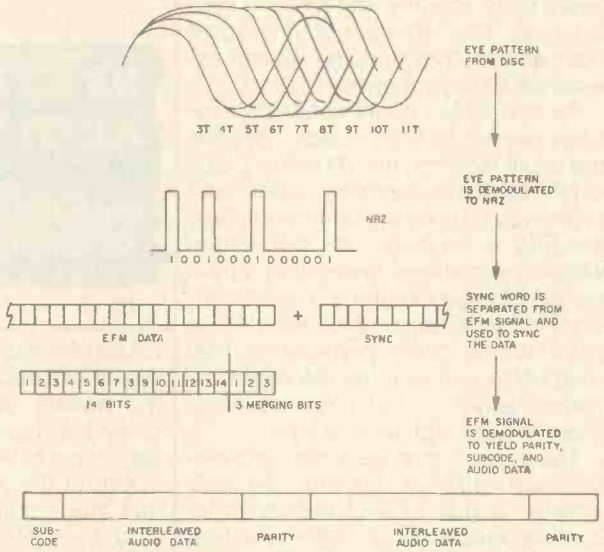


Fig. 2— Demodulation and decoding, from r.f. signal to subcode, parity and audio data.



IVAN BERGER

TRENDS FOR THE TRAIL

Who designs car-stereos? "Most of them," says Ken Furst of Denon, "seem to be designed by people who come to work by cab or subway." As you might suspect from that, Denon's new in-dash cassette tuners and receivers emphasize human engineering. For example, the 27 controls on their top-of-the-line DCR-7600 cassette tuner are divided into six groups and at least seven different types (knobs and buttons of different sizes, toggles, and an outer control ring). This lets your fingers figure out just what they're doing without assistance from your eyes.

As the control count suggests, features are not in short supply. Besides the usual facilities, the 7600 has Dolby C NR, loudness controls, "Tuner Call" (it lets you listen to the tuner when fast-winding a cassette—or not listen, which is sometimes preferable), and a dynamic-range expander. I'm not convinced that a compressor wouldn't be more to the point, considering how road noise can limit the listenable dynamic range . . . but I reserve judgment 'til I get a chance to try it.

The current emphasis on ergonomics—not just at Denon, by any means—is due to several factors: Increased emphasis on highway safety, the urge to offer benefits that even those who don't understand specs or circuit features can appreciate, the desire to develop a distinctive look, and the advent of control circuitry that gives the designer almost infinite leeway in panel layout.

Denon DCR-7600

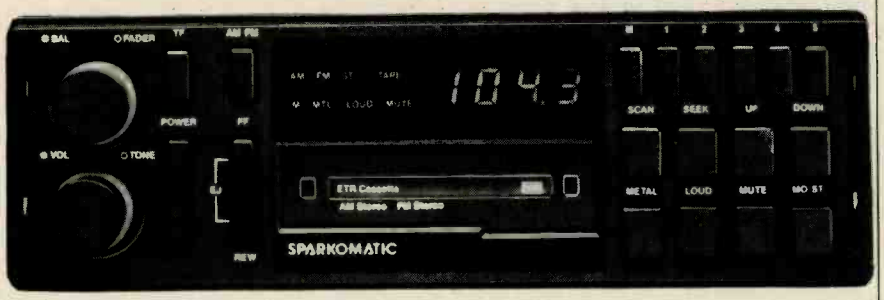
Pioneer Centrate FEX-55

Part of that leeway comes from the fact that controls need no longer be near the circuits they operate. A bit more comes from the use of digital circuitry which allows the substitution of buttons or rocker switches for the old, familiar knobs.

Eliminating knobs makes for a sleek and sexy look, as evidenced by the Pioneer FEX-95 reviewed last month, their similar-looking new FEX-55, Jensen's ATZ500 and ATZ300 (introduced last year, but now also available in black), and some of the new JVC units. But, as I've found from a further month's experience with the FEX-95, eliminating knobs also makes operation a bit harder when the car is bouncing over bumps. So there's more than stodginess behind the retention of knobs for volume and tone and/or balance control by so many other new-style car-stereo units (such as the Sparkomatic SR 425, Kraco KF-1186, and Pioneer's KEH-9000). Even the old, original, knob-at-each-end, dial-in-the-middle design has nothing wrong with it except for limiting the room available for buttons and switches.

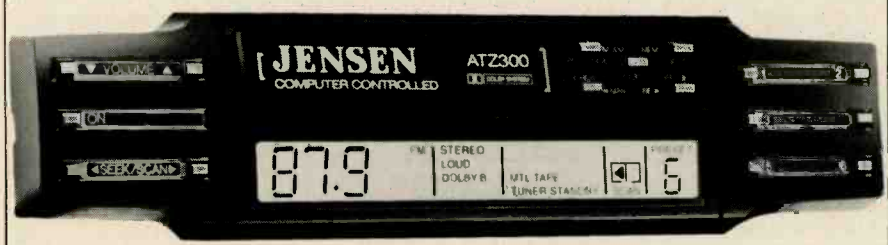
And knoblessness does not ensure clean design, as evidenced by Kraco's smooth-looking KF-1186, with knobs, and their nervous-looking KF-1190, without. The latter has nice, V-shaped volume and tuning rockers, which are slightly easier to use than flat buttons.

One reason for turning this month's column into a picture gallery is to show how many ways designers can use their new freedom. Another reason is



Sparkomatic SR 425

Jensen ATZ300



VALUE

Introducing Karat — a new generation of bookshelf speakers from Canton.

With Karat, Canton leads the way into the digital era of sound reproduction. The result is sound so natural and free of coloration you must hear them to appreciate the acoustic achievement this series represents.

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Value in terms of detailing goes into every Canton speaker as well. That's why we offer our speakers in a variety of fine finishes, like walnut and oak veneers, rich black, bronze and white lacquers and now a premium finish, gloss mahogany. For at Canton, we believe speakers should look as good as they sound.

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Enter No. 12 on Reader Service Card

Knobless panels are sleek and sexy, but harder to use when the car bounces. Retaining knobs is not stodgy, but practical.

Kraco KF-1186

Kraco KF-1190

that the in-dash units I saw at CES last January were not all that exciting in terms of features or performance—a lot of gradual improvement, but no breakthroughs. Instead, the breakthrough features of the last few years are working their way down into the lower price ranges—good news for the average buyer, anyway.

It's easy to spot trends in such a time of gradual change. For instance, AM stereo is slowly but surely catching on, as witnessed by new models introduced at CES by Sparkomatic, Kraco, Sony and Concord, and a prototype shown by Panasonic. All but the Sony are designed for the Motorola C-Quam system; the Sony can decode any of the FCC-authorized systems. In stereo's wake we're likely to see improved AM performance: Sparkomatic's SR 430, for example, has switchable AM bandwidth (as does the Pioneer FEX-95 tested last month), plus some AM specifications said to be identical to the unit's FM specs.

Pioneer KEH-9000

Pioneer CDX-P1 CD player

Another trend is toward more potent noise-reduction systems. Denon, Harman/Kardon and Sony, for instance, have swelled the ranks of car-stereo makers offering Dolby C NR, while Yamaha and Concord now have models with Dolby C plus dbx.

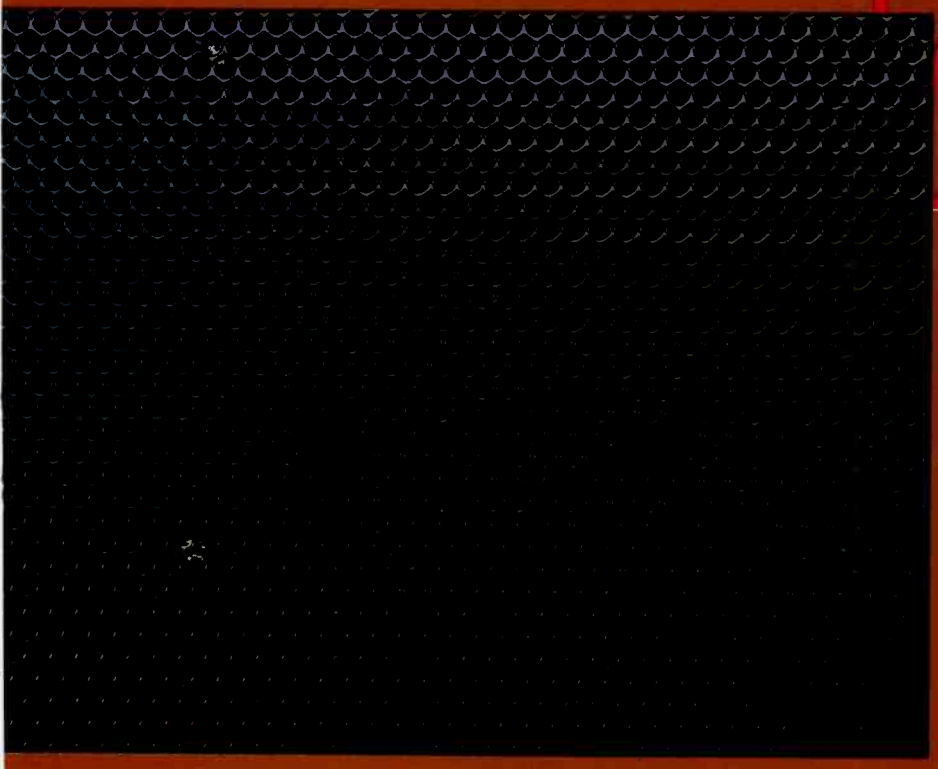
There's also a trend toward audiophile circuit design, but it's just beginning to crawl. For example, Class-A circuitry is no longer just in power amps (such as Denon's, Alphasonik's, and Soundstream's)—the preamp sections of Harman/Kardon's new in-dash units boast of Class-A, fully complementary, all-discrete circuitry with low negative feedback (22 dB) and wide bandwidth (10 Hz to 100 kHz). Name your circuit type—or buzzword—and you have but to wait until it appears in the car.

Or almost so—I don't expect to see tube amps in any hurry. On the other hand, who knows? For its first 30 years or so, car audio used only tubes—and mainly in Class A, with little or no negative feedback, at that. Of course, that was on the cheaper units, with single-ended output stages; the better models used two output tubes, in push-pull . . . and in Class AB.

What about CD players? Sony and Pioneer have two models apiece in their current lines: Sony's CDX-R7 and CDX-5 are with and without tuner, respectively; Pioneer's CDX-1 and CDX-P1 are, respectively, for Centrate and more conventionally configured systems. Though others will be joining them, none seem in any rush. Mitsubishi's CD-100 should be available about now. Kenwood has a working prototype which they expect to have in their line late this year. Ditto Yamaha, whose prototype did not accept bare discs, but only discs in special cartridges. Reportedly, NEC and Matsushita are showing similar—though perhaps not compatible—CD cartridge systems in Japan. Clarion's player, which takes discs in an envelope (it wasn't on the show floor), is planned for introduction in Japan this spring.

Meanwhile, if you already have a portable CD player, you can plug it into your existing system with Parasound's CDS-1 input-switcher box with volume control, input jack and 9-V a.c. power jack for the player. All it lacks is a shelf to rest the player on.

ADS



ADS Atelier:
World-class performance

ADS Loudspeakers:
Technological precision

ADS Automotive:
Continuing innovation

ADS high-performance audio:
An overview

ADS Atelier

P2, C2, A2, T2

P1, F1, C1

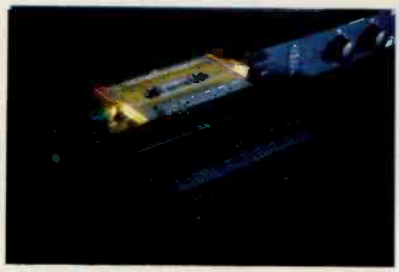
World-class performance

Both the audio press and knowledgeable consumers have been consistently enthusiastic about each model in the ADS Atelier component series. The consensus is clear — the engineering and electronic design of Atelier effortlessly deliver world-class performance. But the praise doesn't stop there. Over and over, reviewers and users mention that Atelier's design introduces a new, welcome friendliness to living with audio. These comments are particularly pleasing to us because we try never to lose sight of the fact that our products are as much about the simple enjoyment of music as the continual refinement of technology.

The design of the Atelier module gives components a new, accessible form. ADS technology fills that form with a new adaptability, offering consumers high quality equipment, built to last, that need not be replaced to be upgraded — a genuine system, specifically designed to grow. Atelier's fusion of design and technology (we think of the components as ingots of technology with the future built in) sets these components apart.

Once again, as with our home loudspeakers and our automotive products, ADS has defined the standard for the industry to follow. Experience Atelier for yourself. We know you'll be pleased.

Atelier components can be stacked, placed side by side, or located on shelves. Hinged panels cover all system wiring.

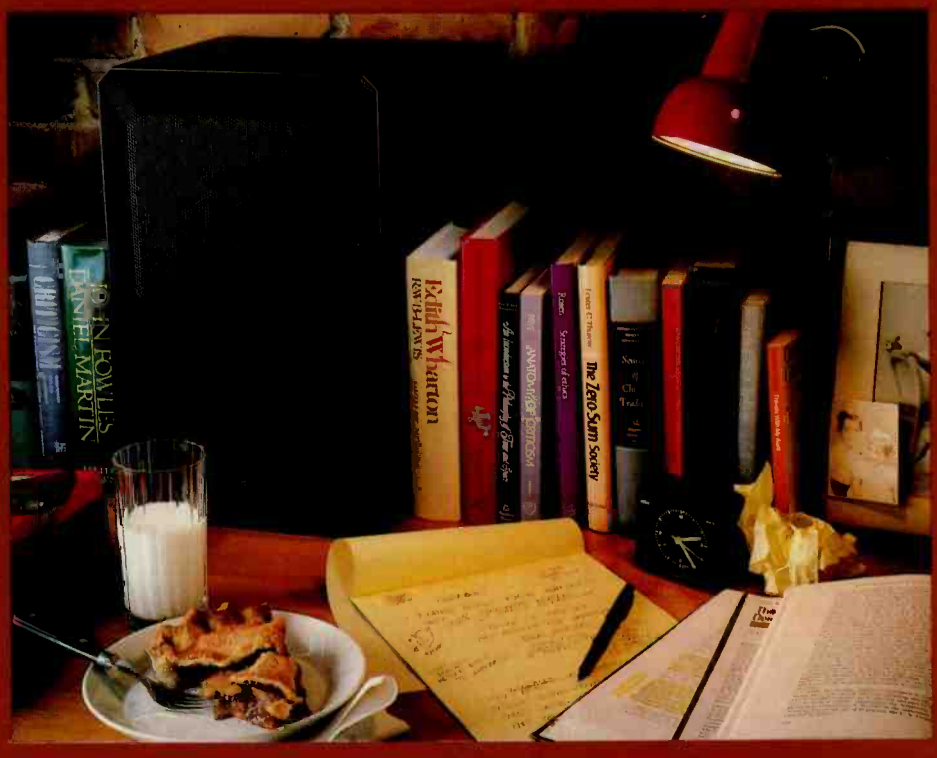


A motor-driven drawer in the C2 places the illuminated cassette at hand only when needed.

Digital accuracy, convenience and control are the hallmarks of the T2. The digital frequency synthesizer system also provides the convenience of 16 station presets and 'search' tuning.

ADS Loudspeakers

L1590



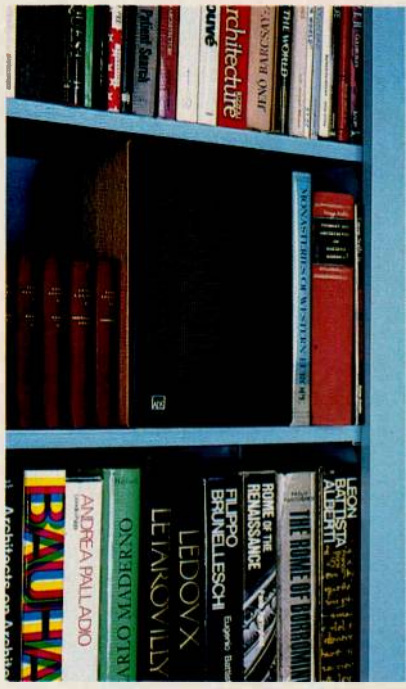
L470

Technological precision

The increased fidelity of digital recordings can be realized only by loudspeakers of impeccable accuracy and precision. Because of their musical integrity, ADS loudspeakers are used as monitors in the recording of many of the most respected Compact Discs. The experience gained from our decade of work with digital extends through the eleven home loudspeakers we offer. The line includes mini speakers (which we pioneered), two-way and three-way bookshelf models and monitor towers.

Every driver in every speaker is made by ADS. Each shares a technology unsurpassed worldwide. We use woven soft-dome tweeters and midrange drivers exclusively, to achieve clarity and pinpoint stereo imagery. Our Linear Drive woofers feature Stifflite® cones in butyl surrounds. Materials of this quality cost us more, but with them we can deliver bass performance unavailable any other way. Our crossover networks use computer-grade components and elegant circuitry designed to keep efficiency high. We're proud of our finishes, too. The veneers we choose are the best available, and great care is given to the craftsmanship.

We invite and encourage you to listen to the ADS loudspeakers. This level of precision and performance offers exceptional value at competitive cost.

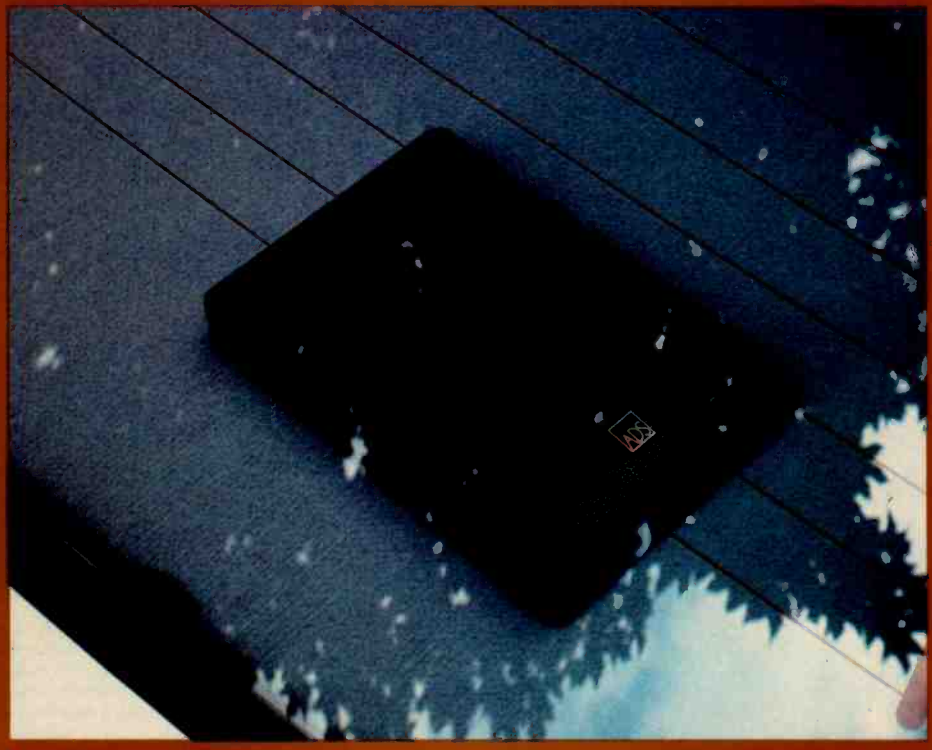


ADS pioneered the development of the high performance mini-speaker. The L400 places genuine high fidelity where it otherwise wouldn't have been possible.

The premium butyl surround allows long linear woofer travel for maximum movement of air while precisely controlling excursion for tight definition and low distortion.

ADS Automotive

320i



300i

Continuing innovation

There is an undeniable affinity between cars and music. More than transportation, the automobile at its best offers comfort, privacy and time alone — and no one has more experience bringing innovation to automotive high fidelity than ADS. Our early products were the first ever to introduce digital technology. They, and the products that followed, have built a loyal and enthusiastic group of ADS owners who are happy with the thought of driving anywhere.

We design and build every driver in our five automotive speakers with the same care and attention that we bring to our home loudspeakers. Every model features our proven performers — woven soft-dome tweeters, Stifflite woofer cones in butyl surrounds, and low-loss crossovers. Our exclusive Linear Drive bass design endows our subwoofers with sonic impact that larger, conventional woofers cannot approach. Our digital technology means that ADS Power Plate amplifiers will fit in more places, work more reliably, and sound better than any other choice you can make.

In size, shape, materials, finish and workmanship, we design ADS automotive products to take the bumps, the heat and the demanding use that are all part of being 'high performance.' You owe it to yourself to hear the best.

The unique materials and construction of the 320i system make it the right speaker for applications where flexibility, durability, and superior sound are required.

ADS Power Plates can be thought of as building blocks; they easily accommodate more speakers, additional amplifiers, or a subwoofer system.

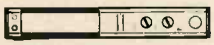
Atelier components

R1 Receiver

P2 Turntable

C2 Cassette deck

T2 FM stereo tuner



A2 Control amplifier

CD3 Compact Disc player
available in 1985

PA1 Biamplifier for L1290
and L1590

For suggested retail prices and specifications, see the directories in this issue of **Audio**.

A word about ADS dealers

The ADS commitment to quality extends to the dealers who sell our equipment. There are not many of them, and they are chosen for audio expertise and the ability to stand behind ADS honorably with service. To find the ADS dealer nearest you, call us, toll free, at 1-800-824-7888 (in California 1-800-852-7777), Operator 483. Mention that you read about us in Audio, and we will promptly send you the names and locations for your area.

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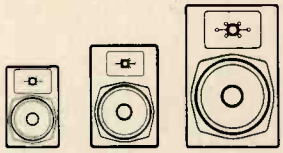
Massachusetts 01887
USA
617 658-5100

Loudspeaker systems

Minispeaker systems

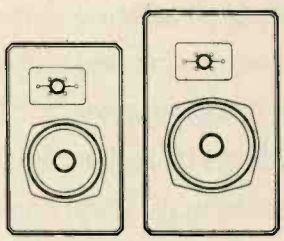


L200
black

L300
black
walnut

L400
walnut
oak

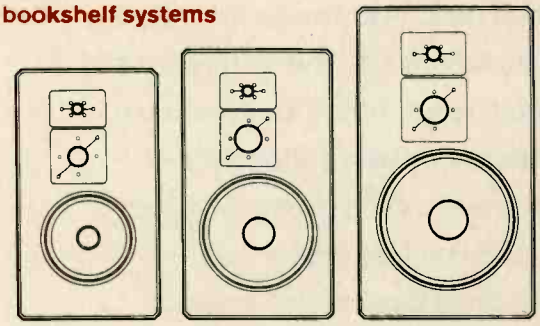
2-way bookshelf systems



L470
black
walnut vinyl

L570
black
walnut

3-way bookshelf systems

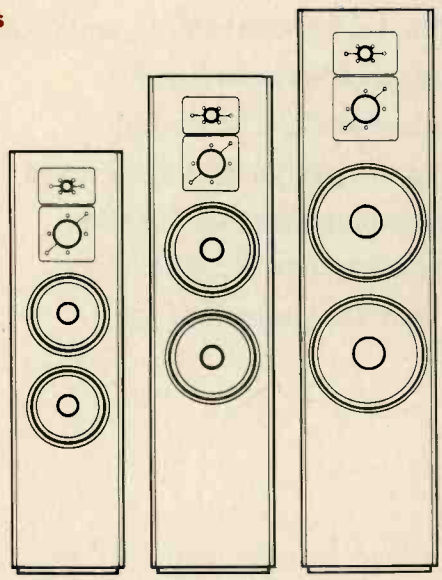


L780
black
walnut

L880
black
walnut

L980
black
walnut

Tower systems



L1090
black
walnut

L1290
black
walnut

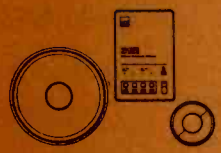
L1590
black
walnut
rosewood

Automotive products

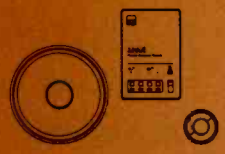
200CC Integrated loudspeaker system with swivel bracket

300CC Integrated loudspeaker system with swivel bracket

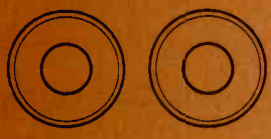
300i Integrated loudspeaker system



315i Discrete loudspeaker system



320i Discrete loudspeaker system with Samarium-cobalt tweeter



CS700 Subwoofer system with AX2 electronic crossover

P80 40W/40W high performance amplifier

P120 60W/60W stereo bridgeable power amplifier

HERMAN BURSTEIN

Input-Output Mismatch

Q. I seem to have several problems with my cassette deck. First of all, when I record with equal input levels on both channels, on playback the left channel is 1 to 2 dB lower than the recording level, while the right channel is 3 to 5 dB lower than the recording level. Also, when the tape is played in the reverse direction, there is an additional loss of about 3 dB in both channels.—Joe Faiferlick, Fort Dodge, Iowa

A. The difference between input and output levels can be accounted for by tape sensitivity, that is, the amount of tape output for a given signal input. Various brands and types of tape differ in sensitivity. The difference between the left and right channels can be due to miscalibration of the meters in recording or playback, or to differences in gain between the left and right channels in recording or playback. The difference in output between playback in the forward direction and in the reverse direction *might* be due to differences in output between the upper and lower gaps of the head.

It seems that the problems you describe are small enough to live with, at least until some other problem with your deck requires a trip to a repair shop.

Playback Misreading

Q. I recently had my old tape deck repaired but still have a problem with it. It records at one level but plays back at significantly higher levels, mostly in the red zone of the meters. I record at about the middle of the meter dials, but playback puts the meter needles out of sight. Also, the right channel seems worse than the left, which produces distortion to my ears. I have tried four different brands of tape, but all produce the same result. The problem existed before the repairs were made, and the service technician checked the meter calibration and said everything was okay. I have called other service shops, but they say that because my deck is 10 years old it's really not worth repairing. Should I give in and buy a new deck?—Eugene M. Forbes, Lake Ariel, Pa.

A. Most tape decks have meter-calibration potentiometers, both for recording and for playback, although less expensive decks may have fixed resistors for this purpose. I have no way of knowing what the situation is in your case. In any event, it appears that your meters are calibrated to read too low in recording, too high in playback, or a combination of these. From your statement that you hear distortion on the worse-adjusted channel, I surmise that the meters read too low in recording. If so, this should not be too difficult for a qualified technician to set to rights.

On the other hand, very good cassette decks, giving far better performance than your present unit, can be obtained today for less than $300. Considering that and your deck's age, it may well be unwise to put any more money into repairs. Even if your present problem is solved, there is a good chance of other problems soon developing in a deck so old.

Meter Calibrations

Q. I've purchased a cassette calibration tape which contains a 315-Hz test tone at 0 dB DIN. This tape reads +2 dB on my new cassette deck and +4 on my old one, whose 0 VU mark was calibrated at 160 nWb/m. When tapes recorded on the new deck are played on the old deck, the meters of the latter read 2 to 4 dB lower than when I originally recorded them. Shouldn't the meters of the old deck read +2? Should +7 dB on the new deck correspond to +5 dB DIN? How should I interpret the different readings of the meters?—Curtis P. Jeffries, New York, N.Y.

A. A number of cassette decks are calibrated so that 0 VU on the meters corresponds to Dolby level, which is 200 nWb/m. A number of others are calibrated so that 0 VU corresponds to the DIN (and IEC) standard reference level, which is 250 nWb/m, or about 2 dB higher than Dolby level. Therefore, your deck correctly reads +2 dB (relative to 0 VU) when playing a DIN calibration tape. The DIN level is about 4 dB above 160 nWb/m, so your old deck correctly reads +4 dB when playing the test tape. So far, so good.

But your problem, if I follow correctly, is that after recording a tape on your new deck, you get a reduced reading, rather than an increased reading, when playing the tape on your old deck. This may be due to a mismatch between the record and playback readings of one of your decks, probably the new one. When a tape recorded on the new deck is played back on it, does the playback reading match the record reading? If the playback reading is lower, there is your answer. Such a mismatch could be due to miscalibration of the meter or to variation in sensitivity among brands and types of tape.

If record and playback readings match on your new deck, the reduced reading on your old deck—not a very seriously lower one—could be due to the way the meters of this deck react to program material rather than steady tones. Or, again, miscalibration of the meters or differences in tape sensitivity could account for the situation.

Yes, +7 dB on your new deck should correspond to +5 dB DIN. As already pointed out, your deck reads +2 dB relative to 0 VU DIN, and therefore +7 dB relative to +5 dB DIN. (This assumes that the meters of your new deck are truly logarithmic so that they accurately represent level differences in dB.)

While on the subject, it should be pointed out that, in some decks, 0 VU corresponds neither to Dolby nor DIN level but *approximately* to the recording level that produces 3% harmonic distortion. Depending on the brand of tape and how the deck is set up with respect to bias and equalization, the 3% harmonic distortion level is typically about 2 to 6 dB higher than the DIN 0 VU level for Type I and Type II tapes; it is about 3 to 8 dB above DIN 0 VU level for Type IV tapes. Of course, this kind of meter calibration is employed only in decks with peak-reading meters. And, finally, in some decks the 0 VU level corresponds to a level below 0 VU DIN, sometimes as much as 5 dB below. Apparently the purpose here is to provide a very good safety margin against overrecording, to prevent distortion and treble loss.

So, what is the recordist to do? What is he to make of these various calibrations and interpretations? I suggest that you experiment with recording lev-

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.

No matter what EQ was used in recording, you may choose any EQ setting you wish in playback without harm to tapes or heads.

els, using the tape of your choice. Start with levels that cause peaks to drive the record-level meters to about 0 VU. Listen carefully to the playback. Successively increase the recording level about 1 or 2 dB at a time, until distortion and/or high-frequency saturation become noticeable in playback, and then back down 1 or 2 dB for safety. Depending on your deck and the tape you use, you might find that you get satisfactory recordings when the meters read as high as +7 or +8 dB, and occasionally even +10 or more.

Portable-Player Compatibility

Q. I recently purchased a personal portable cassette player which has a switch providing for playback of either "Normal" or "Metal" tapes; I assume this means the choice of either 120- or 70-μS equalization, respectively. However, the majority of my cassettes were recorded on my home deck using chromium dioxide tape, which utilizes 70-μS equalization. Therefore, when playing these cassettes with my portable unit, which playback setting should I choose, "Normal" or "Metal"? Will I damage the tapes or the playback head of my portable unit if I choose the wrong setting?

Also, my portable has an on-off switch for Dolby noise reduction, which I assume is Dolby B. But the majority of my cassettes were recorded with Dolby C. What will occur when playing the Dolby C-encoded tapes when the player is set for Dolby B? What will happen when the portable's Dolby B switch is off? In the future, should I record with Dolby B on my home deck if I plan to play the cassettes with the portable unit, or should I continue to record with Dolby C?—David M. Lukac, Towaco, N.J.

A. Equalization of 120 and 70 μS applies only to playback. (Much different equalization is employed in recording, varying according to tape type, the cassette deck manufacturer's notions about optimal bias current for each tape type, and other factors. The required record equalization is that which, in conjunction with standard 120- or 70-μS playback equalization, will result in flat response on a record-playback basis.) No matter what happened in recording, you may apply any kind of equalization you wish in playback without causing harm to the tapes or heads.

Dolby C NR applies substantially more treble boost in recording, and substantially more treble cut in playback, than does Dolby B. If you play a Dolby C-encoded tape with the deck set for Dolby B, the effect will be emphasized treble. If a Dolby C-encoded tape is played with no Dolby decoding whatsoever, the result will be still greater treble emphasis.

If you plan to use Dolby B in decoding, you should use Dolby B in encoding, unless you find that the extra treble emphasis due to Dolby C encoding is desirable, perhaps to compensate for a treble deficiency elsewhere.

Extra-Long-Play Cassettes

Q. I intend to purchase a cassette deck and wish to get maximum recording time by using C-120 or even C-180 cassettes. The programs that I plan to record are mostly speech. Do you know of any tape brands particularly suited to my purpose?—R. Kroenke, Mt. Shasta, Cal.

A. My experience with such cassettes is very limited inasmuch as they are not recommended for high fidelity. For this reason, and also because the policy of *Audio* prohibits me from recommending specific brands, I cannot answer your question directly. However, what experience I *have* had indicates that results are not as good as with the shorter tapes (C-90, C-60, etc.). Recordings don't sound as clean, and there is increased danger of the tape fouling up. However, your experience for your particular purpose may prove otherwise. When you get your deck, experiment with one or two major brands of the extra-long-playing cassettes and compare them with C-90s of the same brand.

Dolby Dubbing

Q. When copying a chromium-type tape that is Dolby-encoded, should the decks' Dolby switches be on or off? Should the tape-type switch be in the "chromium" position for both decks? When I make a copy with both decks' Dolby switches off, the tapes seem to sound fuller than with the switches on.—Deb Murphy, Chicago, Ill.

A. When copying a Dolby-encoded tape, *usually* the best procedure is to play the source tape with Dolby on and to record the copy with Dolby on. However, the proof of the pudding is in the eating. If the copy sounds better when dubbing with *both* Dolby switches off, then make your copies that way. In the case of a Dolby-encoded tape, the copy may sound fuller because of some loss of highs when playing with one deck and recording with another. This would be due to mistracking, which signifies that the signal level for Dolby decoding (playback) is not matched to the signal level for Dolby encoding (recording). Such matching is more difficult to achieve when using different decks for recording and playback instead of the same deck for both operations. Yes, the tape-type switch should be in the "chromium" position on both tape decks.

Adjusting Bias

Q. I am considering the purchase of a cassette deck that offers bias adjustment but not test tones. Is there a simple and effective way to adjust a deck to match a given tape?—Michael Deutsch, Los Angeles, Cal.

A. The easiest way to adjust bias is for flattest response, as judged by ear, when taping interstation FM noise. If the deck has separate record and playback heads, the adjustment can be made very quickly by monitoring playback while recording, and immediately comparing the playback sound with the source. If the deck uses the same head for recording and playback, it will take several trials to arrive at the optimum bias setting. That is, one records, rewinds, plays, and compares the playback sound with the source. If bias is too low, the tape will have exaggerated treble response; if too high, treble will be deficient. One makes a tentative bias adjustment in the proper direction and repeats the procedure until the optimum setting is reached.

Do not underestimate the importance and effectiveness of your own ears as measuring instruments. Should you find that there is a range of bias (usually small) within which you achieve flat response according to your ears, use the greatest amount of bias which still maintains apparently flat response. This will tend to minimize distortion.

Special Mixer Features

Q. On my mixer are connectors marked "Send" and "Receive." A short jumper cable connects the two. When I disconnect this cable, there is no sound from the output. What are these jacks for?

I would also like to know what the "Bus In" and "Cue Out" connectors on this mixer are for.—Tom Wick, Huntington Station, N.Y.

A. The "Send" and "Receive" jacks work like a preamp's tape monitor or external-processor loops, but without the front-panel switch. They allow equalizers, reverb units and other signal processors to be placed in the signal path, getting their signals from the "Send" jack and returning them to the "Receive" jack.

The "Bus" for each output channel is the common line into which all signals are mixed. If you need to mix more signals than your mixer has input channels for, you can feed the extras into the bus. The added signal sources must, of course, have output-level controls, since there will be no way of controlling these levels at the mixer. Bus jacks are also sometimes used to link two or more mixers together.

The "Cue Out" connector provides a way to listen to signals without their getting into the regular outputs of your mixer. This allows you to cue (or set a source to its start) without having that signal reach your tape recorder or the audience.

Spikes and Surges, Part II

In response to an item in the December '84 "Audioclinic" on "Spike Protection," I would like to add the following information:

Power surges and spikes of varying degrees can occur at any time. These surges and spikes are fluctuations on the line that can occur from a lightning strike as far away as five miles, a power company's switching of loads, nearby electric motors, a return to full power after a brownout, or various other unpredictable causes.

There are many products to protect equipment from these surges and spikes. Some are just plain surge protectors, while others combine surge protection and EMI/r.f.i. filters. These products are basically made for use with computers and their peripherals, but they also can be used to protect high-fidelity products, TV sets and VCRs from electrical damage.

Below is a rundown of products from three of the major manufacturers of surge protectors. These represent the best protection you can buy for high-fidelity equipment, though you must go to computer stores to buy them. (Note: This is the opinion of my correspondent, and does not necessarily reflect my own view or that of *Audio*.—J.G.)

Six-outlet surge protectors that plug directly into the wall include the EPD Lemon, EG System 2, and Curtis Diamond. If you want an a.c. surge protector with six accessory outlets and a 6-foot power cord, try the EPD Lime, EG System 6 or Curtis Emerald. Three-outlet units which combine a.c. surge protection with EMI/r.f.i. filters, and which plug directly into the wall, include the EPD Peach, EG System 4 and Curtis Sapphire. And if you want a unit combining a.c. surge protection with EMI/r.f.i. filters, equipped with 6-foot cords and six accessory outlets each, there are the EPD Orange, EG System 8 and Curtis Ruby.—Christopher Sullivan, Belmont, N.C.

Phonograph Motor Vibration

Q. I have a three-speed Rek-O-Kut turntable (vintage early 1950s) which has a peculiar problem. It has not been used in years, but it has been kept covered, and with the idlers disengaged.

I recently tried it out, after lubricating the motor and idlers, and heard a vibration which was never present before. This was easily identified as coming from the motor, because the noise was the same whether or not the turntable and motor were connected through the idlers.—C. F. Casey, Alexandria, Va.

A. I think the motor vibration was always present, but it is now more closely coupled to the turntable—probably as a result of dried-out, hardened, motor shock mounts.

I have owned various versions of your turntable. I recall that, by replacing the shock mounts, some rumble could be removed. Still more rumble can be removed by careful adjustment of the pressure the idler exerts against the motor pulley and the turntable rim. Limit screws are provided to achieve the right pressure—which will allow for good drive and still not induce vibration into the platter.

Check that the motor is free from surrounding objects. If it comes into physical contact with the cabinet in which it is housed or with equipment within the cabinet (such as a preamplifier), vibration will then have another path to the platter.

Obtaining Good Bass Sound

Q. I am a bass player and wish to improve the sound of my instrument. Is there any inexpensive way to do it?—G. A. Gowman, Detroit, Mich.

A. So often, the problem of obtaining good bass sound has to do with the quality of both the instrument and the pickup used. Part of the problem, too, is that most performers play their bass "straight," with no limiting.

By limiting, I refer to a scheme by which the loudest-volume peaks are suppressed. It is done by using an amplifier whose gain varies inversely with the input signal. In other words, as the strings of your bass vibrate less and less, and the output from the pickup falls, the amplifier connected to the pickup increases in amplification to compensate for this falling output.

Limiting makes the bass smoother. Experience with my own bass has shown that its output is not uniform with frequency. The use of a limiting amplifier between the pickup and its regular amplifier will even out the tone over the instrument's entire range. The limiter also enables the instrument to "sustain" for a longer time. This is not too important when you are playing a rapid succession of notes, but it is important at such points in the music as the end of a song, or perhaps at the end of an intro, where there might be a retard or a hold. The greater the limiting, the longer the sustain time.

Limiters can be very expensive indeed. I have seen some, however, which are inexpensive and do a remarkably good job. They are made just for applications of the kind we are discussing here, and are sold by dealers specializing in electronic musical in-

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The ear's sensitivity to energy at 2 to 5 kHz can make a signal with slight added treble energy seem disproportionately loud.

struments and accessories. They are in the form of a small box, equipped with an on/off switch and a knob. The knob determines the amount of signal reaching the input of the device and, therefore, the amount of limiting which takes place. If the input signal is too low, it will be below the "threshold" of the unit. The effect will be as though no limiter were in the system. As the input signal increases, more and more of this limiting effect will be noticed.

Volume Increase with Equalization

Q. When I switch my graphic equalizer into my system, there is a very audible sound-level increase, obviously more than 3 dB. Please explain this.—K. R. Stephens, Tucson, Ariz.

A. Sometimes the use of an equalizer can produce a real or perceived increase in level, for two reasons:

The first reason is that the equalizer may have more than unity gain—it may produce more signal than was fed into it. This is somewhat analogous to turning up the volume a bit.

The second possible reason for this perceived increase has to do with psychoacoustics. If you happen to add treble in the range of perhaps 2 to 5 kHz, this added frequency boost will not increase sound level significantly. The ear is, however, very sensitive to changes in level at these frequencies, so this added coloration may make the sound seem louder.

Crackling and High B+

Q. I have a Dynaco ST70 tube-type amplifier to which I added 100-μF capacitance by paralleling a bunch of capacitors. The higher B+ produced improved performance.

Lately, however, I hear a sound—sort of a static, or "tearing" sound—from the speakers, about 3 S after the equipment is turned off. I do not get the sound if I disconnect the capacitor bank. I'm about to jump around each capacitor to find which one is causing the sound. I'm also wondering if there may be some weak component in the ST70, which makes this sound only when extra capacitance is used. I'd appreciate your advice.—R. W. Clifford, Lancaster, Cal.

A. I do not believe that the sound is produced by a defective unit in your bank of added capacitors. Of course, the added B+ which is produced because of the use of these capacitors can create problems with other components in the ST70.

I believe that there is a leaky interstage coupling capacitor producing the crackling you have described. Using another amplifier to listen, check the grids of successive stages until you locate the first circuit on which the noise is present. Unless feedback is involved (giving you misleading results), the capacitor feeding this grid should be replaced.

Radiation from CD Players

Q. When scanning the instruction manual for one of the first-generation CD players, I noticed a warning that improper use of the player "may result in hazardous radiation exposure." In what sense does CD technology pose a radiation risk? Do the newer, sliding-drawer-type players, in which the disc and laser are completely enclosed, pose any less of a risk to the user? —Name withheld

A. A laser is a very intense light source. Although I have not seen a warning like the one you cite, I can see that if a person is determined to get to the innards of a CD player, he could expose his eyes to light which could cause damage.

Based on the machines I have had the chance to study, I see no way one could become exposed to laser light without going to great lengths to destroy the player.

Of the players I have seen, top-loading units would seem to pose the greatest possibility of radiation. Even so, one would have to go out of one's way in order to take a squint at the light. Naturally, the players using sliding drawers are even less likely to pose problems.

Movement and FM Reception

Q. When using any of three separate FM sets, in three different locations (Queens, Brooklyn, and Manhattan), people moving about in the room in which the equipment is located affect reception. Why? Can anything be done about this?—Steve Marston, Hollis, N.Y.

A. Apparently you use indoor antennas for FM reception. It is because of this that you have had the problem.

A human body is not neutral to radio frequencies; it can absorb or reflect them. Thus, if you stand in just the right place, your body can reflect signal to your indoor antenna in such phase as to reinforce the direct pickup of these signals. Moving just a few inches one way or another can create reflected signals that cancel out the direct signal. If you stand in the right place between the antenna and signal source, the body can absorb energy which would otherwise reach the antenna.

The obvious solution is to use an outdoor antenna. If this isn't possible, you must experiment with the location of the indoor antennas, and find a place where the effect of people moving in the room is minimized. Placing the antenna near the ceiling is a possibility; locating it in another, less-trafficked room may also help.

Poor Performance at High Power

Q. My sound system, which includes a preamplifier, power amplifier, equalizer, phonograph and loudspeakers, performs well only up to a point. I am unable to drive the amplifier past its 75-watt level, even though it is capable of much higher power, which my loudspeakers can handle. In order to eliminate the serious distortion which occurs at this level, I am forced to roll off bass significantly via the equalizer. What is happening, and can I do anything about it?—Ron Bryson, Carol Stream, Ill.

A. I suggest that you disconnect the equalizer and run the system without it. See if the system now operates at the greater power output you desire.

If you are using the equalizer between the preamplifier and the power amplifier, the signal level from the preamplifier could be too great, thus overdriving the equalizer. This means that the voltage needed to drive your amplifier to 70 watts output represents the overload point for the equalizer.

If the power amplifier has volume controls (and if they are not advanced all the way), turn them up. This will give the equalizer less work to do and may bring about a surprising improvement in performance.

If this remedy is not available, I suggest you place the equalizer in the tape loop, where it will probably operate more satisfactorily.

BEYOND CONVENTIONAL AMPLIFICATION

ONKYO'S NEW REAL PHASE TECHNOLOGY

Today's speakers, with their multiple driver construction and complex crossovers, differ electrically from the simple resistive load used by amplifier designers to simulate the loudspeaker load. The actual load that is "seen" by the amplifier causes severe phase shift between the voltage and current sent to the speckers. This causes an audible loss of sonic clarity and dynamics.

Onkyo's Real Phase Technology uses not one, but two power transformers to correct this problem. A large high capacity primary transformer together with a special In-Phase secondary transformer prevents this phase shift, providing increased power output into the loudspeaker load as the music demands it. The result is clean, dramatic dynamics; musical peaks are reproduced with stunning clarity.

Now, the dynamic range of the music can be fully realized. On the following pages, you'll find a complete explanation of the Real-Phase story.

Shown is our new A-8067 Integra amplifier, with Real Phase Technology and our exclusive Dual Recording Selector.

Artistry in Sound

ONKYO®

200 Williams Drive, Ramsey, N.J. 07446

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The ONKYO "Real Phase" Amplifier Story

Overview

In conventional amplifiers, the power supply and amplifier stage have been designed with a simple resistive load of fixed impedance, quite unlike the reactive load actually provided by high fidelity loudspeakers.

Recently, some amplifiers have been designed to operate into a wider range of load impedances, as the actual impedance of a loudspeaker varies with frequency. However, the power supply design of these amplifiers still treats the loudspeaker load in a simple resistive fashion.

The IHF A-202 reactive loudspeaker load model, shown in Fig. 1, consists of a circuit configuration designed to simulate the reactive load normally found in today's loudspeakers. The graph in Fig. 1 shows the impedance variation with frequency caused the IHF A-202 reactive loudspeaker load, with an impedance peak of 23.7 ohms at 50.3 Hz.

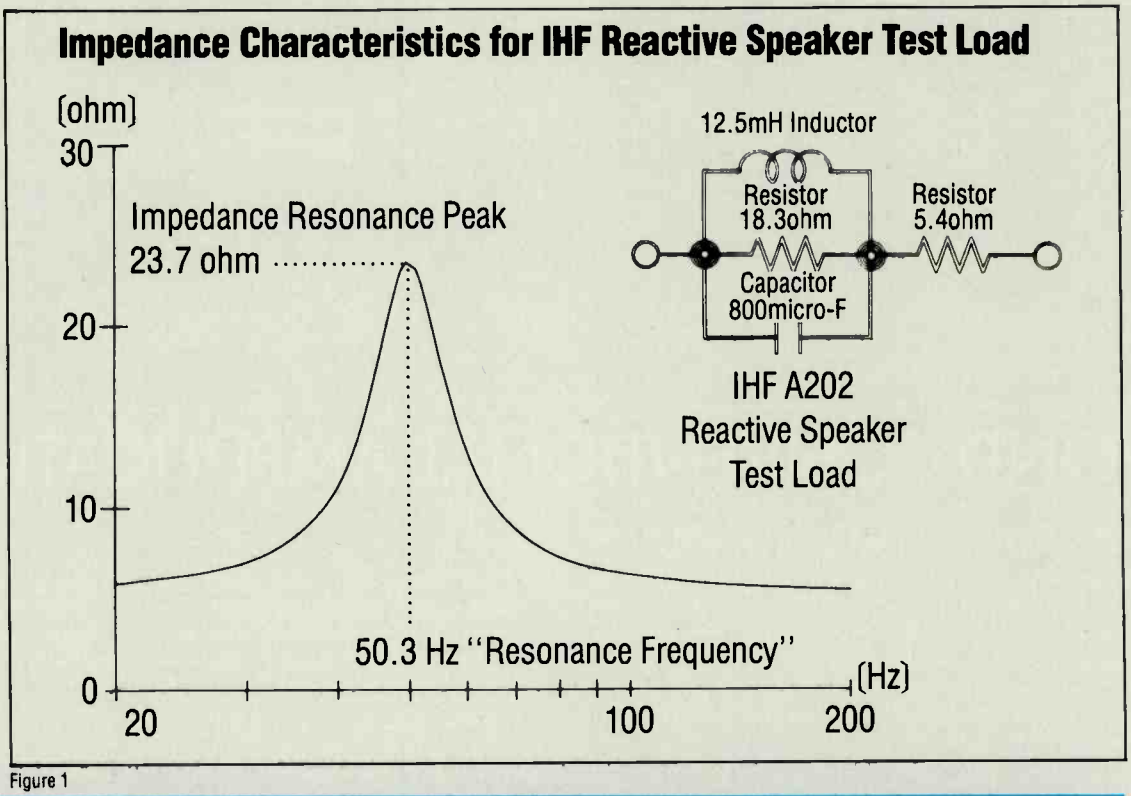


Figure 1

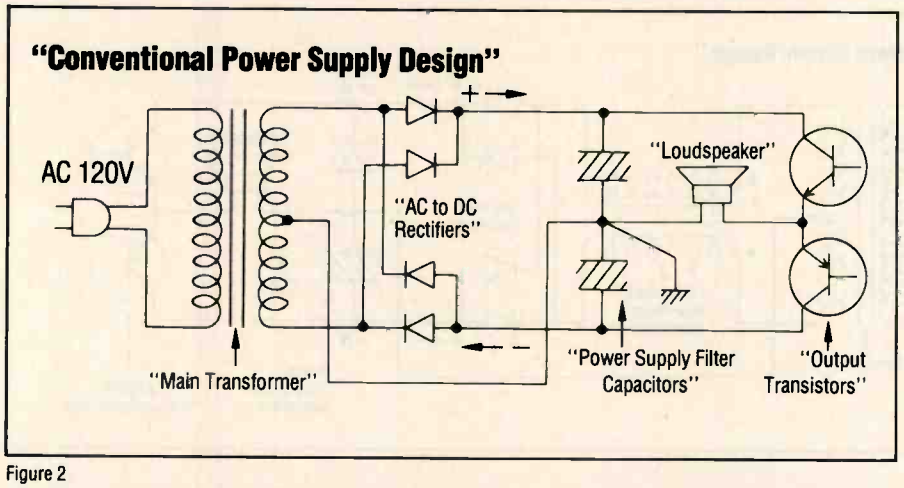
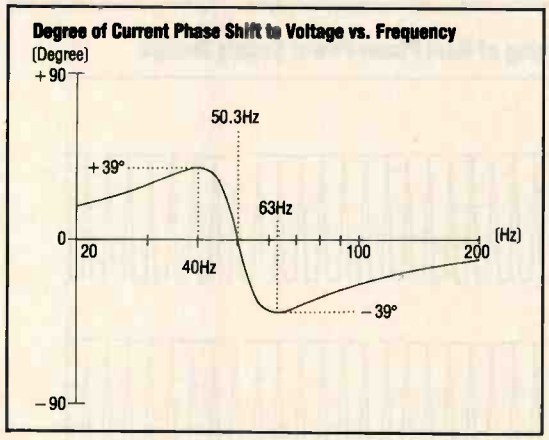


Figure 2



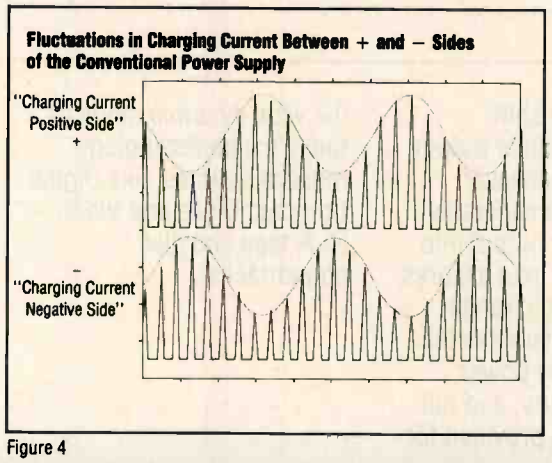


Figure 4

Conventional Power Supply Design

Fig. 2 shows a conventional power supply design. The 120 Volt AC home supply is reduced by the main transformer to a lower level. The AC to DC rectifiers convert the AC pulses to DC pulses, and the filter supply storage capacitors smooth the ripples into a steady DC supply. This DC source feeds the amplifier's output stage with the energy required to drive the speaker load.

Unfortunately, if the speaker load connected to the amplifier output stage is reactive in nature, and not a simple resistive impedance, a phase shift between the amplifier output voltage and the loudspeaker drive current will occur. Fig. 3 shows the amount of phase shift between the amplifier output voltage and the loudspeaker drive current caused by the reactive loudspeaker load model.

Fig. 4 shows the fluctuations between the charging current values at the positive and negative sides of the conventional power supply. The peaks and troughs of the "+" and "−" sides are 180 degrees out of phase with each other. This charging current fluctuation prevents the power supply from delivering a steady DC source to the amplifier output stage and loudspeaker load.

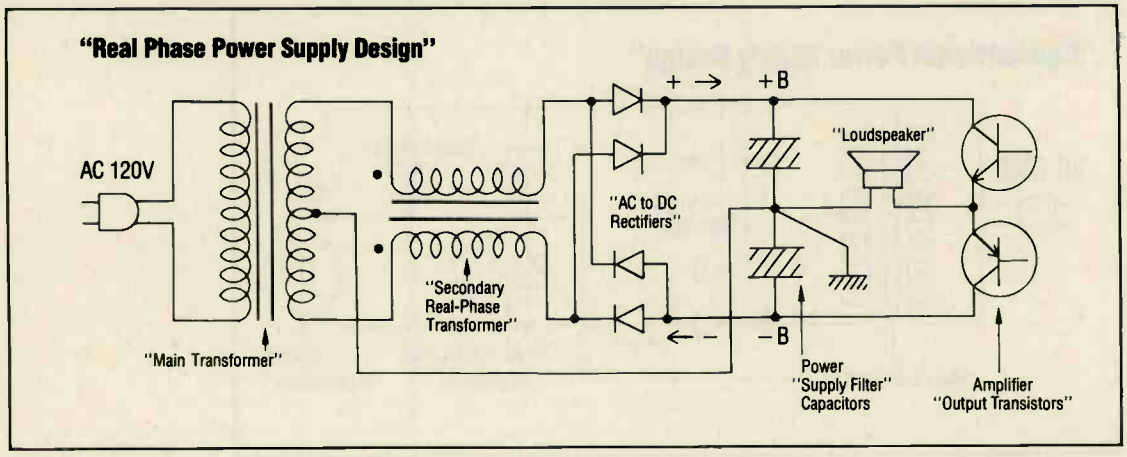


Figure 5

Onkyo Real Phase Power Supply Design

Fig. 5 shows the Onkyo Real Phase solution. A second power transformer, called the "In-Phase Transformer" is connected between the "+" and "−" sides of the main transformer's outputs. Any potential between the "+" and "−" charging current is cancelled out by the In-Phase transformer, and a rock-steady DC supply current is supplied to the amplifier output stage, regardless of the actual loudspeaker load. Fig. 6 shows the constant, non-fluctuating charging current of the Onkyo Real Phase power supply.

The Real Phase power supply design ensures that the amplifier's output stage has a continuous DC supply, free of the fluctuations caused by phase shift between the amplifier output voltage and loudspeaker drive current. Considerably increased power output into any loudspeaker load assures maximum dynamic range and impact. Transient details are not blurred by power supply fluctuations, and full power reserve is provided for the wide dynamic range of today's high technology musical sources, like Digital Compact Discs and Video Hi-Fi tape and disc soundtracks.

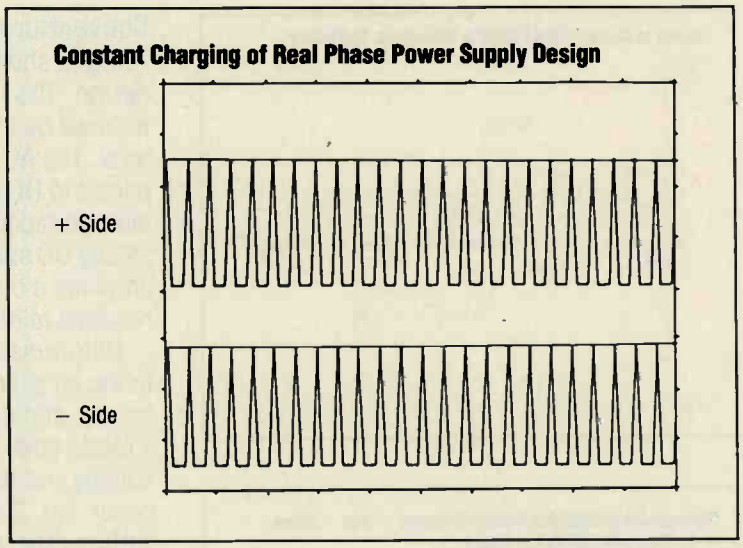


Figure 6

The Onkyo Real Phase M-510 Power Amplifier is the first amplifier to incorporate this unique technology, with other Real Phase Onkyo components soon to follow.

The Onkyo M-510 represents the state of the art for solid-state amplification, conservatively rated at 300 Watts per channel, minimum RMS at 8 ohms, both channels driven from 20 Hz to 20 kHz, with no more than .005% THD. However, this specification is derived with a simple resistive load, using sine wave signals of fixed intensity.

The IHF Dynamic power test, using low and high level signals, more closely simulates the actual performance obtainable with actual loudspeaker loads and music signals, and the Onkyo Real Phase design contributes to the exemplary performance:

The Onkyo Real Phase Amplifier Technology will soon be available in two new integrated amplifiers, the A-8057 and A-8067. Rated at 65 and 80 watts per channel respectively, these models feature the ability to drive difficult loudspeaker loads with ease; both models feature substantially increased power output into loads as low as 2 ohms.

Load Impedance	**8 ohms RMS** Continuous	**8 ohms IHF** Dynamic	**4 ohms IHF** Dynamic	**2 ohms IHF** Dynamic	**1 ohm IHF** Dynamic
Power Output (ch)	300W	400W	750W	1.3 kW	2.1 kW

Onkyo Industry Innovations

1975
Affordable Quartz Digitally Synthesized Tuning

1976
Quartz & Servo Locked Tuning

1977
Straight Low Mass Tonearms

1978
Auto Accubias

1979
Super Servo & Linear Switching

1980
First Cassette/Receivers

1981
High Speed Dubbing Cassette Decks, Real Time Counters

1982
Receivers with CX Decoders

1983
Delta Power Supply, Digital Ready Amplifiers, Automatic Precision Reception, Triple Stage Isolation Systems

1984
First Compact Disc Player with FOUR Power Supplies, First Cassette Deck with all Noise Reduction Systems; Dolby B-C NR HX Pro,* dbx†, First Receiver with dbx and Dynamic Bass Expander, First Dual Auto Reverse Dubbing Cassette Deck

1985
- Real Phase Technology
- Dual Recording Selector
- Polysorb® Acoustic Vibration Absorbing Compound for Turntables & CD Players
- First Affordable Audio/Video Remote Control Receiver

Artistry in Sound

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EDWARD TATNALL CANBY

HOMING IN ON A BARGAIN

Illustration: Philip Anderson

So you thought you couldn't edit digital audio tapes—that is, short of some enormous expenditure on state-of-the-art digital editing equipment? The sort that only a Very Big Company, or big-time video, film, or pop music star, could afford? Costing, say, a mere 100 grand, or 50 grand, as a starter?

If so, then almost all of you small- and medium-timers into recording for LPs, cassettes, maybe even a CD or two; one-man operations; mini-major classical labels; makers of special products (for medicine, law, languages, what have you); producers of high-school shows, from Bach to Boogie and back—all of you seem to have decided that maybe you'll stick with analog a while longer. *Analog is cheap to edit.* We can all do it. Editing—precise, exact editing—is the payoff for everything but consumer-style cassette recording. If you can't edit, you can't record.

I am surprised at how widespread is the idea that you can't go into digital-audio editing on account of the cost. Because, to my astonishment, I've discovered that (as Gershwin said) it ain't necessarily so. Not any more! This last winter, with help, I was able to do a trial editing of a short tape of my own Canby Singers. By professional standards the cost was peanuts or less. And the results are good—plenty good enough to please me. Better than I can do myself, if that means anything.

This is such good news that I must tell you all about it, even though, oddly enough, the actual digital equipment has been around quite a while; it should be familiar to most audio professionals and to readers who have perused equipment reports here and elsewhere.

It's a matter of communication. In an area as big as audio, communication crosswise, side to side instead of the usual top to bottom, is often very chancey. You'll remember my January account of the San Francisco AES people and the Stanford electronic music researchers, getting together but virtually unknown to each other. A great many recording entrepreneurs, though they are highly knowledgeable in practical recording terms, have come out of fringe backgrounds, anything from big-time pop and movies to a purely professional music training. It is not easy for them to keep up, not only with the latest equipment but the *potential* of that equipment. A large part of the audio world revolves around such people in all their diversity, and depends to a large extent on their "softgear," their products in sound.

Now, you take me. I have no X-ray eyes for audio. Perhaps I have judgment as to what is important, but as a writer I get help, much more than mere tips and hints. Audio people rush forward to tell me all about it in person, to explain new things, verbally or on paper, until I am dizzy trying to keep up. More than that, they are ready to work on any practical project I may have in mind, including recording.

Yes, I know—they do it for the publicity. Why not? That's often the catalyst. But I am constantly astonished at how dedicated audio people are to their work, how sincerely they propagate their faith, whatever it may be, far beyond the call of publicity. It's one of the good things in the audio profession and the reason we usually are able to move forward without too many cattle prods at the rear.

So now—digital editing. Here's the story this time. Several years back, I worked on a recording session of my singers with a New Jersey audio pro, Craig Dory, out of Fair Haven, N.J. He's also in music—that's my kind of man. This was a sequel to another session in which he had participated a year earlier. Digital recording was already getting around, but both sessions, of course, were done in analog. I had no choice. A digital recorder was one thing, but I knew I could not edit any sort of digital job for a finished usefulness. That was the clincher. Fifty thousand bucks for an editing machine? I couldn't even rent that kind of stuff for five minutes.

On this second session, with Craig Dory, there was a mild surprise. Another man came along from the big research lab where Craig worked. They needed some bulk audio for their research; ours would do just fine. So this man set up a Sony digital recorder off to one side. While we started and stopped and started again in analog, with all the usual confusion of multiple takes of Brahms' music for voices, he just sat there idly and let his machine run. Took down everything, got lots of audio time on a Sony videocassette. I paid no attention; I was busy, and this was just a lab reference tape. Digital—yes! But it wasn't ours and, anyway, what could we do with it? Especially inside a Beta cassette. I shoved it out of mind and the man went away with the bulk sound he had wanted.

But I underestimated my engineer, Craig. Next thing I knew, I was put to the challenge: Craig said that we now

In digital the copy is the original. No loss, no additives. This alone is the biggest improvement in editing I could ever imagine, at any price.

had permission to use that digital tape (or rather a copy of same) any time we wanted. I gulped, said "*Wow!*" and added, thanks anyway. How could we get any good out of it? Can't edit! So again (just like most of you) I put digital out of mind and got on with my analog. And this with digital, so to speak, staring me in the face.

Craig is one of those dedicated people, if a very quiet one, and he kept after me. That digital tape was so *good*—he even made an audiocassette of it for me, though this didn't prove much. Sorry, I thought, I'm not the Denver mint. I can't touch it. Too bad. It would have been a wonderful opportunity. Et cetera.

Then this last winter he came up with something new. He now had a colleague, he said, who could actually do quite precise digital editing on my tape at a price that I could probably manage. I snorted. Down another few grand, to only 20 thou? Great stuff! Craig, as I say, is not the shouting type, but what he told me next was like a bomb. Per hour, this job would maybe cost mę *roughly a thousandth* of 50 grand. WOW! This wow was much louder. But there was a minor hitch. The guy, Al Swanson, lived in Seattle, working from his home as "Location Recordings." Would I mind hopping out there for a day or so? I had to give another snort. Fat chance, as we used to say. No way, as we say now.

That was in December. In January—lo, I was there. Only a hop from Spokane and its Bach Festival, which I wrote about last month.

In Spokane I got a phone call from Seattle. It was Al Swanson's wife. Mrs. Al said Al would work with me, but they simply could not allow me to stay in some old hotel; I must stay with them. Then I'd be right there, on location. I gratefully accepted and she even went to the airport to meet me.

Like Craig, Al Swanson is also a musician, and his wife is a musician too, active in the business, playing string instruments and teaching both piano and violin in their home. (She also reads *Audio*.) Craig and Al have never met but they do business, mainly by phone. Craig had made a VHS copy of our digital music, the better to suit Al's digital editing equipment; it was on hand when I arrived. Craig, it seemed, could do all the rough editing on digital in New Jersey, removing the junk, assembling whole takes, but Al at the moment had more digital equipment and could do the precise editing. Hence the referral, like one M.D. to another. So I found myself on location—Seattle. And we were ready to go to work on the tape.

I'm going to save a more specific account of this digital operation for next month—I have pages of computer printout from Al with all the professional data and his own first-hand description. For now it's enough to say that the instant I walked into that small studio I knew this was no $100,000 deal, nor even $50,000. I saw just a typical batch of semi-portable, black components, professional grade, spread around on table and desk, plus a computer, and including two JVC VCR units, one of them a standard type to play the source videocassette and the other more specialized, to make the final edited cassette. In between were the crucial digital operators, a computer-type keyboard, a couple of other units (next month) and a CRT monitor crammed with visible information—which, incredibly, told us exactly where we were and what we were doing at every moment of the job.

Astonishing! What a difference! It's all done by time code. You cannot get lost. You can locate everything in seconds, without fail. You can do trial edits or "rehearsals," out loud, without risk or damage, until you have exactly what you want—then you let the the machinery do the actual copy-edit. Remember: In digital the copy is the original. No loss, no additives. All this, thanks to the computer-style approach and the video-type technique. Without going further, I can say that this alone is the biggest improvement in editing I could ever imagine. At any price.

With the time coding (long since familiar, of course, in film and video), every point in the music has its specific "address." Nice terminology; that's where it lives, where it *is*. Same for all digitalized equipment, computers included. Just punch in the right coded address and you are there, in seconds.

The actual musical editing? Let me say quickly that from my viewpoint it was hearteningly familiar, automation and computer notwithstanding. True,

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My old analog skills were as useful as ever. This should be heartening to old hands afraid that their years of experience are come to naught.

in this technique you can't "rock the tape" or play slow. (I didn't miss it.) But you can hear everything, again and again. The actual choice of places to edit was exactly the same for me as in my familiar, longtime analog editing of music and speech. I knew what might work and what might not. My old skills, thank God, were as useful as ever. No real change! This should be heartening to a lot of recording hands, maybe afraid that their years of analog editing are come to naught. Not so.

This time I could not touch the machinery myself. It wasn't mine. But I found that Al's practiced musical ear heard very closely what mine did, and so we moved forward from edit to edit in perfect harmony, if you will. If you want to get your own fingers on the controls, you can buy Al's range of equipment for approximately $18,000, list (you'd pay less). *You* have the knowledge of your own recording and what you want to do with it. But you might need a couple of years to match Al's dexterity, if you ever could. He's a whiz. Thanks, I'll stick with the likes of him, and save.

How precise is this shoestring digital editing? That's the ultimate question! No professional wants to do a sloppy, inaccurate job, at any price. Well, you can edit to within a video half-frame, or closer, via (you might say) musical deduction. Here are examples from my Canby Singers tape.

After two loud chords, one of my Brahms songs was interrupted in a pause by a hysterical little dog, barking. The singers dissolved in laughter and we started again—but, alas, not as well. *I needed to excise that dog.* Al and I removed three of the five fast, little barks, leaving two that were too close to the reverb and not noticeable to those who weren't specifically looking for pooch noise.

Another piece ended quietly on the German word *fahrwohl* (farewell). The second take was excellent, but on the *very last* syllable an auto horn blasted. Tough! On that final word we edited over from the syllable *fahr-* in take two, to *-wohl* in take one, right in the middle of the word. The match is perfect; you would never know. And there's no auto horn.

In still another Brahms song, one tenor came in a fraction of a second too soon, on an "s." The others followed with a second "s." Via careful automated rehearsal trials we edged up closer and closer to the first man, until suddenly he was gone—and there was one "s," exactly in the right place.

That "s," I figure, equals less than a half-inch of analog tape at 15 ips. Slice off a trace too much in analog and you're lost. You can't restore it. In digital, there is no danger. Your original remains intact. Try as often as you like, in tiny increments—then push a button and it's done. What you've gotten is not a splice but a copy.

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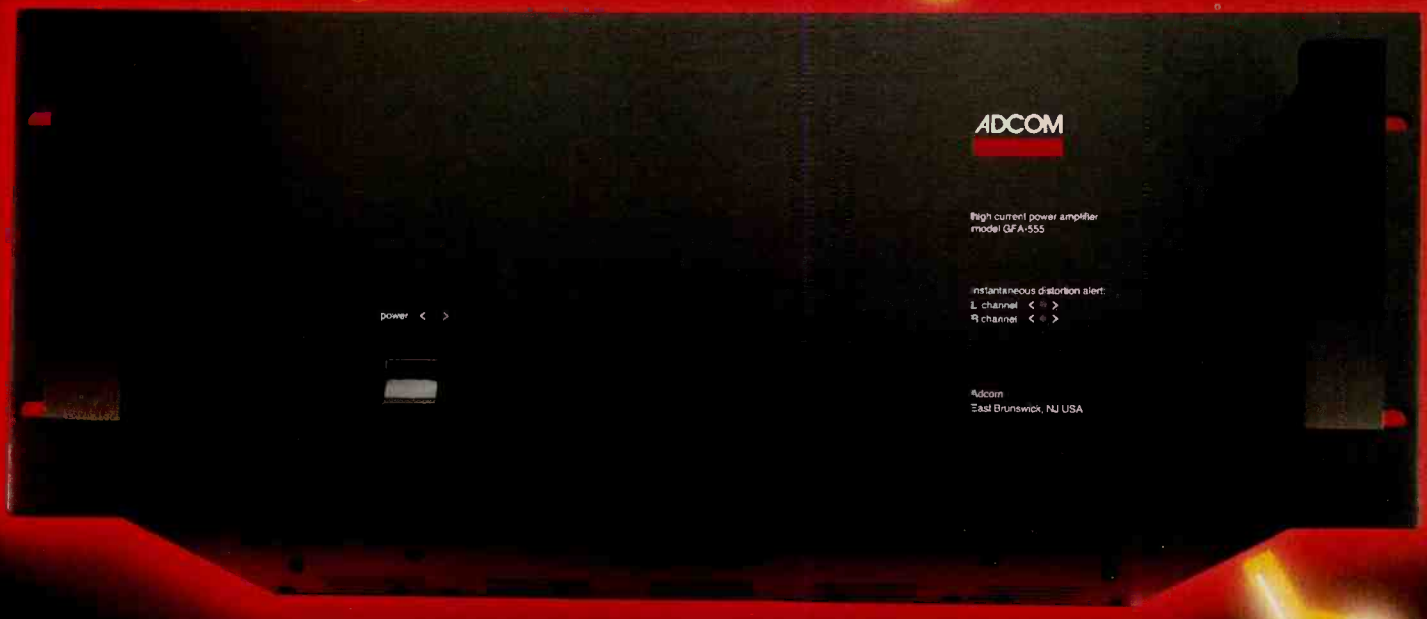

The modestly-priced amplifier that delivers price-no-object sonic performance.

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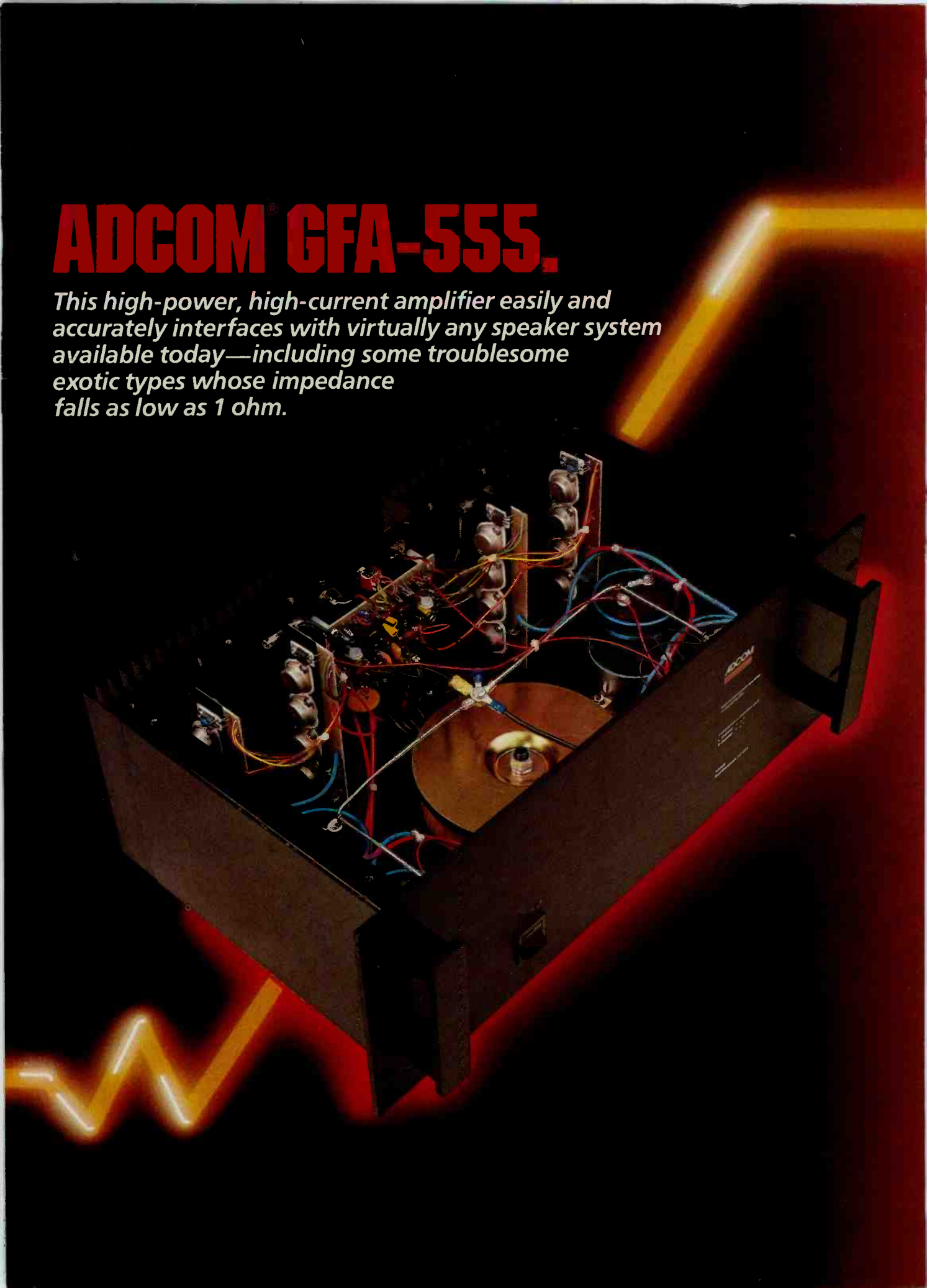

If you're considering a new amplifier for your stereo system, you're probably suffering from an "agony of choice."

A recent directory of audio components listed 54 manufacturers of power amplifiers and 154 different models. Listed prices range from under $300 to $10,000, and watts per channel from 50 to more than 500.

Obviously, your problem is deciding which of these amplifiers best meets your requirements.

Before we tell you about one of them, the Adcom GFA-555, we'd like to put forward a few facts you should know about amplifiers in general.

Why a separate amplifier?

Anyone who's decided his (or her) system should include a separate power amplifier is probably an experienced and serious listener to music at home. Most people upgrade their systems to include separate power amplifiers because their receivers were lacking in some area—power, noise level, flexibility, or (most important) musical accuracy.

A power amplifier hardly looks as interesting as a preamplifier or tuner. It's likely to have a nearly blank faceplate—with an on/off switch, a few LED indicators and perhaps some form of power output metering. In short, it's the one component you can pretty much ignore—even hide in a closet—after it's been hooked up.

Amplifiers vary enormously in two related areas: how accurately they present the audio signal to the speakers, and how well they interface with the complex electrical load presented by many speakers. The latter is probably the least understood of all the factors affecting the ultimate sound in a given stereo system.

All the specifications that describe an amplifier's performance—including our own—are test bench measurements made with standard purely resistive loads. These measurements provide relative benchmarks, but do not fully predict an amplifier's performance with any particular speaker system.

The importance of high current potential.

The standard 8-ohm impedance at which an amplifier's output power is normally referenced may not even be close to the actual moment-by-moment impedance presented by a given speaker under typical operating conditions. That is, with a music signal feeding a speaker.

A speaker with a nominal rating of 8 ohms can actually present the amplifier with a load anywhere from about 40 ohms to less than 2 ohms, depending on the frequencies it is handling at any given moment.

As speaker impedance falls, increased current is drawn from the amplifier output stage. In fact, many amplifiers, when pushed to very high levels and very low impedances, reach a point where their protection circuitry had better shut them off...or their output transistors will self-destruct.

But even when operating well within normal limits, an amplifier's output circuit interacts with the speaker's impedance variations to affect, for better or worse, how the music sounds.

Which brings us to the Adcom GFA-555.

With respect to those 154 amplifiers mentioned earlier, the 555 ranks very high on the wattage scale (200 watts per channel) and very low on the price scale.

However, despite its modest price, the sonic performance of the 555 was conceived and designed to be compared with "esoteric" price-no-object amplifiers. Throughout its development, we subjected the 555 to comparative listening tests against highly-regarded amplifiers priced up to three times higher.

And when the 555 prototype was completed, we conducted a series of demonstrations for experienced, objective listeners. As in our development tests, the 555 was matched against far more expensive competitive models. In these demonstrations, however, none of the amplifiers were identified.

Although some listeners reported hearing subtle differences among all the amplifiers, none heard anything to suggest that any of the amplifiers was priced much lower than the others. In that very selective company, we were highly pleased not to stand out.

Why the 555 sounds as good as (or better than) those expensive amplifiers.

High current output stage.

Each channel is provided with 8 high-current output transistors, and is capable of delivering more than 20 amperes into low impedance loads.

As a result, transient capability—which virtually defines the demands of music—is greater than 800 watts into 2-ohm loads and 400 watts into 1 ohm. And the amplifier remains stable, without glitches or oscillation, under any operating conditions.

No matter how complex a load it presents, no speaker made yesterday, today—or likely to be made tomorrow—should be a problem for the 555.

Simple gain path throughout.

The gain path is simple and direct, with a minimum of components from input to output. This means less waveform distortion and less phase shift. Further, we used only discrete circuit elements rather than integrated circuits. This allowed for total flexibility in selecting individual elements and tweaking them for optimum performance at every stage. Functionally, the input circuit uses a differential-input transistor pair, followed by a single voltage-gain transistor. Both active elements in this stage are class-A biased, using very sophisticated double-regulated active current sources. This current supply is unaffected by variations in the power supply or signal.

This circuit design provides pure Class A operation for the input and second gain stages, resulting in low noise, low distortion and low DC offset voltages.

Toroidal transformer with double secondaries.

The 700-watt toroidal power transformer was specially designed for the

555, and has many of the technical advantages of two separate transformers, but is far more cost effective. It provides especially tight regulation and a minimum of interchannel crosstalk, vibration, hum, or noise.

Well-regulated, high-current power supply.

The two secondary windings feed separate rectifier bridges and filter/storage capacitors—also specially designed—with a total capacitance of 60,000 microfarads. This high capacity provides excellent reserves for transient high-output peak current demands.

(As an informal but impressive way of experiencing these reserves, you can unplug the AC line cord of the GFA-555 while your system is operating, and the music will probably continue for several seconds.)

This rugged, efficient and stable power supply is extremely important, and is largely responsible for maintaining low distortion down to very low frequencies—and for performance that remains relatively unaffected by low or high AC line voltages.

Ultra-stable bias circuitry.

A significant new current-feedback technique was developed especially for the 555. It is used in the bias circuitry for the drive and output transistors. This assures exceptional bias stability under widely varying thermal, line-voltage and signal conditions. The critical factory bias adjustment, once made, will remain unchanged over the life of the amplifier.

No current-limiting circuitry.

The only circuitry needed against large, short-term overloads is power-supply fusing. To protect against long-term overloads that can cause overheating, a thermal circuit breaker shuts down the amplifier when the heat sink temperature reaches 75 degrees C. When the temperature drops, normal operation resumes automatically.

Advantages of direct coupling.

Coupling capacitors can be responsible for a variety of subtle signal distortions. Some manufacturers minimize the problem by using special and expensive capacitors. By direct coupling of the input and output of the circuitry, Adcom eliminates the need for such capacitors, and thus eliminates the problem at the source.

No output coil.

Most amplifier designs have isolating coils in their output circuits to prevent spurious oscillations under typical load/signal conditions. But these coils are responsible for most amplifier/speaker interface problems. They introduce frequency-response irregularities and lower damping factor.

And when the amplifier is connected to high-capacitance loads, such as electrostatic speakers and some esoteric cables, the coil can introduce resonance and ringing. Adcom solved this problem by the direct coupling of the output. As a result, the damping factor remains high at all frequencies, phase shift is kept low, and bandwidth into difficult loads—particularly electrostatics—is improved.

Instantaneous distortion alert.

The instant that any form of distortion—THD, IM, TIM, SID, etc.—or DC offset—exceeds 1 percent, a front-panel LED illuminates.

The 555's highly accurate indicator is activated by unique circuitry that monitors the activity in the internal feedback loop.

Final word.

To sum up. There is no superfluous circuitry in the Adcom 555. Everything makes a specific contribution to its sonic performance and stability. There are no circuits in the 555 to solve problems that shouldn't exist in the first place. Those elements that are in the 555 are very specially designed to do their job superbly, with total reliability and musicality.

So if you are looking for a new power amplifier, appreciate the need for considerable power, understand the importance of high-current capability—and know great value when you hear it—you'll certainly want to compare the Adcom GFA-555 to any other amplifier at any price!

When you do, you'll hear for yourself that higher cost does not necessarily mean better performance. And like many others, you're likely to prefer the 555 purely on its own sonic terms—sight unseen and price unknown.

SPECIFICATIONS:

Frequency response:
4 Hz to 150 kHz, +0, −3 dB
(10 volts RMS @ 8 ohms @ 50 ohm source)

Power output:
200 watts per channel continuous, both channels driven into 8 ohms, 20 Hz – 20 kHz, 0.09% THD

325 watts per channel continuous, both channels driven into 4 ohms, 20 Hz – 20 kHz 0.25% THD

Bridged power: 600 watts continuous, driven into 8 ohms, 20 Hz – 20 kHz, 0.25% THD

Noise:
<200 microvolts unweighted
(−106 dB @ 200W)

Gain:
27 dB

Input impedance:
22 kohms, 300 pF

Damping factor:
200 @ 20 Hz @ 8 ohms
150 @ 20 kHz @ 8 ohms

Maximum current:
20 amps peak @ 1 ohm
12 amps RMS @ 2 ohms

Dimensions:
Height: 7 5/16" (185 mm)
Depth: 12¼" (311 mm) including handles
Width: 19" (483 mm)

Shipping weight:
34 lbs. (15.5 kg)

Voltage:
117 V/60 Hz.
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BERT WHYTE

HEARKENING BACH

Photograph: The Bettmann Archive

The 300th anniversary of the birth of Johann Sebastian Bach was celebrated on March 21, 1985. To mark the occasion, National Public Radio station WGBH in Boston arranged for an all-digital uplink and downlink, via Intelsat satellite, of a performance of Bach's "St. Matthew Passion" from the Gewandhaus in Leipzig, East Germany. The program was also made available to other stations in the NPR network.

Obviously, this was an historic broadcast, emanating as it did from behind the Iron Curtain. Of course, it was entirely appropriate, considering the years Bach spent as organist and music director of the St. Thomas Church in Leipzig.

I have had an abiding love for the music of Bach ever since I was a 12-year-old choirboy and sang many of his glorious cantatas. In my life, I have been privileged to know, and to record, some great Bach scholars.

I was most profoundly influenced on the music of Bach by my long association with Leopold Stokowski. Although the popularity of Bach's music has been increasing ever since its "rediscovery" by Mendelssohn, surely much credit must be given to Stokowski for his tireless efforts in bringing Bach's music to a wider public awareness. His famous transcriptions of Bach organ works for full symphony orchestra, as exemplified in the great "Toccata and Fugue in D Minor for Organ," are legendary. When he performed this work in the Walt Disney film *Fantasia*, he introduced millions of people to the glorious music of Bach.

I remember many occasions in Stokowski's Fifth Avenue, New York apartment when we would discuss Bach's music. He liked to point out (sometimes by playing snippets of recordings) how the magnificent architectonics of Bach's music were so appreciated by musicologists, but that the essential beauty of the music was what endeared it to so many people.

Another Bach scholar I recorded was the great cellist, Pablo Casals, surely one of the most passionate advocates of Bach's music. At the Casals Festival in Puerto Rico, I recorded Pablo and Alexander "Sasha" Schneider, the famous violinist, conductor of the Casals Festival Orchestra, and another ardent champion of Bach's music. I recorded Pablo performing the Dvořák cello concerto, which, sadly, turned out to be the last time he was able to play a full concerto. I attended a number of Pablo's "master classes" just to see the grand old man in action, and I heard how he inevitably turned to the music of Bach to demonstrate techniques to his cello students. He would not dwell on the structural complexities of Bach's music, but on its sheer musical values—all the while exhorting his students to play cantabile—"Your instrument must sing!"

One activity in which the saintly Pablo Casals did not participate was a rather uninhibited farewell party at the conclusion of the aforementioned festival in Puerto Rico. Held at the Rockefellers' Dorado Beach Club, it was a combination luau, barbecue and fiesta, with fabulous food and exotic tropical potables. As the party became more bibulous, Jesús Sanromá, the well-known concert pianist (whom I was later to record in Gershwin's "Rhapsody in Blue," with William Steinberg conducting the Pittsburgh Symphony Orchestra), had someone support him from behind while he leaned backwards on the piano stool and played the piano with his bare feet! During all this, he was accompanied by Sasha Schneider, who was playing some outrageously schmaltzy Gypsy violin music!

I have many anecdotes about amusing incidents during recording sessions—maybe I'll tell you them one of these days. I hasten to add that making recordings is a serious business, with a great deal of strain and pressures and responsibilities. There is always that big "taxi meter" (musicians'-union fees) inexorably ticking away! However, I don't subscribe to the starched, white lab coat *Tonmeister* attitude, replete with grim visages. I've always found that with a relaxed and happy session there is a much better chance of making a good recording.

Another concentrated exposure to Bach's music came when I spent some time with Walter Carlos, creator of *Switched-On Bach*. In his lab/studio, Walter went through the incredibly complex and difficult process of using his synthesizers to construct Bach's magnificent musical edifices. So much electronic manipulation for each small increment of music! Although Walter was obviously deeply involved in the architectonics of Bach's music because of the very nature of the synthesizer process, he has always had a most profound respect and scholarly attitude for the purely musical aspects of Bach's works. Even those who are disdainful of the synthesizer process, per se, admit that some of the performance values of *Switched-On Bach* are consonant with accepted practices in live music performance.

I think it all boils down to the concept that whether Bach's music is performed on a flute, a harpsichord, a synthesizer, or a kazoo, it is still the music of Bach. After 300 years it remains transcendently beautiful, cere-

Those who remain rigidly anti-digital are putting themselves into a straitjacket, because there are few new analog recordings being made.

bral if you will, as emotionally uplifting and as spiritually exalting as ever.

The special broadcast of Bach's "St. Matthew Passion" was digitally transmitted via satellite. It would be interesting to know whether the more hidebound anti-digital people denied themselves the pleasure of hearing this historic performance just because the music was subjected to that "awful digitizing"! Don't laugh! At the last two Consumer Electronics Shows, I saw some well-known members of the anti-digital corps walk into a demo room, note that the only music source was a Compact Disc player, and, sniffing disdainfully, immediately walk out!

Well, everyone is entitled to their own opinion. However, I do feel that the anti-digital types have some misconceptions. For one thing, just because someone likes the sound of digital recordings doesn't mean that person is automatically anti-analog or that he can't abide black vinyl records! As far as I am concerned, I am less interested in the medium, and more concerned with how the recording sounds—be it analog or digital—and whether the musical values are properly preserved and presented.

I still like and enjoy good analog recordings. Lord knows, I've got a helluva lot of them! I'm fortunate enough to own many 15-ips, Dolby A first-generation master-tape copies, and I'm sure not ready to abandon them! I also have many 30-ips, two-channel, half-inch master tapes which are real gems! But if a given piece of music is available on a really good digital Compact Disc recording, it has virtues with which an analog version of the same piece can't possibly compete.

Flexibility—that's the name of the game, and not a cop-out! Those who remain steadfastly anti-digital are putting themselves into a technological straitjacket. Why? For the simple reason that major record companies are recording virtually all of their classical music in digital format. Except for a tiny trickle of new analog recordings from small, independent companies, usually small-scale stuff with minor or unknown artists, digital is all there is! Even the most vociferous anti-digital types are aware that, for several years now, most black vinyl discs have been mastered from digital tapes. Thus, if they want analog, they will have to resign themselves to older recordings, many of which will go out of print. Scare tactics? Not at all. Just ask any major classical record producers if they are still making analog masters.

Is there any way to resolve this problem? I'm afraid it would be difficult, at best. Let's put it this way: If I were going to record a major symphony orchestra—the New York Philharmonic, for example—I would probably employ a simple, spaced array of three omni mikes, or a Blumlein or M/S setup feeding a basic, two-channel digital recorder. I would simultaneously set up a Calrec Soundfield microphone feeding a four-channel digital recorder so as to have a "surround" master in the can for future use. In spite of the possibility of deriving a binaural pair from the Soundfield mike, I would also set up the new Brüel & Kjaer dummy head (originally designed by Mercedes-Benz for their own acoustical testing) with B & K ear-canal mikes. This array would be fed into another basic, two-channel digital recorder to provide pure binaural recording. This would finally allow Walkman-type cassette deck users to hear music specifically recorded for headphones with the proper acoustic perspective. Finally, I would feed my basic spaced array or Blumlein mike setup into a two-channel, half-inch, analog tape recorder operating at 30 ips. These various setups would be used simultaneously and be covered by the basic musicians'-union recording fees.

Needless to say, making a separate analog master presupposes that a record company is willing to accept a "double inventory" situation. Based on past experience, this is not likely to happen. About all that could be hoped for is that a company would agree to make the special analog records available at a premium price, in the same fashion as higher priced audiophile recordings. Conceivably, these special analog records could turn a profit.

Jack Renner and Bob Woods of Telarc will hate me for saying this, but their company—with its simple miking philosophy, high-quality recording techniques, and roster of major symphony orchestras and artists—would be a likely candidate for the preservation of analog recording.

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5. This sweepstakes is open to residents of the United States who are of legal drinking age in their states of residence at the time of entry. All-Brand Importers, Inc., Moctezuma Imports, Inc., Pearl Brewing Co., and Terramar Importers, Inc. their affiliates, subsidiaries, distributors, advertising and promotion agencies, retail alcoholic beverage licensees and the families of each are not eligible. This sweepstakes is void in the states of OH, TX, KS, MO, UT, PA, OK, and wherever prohibited by law.
6. Taxes on prizes are the sole responsibility of the prize winner. All Federal, State and local laws and regulations apply. For the name of the prize winner, send a SEPARATE self-addressed stamped envelope to: Dos Equis Uncommon Import Winner, P.O. Box 4235, Blair, NE 68009. No substitution of prize is permitted. Prize winner will be obligated to sign and return an Affidavit of Eligibility within 10 days of notification. In the event of non-compliance within this time period, an alternate winner will be selected. A prize returned to the D.L. Blair Corporation or to the sponsor as undeliverable will be awarded to an alternate winner.

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AU

Jerry Wexler: Navigator of the Atlantic Sound

Ted Fox

This is the conclusion of a two-part interview (begun in our previous issue) with record producer Jerry Wexler, creator of the distinctive "Atlantic Sound" during his decades of work with many of the great names in soul and R&B.

MUSCLE SHOALS

You said Ray Charles taught you a lot. In what way, and what was it like working with him?

It took a while for Ray Charles to crystallize, to become Ray Charles—until about 1954, '55, when he had his own band. It was a seven-piece band, four horns and three rhythm, no guitar. We did "I Got a Woman" and other incredible records. Before that, he worked the way our other singers did. He had an arranger, and he had sidemen. He did very good records. Songs like "Sinner's Prayer," "Losing Hand," "It Should Have Been Me," those were arranged records, studio records. Before he came to us, his big influences were Charles Brown, Nat Cole, Guitar Slim. Then he found his own voice, in the sense of his own persona. When he put this band together, he did it all himself. It used all his own ideas, and they started playing his arrangements. He would dictate them to someone like Hank Crawford, who would write them out. They are marvelous.

How did you work with Ray? Obviously, this was a unique individual who knew exactly what he wanted.

He sure did. With Ray, what would happen is he would call the office. He might get a hold of me or Ahmet and say, "Well, I'll be in on such-and-such a day." It would be like 25 days from that date, and he'd say, "I got some tunes and I'd like to cut them. Could you get me some background singers? Get me three girls." Or, "Get me a good, authentic Latin conga player." Once he even asked for a pedal steel guitar, when he was recording "I'm Movin' On," that Hank Snow thing. Ray would come in and he'd have the songs and the arrangements. We'd just open up the mikes, and there was very little for us to do except pay attention. The records were mixed on the fly, all mono. No remixing to do, no sweetening, because there it was. It was done. He did the whole thing.

Did you have to do for him what you described earlier, get him in the right mood?

Absolutely not. Ray Charles and Aretha Franklin are two people who I could never speak to about singing. With Aretha I probably had more of an input on the arrangements and the music part of it, but very little on the vocalizing. And with Ray, nothing. Maybe "faster" or "slower, Ray." [Laughter.]

What were your favorite sessions with Ray Charles?

Oh God, there were so many. "What'd I Say" was tremendous, it was one of the last ones. I loved the out-of-town sessions, the one at WGST, the Georgia Tech radio station in Atlanta, where we cut "I Got a Woman." They didn't know how to cut records there, and there was no control room. We were in the news room, and we had to stop the session every half hour while they gave the news [laughter].

Why did you cut it there?

Because that's where Ray was at the time, with his band.

There weren't any better recording facilities available?

No. There were no recording studios around the country in those days. You went to a radio station. We went to a radio station in Miami with Ray to cut "This Little Girl of Mine" the next year. Then we went to WDSU in New Orleans, which I think was Loyola University's radio station. And we cut a big one, "Don't You Know." There was another session that I enjoyed with Ray called "Ain't That Love," which started with a tambourine lick. He brought these church ladies up there to play tambourine, and he kept firing one tambourine player after another. So I grabbed a tambourine. He says, "Who's doin' that?" I said, "Me." He says, "Do it." [Laughter.] So I actually had the strain of starting the record, initiating the groove by playing four bars of tambourine unaccompanied.

A little Jewish soul.

Yeah.

Was he being advised to leave Atlantic for another label?

He was, and maybe his advisers had something to gain by the move. Who knows? ABC looked like a more eclectic record company. We were just a funky little R&B company. ABC was

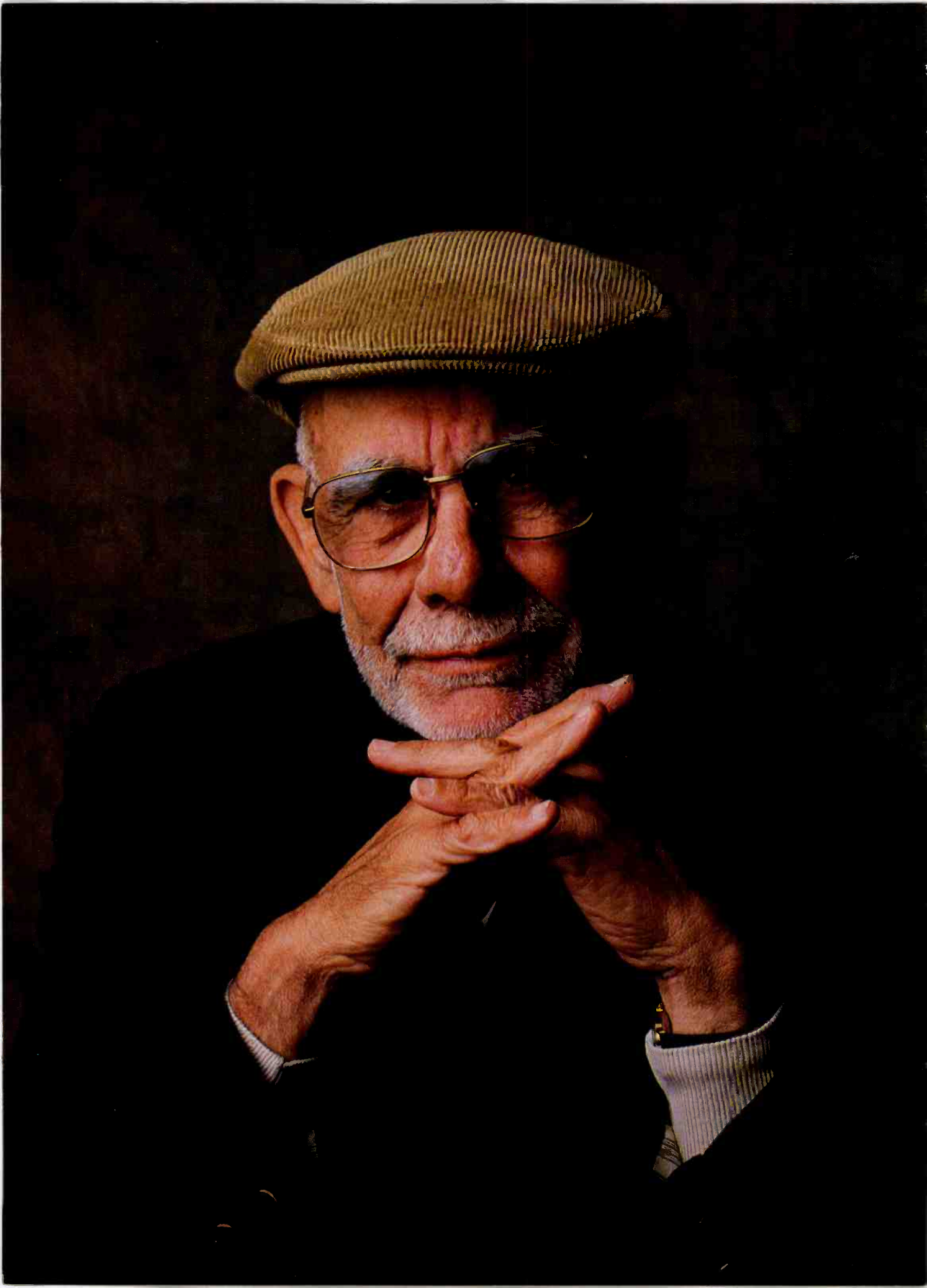


Photo: © 1985 Frank Driggs Collection

ARETHA FRANKLIN

STUDIO SESSION AT ATLANTIC RECORDS IN THE MID-'70s; KNEELING ARE HUGH McCRACKEN AND CORNELL DUPREE IN FRONT OF RICHARD TEE, WEXLER, BERNARD PURDIE, ARETHA FRANKLIN, AND GORDON EDWARDS.

Photo: Courtesy of Jerry Wexler

connected to a television network, presumably to Hollywood and pop radio. All the goodies that a rhythm and blues singer . . . . He thought he was expanding his horizons.

Did that really hurt, when artists left you after you had worked so hard to nurture their careers?

Well . . . Bobby Darin and Ray Charles left us the same year. You can imagine, I had a lot of white nights, you know, looking at the ceiling.

Did you think that was going to seriously affect your company?

Seriously? I almost went crazy. I mean, I figured there was very little chance to survive after that. How do you lose Bobby Darin and Ray Charles in one year? And go on?

Did you consciously think about having to do something pretty soon to shore yourselves up?

We thought about that every day, no matter what. We *always* ran scared. We *always* ran worried about what's going to happen tomorrow. And we always wanted to get the best singers we could.

How did a performer like Bobby Darin end up on Atlantic, an almost all-black record company?

He was our first white artist. He was a singer looking for a gig, and he played the piano like Ray Charles and he was very soulful.

Was he unknown at the time?

Oh yeah. He had made some records for Decca, five or six records that flopped. Herb Abramson brought him in to Atlantic. (Herb had come back from the Army.) We started the Atco label for Herb to administer. So he signed Bobby Darin to Atco. And nothing happened, but we liked Bobby a lot. All of us did. His manager at the time was Donny Kirshner, who was also managing Connie Francis. His first hit was "Splish Splash," which Ahmet produced. Ahmet had a lot of belief in the song. I thought it was an unspeakable piece of doggerel [laughter]. Ahmet said, "This is going to make it. This is going to go." And it did.

Did you work on "Mack the Knife"?

No, Ahmet worked on that. We all did some sessions with Bobby, but mainly it was Ahmet. "Mack the Knife" was a big breakthrough, and won the first Grammy for best pop record of the year. So Ahmet Ertegun's is the first

producer's Grammy. Darin was wonderful. On a nightclub floor he was unbelievable, the best. I mean, even Frank Sinatra would have to worry about Bobby Darin when he was out there on the nightclub floor.

Let's go on to another favorite of yours, Clyde McPhatter and The Drifters.

Ahmet always loved The Dominoes. "Have Mercy Baby" with Clyde McPhatter, he loved that voice. And Billy Ward used to run The Dominoes like a paramilitary organization. Like James Brown. Fines for unshined shoes, missing a beat or dropping a note, or whatever. So Ahmet went to Birdland one night to see The Dominoes, and he saw that Clyde McPhatter wasn't with the group. So he went backstage to see Billy Ward, and he said, "Where's Clyde?" Billy said, "I fired his ass." Ahmet went uptown like a shot, found Clyde McPhatter and signed him up. The first problem was the name: Clyde McPhatter and The Drifters. It sounds like a cowboy group. But Clyde wouldn't let us change his name. He was right; names don't matter. Then, as I mentioned before, to do "Money, Honey" we got this gospel group. We did the session with a lot of rehearsal, and after we heard it we didn't like it. So we called Clyde in and we canned the record. Clyde went and got a new group. This is when he got the good group that had the Thrasher brothers and Bill Pinkney. We redid the whole session, because we didn't like the groove. That first thing stayed in the can, and the record that came out of "Money, Honey" was a hit for Clyde. Not a crossover hit, but a rhythm-and-blues hit.

I remember reading that you thought you and Phil Spector blew the original version of "Twist and Shout," that The Isley Brothers' version done with Bert Berns was much better.

That's right. Oh boy, where do we start with this one? Phil came to New York, and Leiber and Stoller were told to kind of watch out for him. He came to us and went on Atlantic's payroll, working for me and Ahmet in the studio. He never made a hit. One of the projects was to record "Twist and Shout," which Bert Berns had brought to me with a duo called Derek and Howard. They were otherwise known as The Pearls. And we just butchered it. Bert Berns was sitting in the booth and he wasn't allowed to say anything.

What was Bert's position at the time?

He was a songwriter. I had not yet realized his production ability. (Shortly thereafter, I took him in with me to coproduce Solomon Burke. One thing led to another and Bert stepped out; though later he did very well as the producer for Van Morrison, Neil Diamond, The McCoys, and others.) I want to tell you that Phil Spector has all my respect and admiration. He is really one of the great people in the business, but this particular time there was nothing coming.

What other artists was Spector working with at Atlantic?

Gee, I can't even remember. It was a string of flops. As soon as he left us he went to work for Big Top records which was owned by Hill and Range, and he did nothing but cut hits—Ray Peterson, Don & Juan, "Lavender Blue." Then he was home free. At Atlantic, it was just one of those things.

What happened to "Twist and Shout"? It's such a great tune.

You mean, how did we make a bad record out of it? Easy. There's a million ways to make a bad record, but only one way to make a good one, and we didn't find the one way.

Can you describe the old Atlantic studio at 234 West 56th St.?

Over Patsy's restaurant. It had the slowest elevator in the East; people used to be scared to get on that thing. The room was about the size of this living room, about 20 by 15 feet, maybe 20 by 18 or 25 by 20. It was our office. Ahmet and I had two desks that were sort of catty-corner to each other. We used to do three to four sessions a week, because, when you come to think of it, there were no albums in those days. We had a big roster, and what we'd do is record three or four sides by a singer, then put it away, and that would be two singles. We used to put out four records every three weeks. There was a constant demand. We didn't have any producers or anything. We had to make all the records ourselves, three or four nights a week. The idea was, you had to get four sides done in three hours because of union regulations, and we did. Mono. No remixing. When we had a session we'd push one desk against the wall, and we'd lift the other desk and put it on top. Then Tom Dowd would come out and put out the camp chairs—the folding chairs—for the musicians, and set up the mikes. We had a tiny control room which was also the place where we used to store our reference records. It couldn't have been more than three feet wide. We had a little mono, four-channel mixer. Two people could sit and one could stand. Tommy would sit and either Ahmet or I would sit next to him. The other person would stand behind him. We cut some good records there, "What'd I Say," "Shake, Rattle and Roll." By 1958 we had the first eight-track Ampex that was used commercially by a record company. It was the third one that Ampex put out. The first one Les Paul had, and he took it to his house in Bucks County [Pennsylvania], and that's where he made all his terrific records with his wife—"How High the Moon" and all those things.

When Ray Charles recorded, we'd just open up the mikes, and there was little for us to do except pay attention. No remixing, no sweetening; he did the whole thing.

RAY CHARLES

Number two was owned by a man named Jiggs Carroll, who was Mitch Miller's contractor and concertmaster. Jiggs used to live in the Hotel Woodward, a funky hotel on 54th and Broadway. He kept this eight-track in his room, and he played with it. The third one we had, which was bought at the instigation of Tom Dowd. As a consequence, everything in the Atlantic catalog from 1958 on is in true stereo.

Why didn't everybody go out and buy an Ampex?

I don't know. Why didn't everybody record Ray Charles [laughter]?

Wasn't this a revolutionary new technology? I mean, the possibilities. . . .

Multi-track recording, we were three to four years ahead of the pack. Even before we had eight-track, when we were back with mono in that little place, Tommy did revolutionary things with how he would mike the bass and drums. Nobody used to mike drums in those days, but he would place the mike somewhere at an optimum place between the bass and the drums to get them both. Of course, later on he started using multiple miking. We learned all the advantages of remixing and sweetening. We also learned the value of eight-track, and as people became associated with us, we drew them into this eight-track orbit. There was a typical reaction to eight-track. Leiber and Stoller said, "My God, we're going to lose our soul." Bob Crewe said, "I can't deal with this." Sooner or later, everybody fell into it.

What was the difference between Atlantic's production techniques, aside from the eight-track, and other record companies in the '50s who were doing rhythm and blues?

Back in those days we had a thing called The Atlantic Sound. Nobody has a "sound" anymore, because everybody knows how to do it. I would describe our sound best as clean funk. We had a very stong bass line, a lot of bottom, a lot of bass drum. We had a very good midrange, and I always fought for treble in the remix. It's amazing how, to this day, people are careless about getting the top end in the proper perspective. I don't know why there are so many records where you don't hear the articulation of the high hat or the ride cymbal crisply. And if there are acoustic guitars, why you don't hear the top end, the ring of the guitar. It's a very simple little thing. You put a record on, or a tape, and everything's straight up—no EQ. If you run up the treble, let's say to three o'clock or six o'clock or all the way, suddenly you start hearing the high hat when you don't hear it straight up. Somebody has fucked up. Because when you add EQ into your home system, all you should be getting is *more* of something; nothing new should appear. If a new sound jumps in, a new frequency, somebody has failed to mix that record properly. I've been hearing a lot of that all my life, especially with respect to that business of cymbals. If the man's playing cymbals, why don't you have it on your record, mister?

Let's talk a little more about some of the many artists you've worked with over the years. Let's start with Solomon Burke, who many feel was the first soul star.

I could go on and on about him. There was a disc jockey in Philadelphia named Jimmy Bishop who was a friend of mine. We were sitting around in my back yard one day. He and his wife were there. We were having a barbecue and playing some music. It was in the middle of the Soul Era, and I think I had just gotten the record of Otis Redding's "Satisfaction." Somebody asked, "Who's the best soul artist?" People came up with different names: Sam Cooke, Willie John, Clyde McPhatter. Jimmy Bishop said, "The best soul artist is Solomon Burke with a borrowed band." You have to understand Solomon Burke. He'd make a deal, he'd make a contract with a promoter to work someplace in Louisiana or West Texas or whatever, and show up without a band because he knew that Joe Tex would be there with his band, or Joe Simon would be there with his band, and he would persuade the other guys to lend him their band for his gig. Solomon has always been a guy who knows how to fend for himself.

Do you consider him to have been a great recording artist?

Oh, fabulous. See now, Solomon would do whatever I asked him to do. Any song that I gave him, no problem. After he made it, after he got big, he got a little careless about learning the material. He'd come in, I'd give him a demo, and he wouldn't have learned it, and sometimes he'd fake it. He'd try to get by, by doing a lot of note bending and what I call oversouling. I'd say, "Solomon, that ain't the song. Sing the song. Sing the music."

Let's talk about your first Muscle Shoals session with Aretha Franklin. I know there were some problems down there with her husband Ted White and some of the white musicians.

It was just one trumpet player. To this day I can't remember who the guy is; he was not important. I had asked Rick Hall to hire a certain horn section out of Memphis which was mostly black. And I wanted that section, because my whole rhythm section was white. Not that that's the main point; I just wanted to get a certain balance of feeling and sensibility in there. And Rick Hall just plain forgot to hire these horn players. So we had to get whomever we could. What happened was that this one trumpet player got loaded, and he and Ted started "doing the dozens" [a verbal game in which insults are traded] with each other, and one thing led to another. I was hoping to cut two sides the first night, and we only got one side done, but we got it complete, "I Never Loved a Man." We did it live, the horns

SOLOMON BURKE

Photo: © 1985 Frank Driggs Collection

and everything. Then we cut a track on "Do Right Woman." All we had was bass, drums and rhythm guitar. But the session was over. So we knocked off. The party went on for some—not for me; I went to bed. Things got a little rough out there. Next thing I know, Aretha Franklin has packed and gone back without finishing, and Ted White is packed, and they're going back to Detroit. That was the end of it. Now I have this finished record, "I Never Loved a Man," and a three-piece track on "Do Right Woman." I get back to New York and I start sending out dubs on "I Never Loved a Man" to the R&B jockeys, and I get a fabulous reaction. The distributors start calling for the record, and I don't have a B side. I can't find Aretha Franklin, because she's having a domestic problem. I finally get her into New York with her two sisters. So Aretha puts two keyboards on, organ and acoustic piano, does the lead vocal, and then she and her two sisters do the backgrounds. And that's all "Do Right Woman" is. I had a record, and we put it out.

Did you find her to be responsible and on-the-money and all that?

Pretty much, for me. After all, I was not booking her or managing her. I would have some problems getting her into the studio sometimes. She would be depressed or maybe a little moody. But once we got her into the studio, it was pure joy.

What would you do to get her out of a mood and into the studio?

Hold her hand and beg. I'd go wherever she was and beg her, and hold her hand and talk to her, and try to convince her.

Was she insecure about her abilities?

Oh, no. She knew who she was. Her problems all stemmed from her personal life, nothing from her assessment of herself as an artist.

You know, I've always been a big Otis Redding fan, but I don't think there's any doubt that she cut him on her recording of "Respect."

When I played him the tape of her record, he said, "Hey, that little girl done took my song away." [Laughter.] She did a better job than he did, using the arrangement she came up with, the "sock it to me's." We did a little arranging work on it. For example, there is no bridge on Otis' version. There's no in-

BOBBY DARIN

There's a million ways to make a bad record, but only one way to make a good record. And for the original "Twist and Shout," Phil Spector and I didn't find the one way. We butchered it.

PHIL SPECTOR

AT A TESTIMONIAL LUNCH IN 1967 IN NEW YORK CITY, WEXLER (LEFT) WAS CONGRATULATED BY OTIS REDDING, EDDIE O'JAY, KING CURTIS, AND NESUHI ERTEGUN UPON BEING NAMED RECORD EXECUTIVE OF THE YEAR. THIS WAS THE THIRD YEAR IN SUCCESSION IN WHICH WEXLER WAS NAMED IN THE POLL CONDUCTED BY BILL GAVIN.

BOB DYLAN, WEXLER, DR. JOHN, AND AL ARONOWITZ DURING A DOUG SAHM RECORDING SESSION IN 1973.

WILSON PICKETT AND WEXLER DURING AN EARLY-'70s SESSION IN MIAMI AT CRITERIA STUDIOS.

Photos: Courtesy of Jerry Wexler

Ideal music is the optimum combination of the head, that's the musicality; the mouth, that's the voice, and then there's the heart, that's the emotion.

strumental bridge, no musical bridge, it's all one strain. So when we did Aretha's record we built in a four-bar bridge and took the chords from the bridge of Sam and Dave's "When Something Is Wrong with My Baby" and used that for the chords of the instrumental break on "Respect." To me it sounded like too much of one strain. I needed to get some harmonic relief in there. See, Aretha worked out the vocal arrangement by herself with her girls, her sisters. When she came in, it was all done. We put the instrumentals in together, the underpinnings, but it all came from her playing and singing. She would go home and she had a little electric piano—I don't know if it was a Wurlitzer or a Fender Rhodes or what—and she would work with her own vocal group or her sisters, and work out the whole arrangement. So she'd come into the studio, sit at the piano and start playing the song and singing it with her girls until the whole layout would emerge. Sometimes we might change the key, persuade her to raise it one tone, or whatever. But then we would fill it in, like brush strokes. She'd be saying, "Okay, let's have a bass part here, now guitar, drums, second keyboard." And there was your record. Putting horns in, or whatever, was an incidental thing. When we added horns or strings, usually Arif Mardin would write those charts, sometimes Tom Dowd would write or sketch a horn part.

Otis Redding, he never recorded a bad record.

Oh, he was marvelous, he was really an artist. He had a great sense of himself, and a sense of music. But the best voice of the '60s, the best pure voice, would have to be Solomon Burke. Think of that voice. And remember who we had. There was Joe Tex, Ben E.

King, Otis, Sam and Dave, Percy Sledge, we had a bunch of people going. But the voice is not everything. It's the music that's charging it. It comes in three parts: It's the head, that's the musicality; it's the mouth, that's the voice, and then there's the heart, that's the emotion. The ideal is the optimum combination, and Aretha is the one who combined those better than anybody.

How did the Stax-Volt Memphis connection come about? And how did Atlantic Records begin to distribute the Stax-Volt product?

I got a call from Buster Williams, who worked in our pressing plant in Memphis. In fact, he owned the pressing plant. He said, "There's a pretty good record we're pressing a lot of down here; maybe you can get it to distribute." So he sent me the record. It was called "Because I Love You" with Rufus and Carla Thomas. I liked it and I went after it. I went down to Memphis and I saw Jim Stewart, and I made the deal for that record with an option on anything else that might come out of there within a certain period. One thing led to another. The record didn't make it, though it was a local hit. But a year later out comes "Gee Whiz" by Carla Thomas and we had the rights to it, and that's how the thing with Stax was formulated. The next big hit we had was "Green Onions," and then it all started to roll. The next real move came when I brought Wilson Pickett down there, and we cut "In the Midnight Hour" and all those other things we did in Memphis.

You've been credited with almost creating the Stax-Volt rhythm sound in that "Midnight Hour" session. Changing it around.

Well, I think there's a lot of romance there. I just wanted to show them a certain groove. So I went out and danced a little beat for them that I thought would work better than the one they were working on.

This was for Steve Cropper and Duck Dunn and all those guys?

Yeah, I'm very uninhibited [laughter]. I'll tell you, in the beginning, when I first started recording, the idea of dancing in front of veteran session players would have been appalling. I mean, I was very timid about even asking to do anything. But after a while I figured what the hell, I'm signing the checks around here [laughter].

Did the Stax-Volt musicians play differently after that?

Yeah, well, that's what they say. We just pushed two and four a little bit. Instead of leaving it back in the slot, we just advanced it. [He hums, accenting the second and fourth beats.] It gave it kind of a snap, a punch which was new, which was coming off The Jerk. I was just doing The Jerk with them.

Tell me about American Recording Studios, Chips Moman's place. I hear they had two two-track machines that were somehow patched together, and some funky, three-track board.

It was pretty much like that. Tom Dowd came up and helped them with the engineering. Chips used to play guitar in the Muscle Shoals band, and then he stepped out on his own. I guess I helped him get the American studios started. I financed it for no interest, for no involvement. I just liked him, and I figured it would be another good place to record. I did that in Muscle Shoals, and I did that in Miami, both to a greater extent. In other words, I enabled Muscle Shoals to buy a new board and a tape machine, and the same thing with Criteria in Miami, another place where I used to like to record.

You didn't have any problem working with such a makeshift technical setup at American?

I tell you, I never cared about that. I let Tom Dowd worry about that stuff.

Let's talk about Duane Allman and Capricorn.

I had this association with Phil Walden. He was Otis Redding's manager. With all of Otis' success, we spent a lot of time together, and Phil and I hit it off pretty well. Phil expanded with a booking agency and management company. Then he came to me in my capacity as one of the principals at Atlantic and said, "Could you front me a setup in Macon so I could have my own studio?" I said, "It sounds okay to me, but let's go it one better. I'll finance you in a label." I wanted to motivate him because I was hungry for product from the South, and he was right there in position. We decided to call it Capricorn, because we both come under the sign of Capricorn—not that I believe in any of that nonsense. We decided to try to put The Allman Brothers

JOE TEX

CARLA THOMAS

BEN E. KING

together. They'd been together before, but not successfully—The Allman Joys, and something else. Henry Stone had some sides on them out of Miami. Now, Duane was under contract to Rick Hall at Muscle Shoals as a sideman. Rick never signed anyone as a sideman. Musicians to him were interchangeable. But somehow he had the instinct, the smarts, to sign Duane Allman. So I bought Duane Allman's contract from Rick Hall, and Rick Hall thought that the heavens had opened up because I gave him $15,000 for a guitar player who couldn't sing and didn't write songs. I freed him up and turned him over to Phil, and Phil put The Allman Brothers together. Our interest was that we distributed the label. It is still some of the best music that I know out of the South.

You brought J. Geils in, also?

That was through Jon Landau. Jon knew the Boston area; he was living up in Boston. He bedeviled me until I signed The J. Geils Band. I gave Geils a $30,000 advance, which was a fortune, unheard of, with the condition that Landau would produce them. He hadn't produced anything then that I know of. We caught The MC5 on their second bounce, and I know he worked with them, but I don't remember the chronology. But I thought enough of Landau to entrust the session to him, my investment. I was under some heavy scrutiny from my associates to make good on this $30,000 investment. So Landau goes into the studio with them somewhere up in Massachusetts, I guess, and two weeks later he calls me and says, "I want out of this . . . ." He couldn't or wouldn't, or what have you. I've been faced with this before, where you sign somebody on the strength of the producer connection and then the producer takes a cab. So, the first producers for The J. Geils Band, if I remember, were Brad Shapiro and Dave Crawford, two guys I had put together. Dave Crawford was a disc jockey out of Atlanta, and Brad Shapiro was a Henry Stone pupil. Of course, J. Geils flourished but never realized their potential on Atlantic, as you know.

Let's talk about Dylan. How did you and he come together for Saved *and* Slow Train Coming, *both of which were done in Muscle Shoals?*

He asked me to do it. At that time I guess I'd known him 10 years. That was about '77 or '78. Let's see, in '77 I did the score for *Pretty Baby* for Louis Malle, so I guess that was '78. I met Dylan through Doug Sahm, Sir Douglas, who is one of my greatest friends in the business and a person I have the greatest affection for, and admiration and respect. If you asked me who's the best rock musician of all time, and I had to pick one person, I'd say Doug Sahm has about the best ability. Unbelievable man.

Did Bob say, "Jerry, take me to Muscle Shoals and do it the way you did it with Aretha and Wilson Pickett," and so forth?

That's right. He wanted to get that sound. What he wanted was more of a tailored, big funk sound, which he didn't have on his records. He wanted a little more precision, a little more musical input. It was something he felt was time. That was the general idea. When I said Muscle Shoals, no problem. But even more interesting to me, and what I'm pleased about, the innovative part of it, was bringing in Mark Knopfler of Dire Straits as the lead guitar. Instead of going with the regular Muscle Shoals section, I changed it a little bit. And of course, Barry Beckett was coproducer on that, and a lot of him is on that record.

How did you work with Beckett as coproducer? Was it similar to the way you worked with Ahmet?

Very much the same, yeah. There's got to be a lot of respect, and a lot of listening to the other person's ideas. Barry does more on the arranging side and leading the band through the studio, and I'm more in the directorial position in the booth. But in the preparation we just worked the same way together, equally. Before I invited Barry to be coproducer, he, in fact, *was* coproducing. It always works like that. He had come out at the keyboard, he was putting a lot of things together that I'd just jump on instantly and say, "That's it, let's go with it." At some point it would have been indecent if I didn't invite him to become a participant. The same thing with Tom Dowd.

How about Willie Nelson? You opened Atlantic's Nashville office. Was Willie the first country artist signed?

No, because we had people running the office, and they were signing people down in Nashville. But Willie I signed. I signed two people, Willie Nelson and James Talley.

Willie was without a label at the time, wasn't he?

That's right. It was no problem signing Willie. It was not a heavy deal. Nobody wanted him. He was over 40 years old, and he had the pigtails and earrings. He was like *persona non grata* in Nashville. The outlaw. What a bunch of bullshit that "outlaw" stuff was. But Willie played it for all it was worth, and God bless him, he should have. The way I met Willie: There was a songwriter named Harlan Howard, who wrote some great songs. He used to have an open house every year in Nashville. I think that house burned down since then. But everybody would be there playing and picking. It was a party. There would be Conway Twitty and Waylon Jennings, a whole panoply would be there. I had never met Willie Nelson until that afternoon, but I loved him to death. Everything about him—the voice, the music, his guitar playing, his concept, the total picture, his songwriting. I had recorded his "Night Life" with Aretha Franklin long before I met him at Harlan's. He's got to be something if B. B. King and Aretha Franklin recorded a song by this country boy from Texas. But I believed very much in the affinity of certain country players for the blues.

What did you finally end up cutting with Willie?

The first thing that I cut with him was *Shotgun Willie* but Arif Mardin did most of that, as line producer. I turned the project over to him. I was sort of executive producer, although I don't take executive producer credits, I don't like that title. Then I line-produced a couple of his songs, and that got him off to the races. Then the next one I produced, I took him to Muscle Shoals, and we used the Muscle Shoals rhythm section amplified by Fred Carter on lead guitar. Up in Nashville they were saying that it couldn't be done, that Willie Nelson cannot cut country music in Muscle Shoals because it's too funky, it's too black.

What came out of Muscle Shoals?

Phases and Stages. A lot of people still think this is Willie's masterpiece.

Now, more recently, you signed The

Gang of Four and The B-52's. I think The Gang of Four was one of the best bands to come out of that whole era.
Yeah. They were kind of like white boys playing James Brown with polemical lyrics. And I signed The B-52's because I heard this amusing quality in their record, but most of all, I knew they had a following. That's the best way to sign somebody, when they've got a built-in following. You very rarely have that opportunity. By the time you know that you can get a group, they've got followings in six cities, and CBS already has them signed.
Is there anyone else you have in mind to work with?
Yes I do, right now. There's a group called Kristi Rose and The Midnight Walkers. It's a three-piece band, rockabilly, with a female singer. She's from Tennessee, and they're from anyplace. The leader of the group, his name is Chris, too. It's a great story. I had this beautiful antique French chandelier in my dining room. There was a man who used to come and clean the chandelier once a year, it's a specialty. It was this guy Chris. And he brings me a tape, naturally everybody brings me a tape. The milkman brings me a tape. So he brings me this tape, and I liked it a lot. I said, "This sounds pretty good, you ought to do some more." I wasn't ready to jump in, they weren't ready. Chris said to me, "I need some help, I want to go into the studio and cut some demos." I have a son, Paul, who is a very good producer. I suggested they meet my son and see if they liked each other, and they did. They went further, and the band just built since then. They've been playing at Irving Place, the Pyramid Club, the Lone Star. The girl is dynamite. She's something between Janis Joplin and Dolly Parton. Incredible singer. So I'm right now negotiating a contract to sign them up to a production arrangement, and then I will attempt to place them on a good label, and my son and I will coproduce.
We'll have to watch for them.
Listen, if I can't get in a plug after all of this . . . . Like my momma said, "Don't forget to get in the plug." A
(Editor's Note: Jerry Wexler informs us that, since the time of this interview, the deal with Kristi Rose and The Midnight Walkers fell through. In the record business, nobody wins them all.)

I loved everything about Willie Nelson—the voice, the music, his guitar playing, his concept, his songwriting. I believed very much in the affinity of certain country players for the blues.

WILLIE NELSON

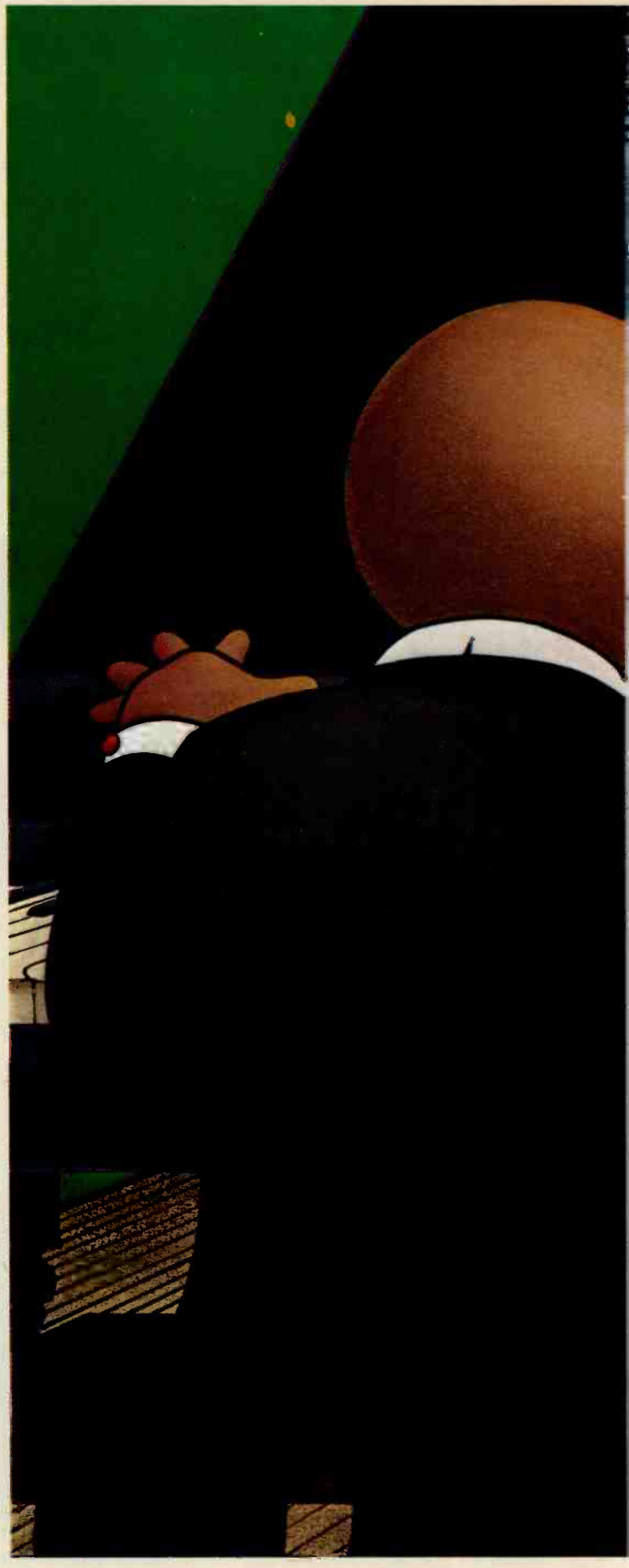
Photo: Courtesy of Jerry Wexler

WEXLER AND LITTLE RICHARD AT CRITERIA STUDIOS

THE B-52's

THE WHYS AND HOWS OF CASSETTE EQUALIZATION

HERMAN BURSTEIN



To get flat, wide-range response from tapes requires equalization, which is frequency alteration in recording and playback to overcome the tape system's inherent frequency deviations. The choice of equalization characteristics interrelates with problems of noise and distortion, and varies among tape types and even among tapes of the same type.

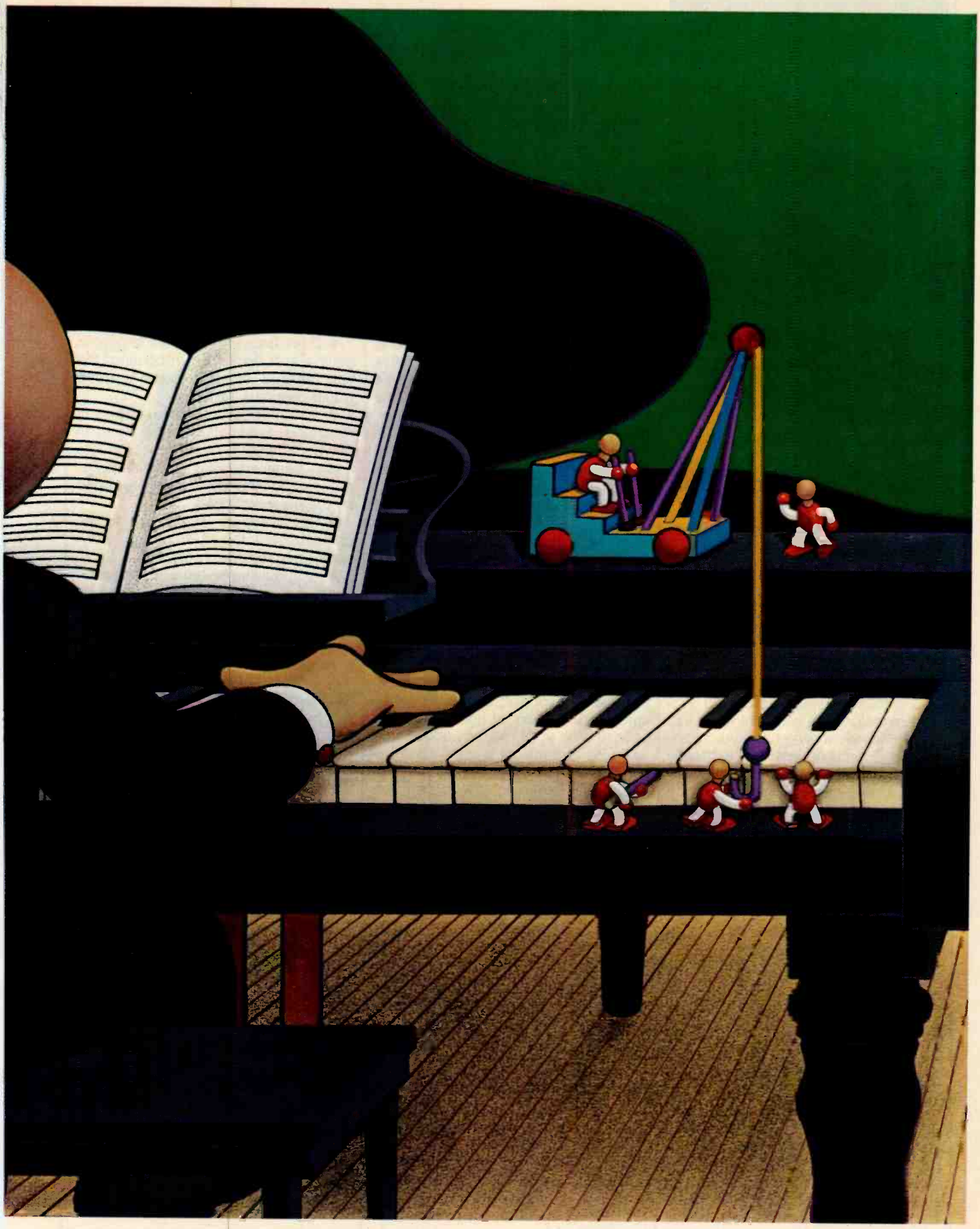
A tape playback head is a "velocity" device, whose output increases as the signal frequency increases. That is, for a given signal level on the tape, the output of the head doubles if frequency doubles, goes up tenfold if frequency increases by a factor of 10, and so on.

It is more convenient to express this relationship in decibels. For a constant signal level presented to the playback head, as frequency rises output rises just about 6 dB/octave, or exactly 20 dB/decade. This is true for an "ideal" head, one without losses or other aberrations, as distinguished from actual heads. Today's high-quality heads come quite close to the ideal, but there are still differences of some consequence in the extreme bass and, particularly, in the extreme treble.

Momentarily, let's assume we have both an ideal, lossless tape system which produces a flat recorded signal on the tape and an ideal playback head. Unequalized record-playback response is then the same as the output of an ideal head, shown by curve ABC in Fig. 1. To achieve flat response, it is merely necessary to employ playback equalization which mirrors head output. This is curve DBE, declining 6 dB/octave as frequency rises. (A simple R-C [resistance-capacitance] circuit could readily take care of the matter.) Curve FBG is the resulting flat response.

Figure 1 is not entirely fanciful. At a high tape speed such as 30 ips, the unequalized record-playback response and the required equalization would be very close to curves ABC and DBE. And life would be simple.

Illustration: Barton E. Stabler



In playback, treble loss is due mainly to the width of the head's gap: The wider the gap, the greater the loss.

But as tape speed is reduced, significant losses appear, particularly in recording. By the time we get down to 1⅞ ips, these losses are profound. Figure 2 takes us from the ideal world into the real world, showing the typical unequalized record-playback response of a high-quality, two-head cassette deck—in this case, a Harman/Kardon CD391—when using Type II (chromium dioxide or ferricobalt) tape. (I am indebted to Peter Philips of Harman/Kardon for supplying measured data on the CD391's equalization and frequency response, which I used to produce Fig. 2 and several other figures.)

In Fig. 2 we principally note the huge treble loss, amounting to about 1 dB at 1 kHz and reaching about 41 dB by the time we get out to 20 kHz. This loss is the difference between the ideal, 6-dB/octave rising response (curve ABC in Fig. 1) and the actual treble response shown in Fig. 2. About 36 dB of the loss at 20 kHz occurs in recording, and about 5 dB in playback.

Treble loss in recording is due mainly to demagnetization. The recorded signal consists, in effect, of a series of bar magnets; as frequency rises they grow shorter (more cycles per second entail more—and necessarily shorter—magnets in a 1-S span of tape), so that their opposite poles get closer together and tend increasingly to cancel each other. The erasing effect of bias current is also substantial; this effect increases as frequency rises because high frequencies are not as deeply embedded in the tape as others. In addition, slight treble loss occurs in the record head due to winding capacitance, eddy currents, and hysteresis.

In playback, treble loss is due mainly to the width of the playback head's gap. The wider the gap, the greater the loss. As frequency increases and the recorded bar magnets grow shorter, gap width approaches magnet width and the resolving power of the gap begins to fail. The record-playback head in a two-head deck ordinarily has a wider gap, and incurs greater treble loss in playback, than the separate playback head in a three-head deck. Slight additional treble losses occur in the head due to winding capacitance, eddy currents, and hysteresis.

There is some further playback aberration below 40 Hz, too. First, there are several bumps in response, on the order of 0.5 to 1.5 dB. Second, there is a slight uptilt with respect to the ideal 6-dB/octave response, as shown by the smoothed version of the deck's response. The uptilt reaches about 3 dB at 20 Hz and makes a slight contribution to the bass boost needed in playback. The foregoing phenomena are due to the "contour effect," whereby the entire head, not merely its gap, reacts to the magnetic flux on the tape.

With the exception of the slight head losses due to winding capacitance, eddy currents and hysteresis, all the losses described above become increasingly severe as tape speed is reduced. It takes just as many flux changes ("bar magnets") to record a given frequency at a slow tape speed as at a high one. But as speed is reduced, the amount of tape that passes the head per second is also reduced, and the magnets must become shorter in order to fit into the allotted length of tape. As we have already noted, the major record and playback losses increase as the recorded magnets become shorter. In technical terms, these major losses increase as the recorded wavelength decreases, with wavelength in inches being tape speed in ips divided by frequency in Hz.

How Equalization Is Achieved

Figure 2 makes it obvious that, in general terms, bass boost and treble boost are needed to restore flat response. Not obvious is the amount of boost required and whether each kind of boost should be provided in recording or playback. Fortunately we have industry standards, which in broad terms call for the following:

- Bass boost is to occur largely in playback; if applied in recording, the vast amount of bass boost needed would overload the tape.
- Treble boost is to occur largely in recording. Substantial treble boost in playback would heavily accentuate noise, because great amplification is required for the tiny signal produced by the playback head.
- Record-head losses are to be compensated for in recording, playback-head losses in playback.
- A specific playback equalization curve is to be followed, depending on tape speed and tape type. This is fundamentally a bass-boost curve, modified (in accordance with the above principle) to compensate for each individual deck's playback-head losses. Stated differently, the *combination* of playback amplifier equalization *plus* head losses must conform to the standard playback curve.
- The record equalization is to be such that, in conjunction with standard playback equalization, flat response is achieved. This is largely a treble boost, some of which (usually very little) is to compensate for record-head losses.

We now turn to specifics for cassette-deck equalization.

Two standard playback equalization curves are provided for cassettes, as shown in Fig. 3. Curve ABC shows standard playback equalization for Type II (chromium dioxide or ferricobalt), Type III (ferrichrome—now little used), and Type IV (metal) tapes. Curve DBE shows standard playback equalization for Type I (ferric oxide) tapes. It is customary to show these curves using 400 Hz as the reference frequency.

The standards express these curves in terms of turnover (also called transition) frequencies, or in terms of time constants. The relationship between turnover frequency and time constant is f equals 159,155 divided by t, where

f is turnover frequency in Hz and t is a time constant given in microseconds. Correspondingly, t equals 159,155 divided by f.

Curve ABC has designated time constants of 70 and 3,180 μS. Accordingly, the turnover frequencies are 2,274 and 50 Hz. This signifies that bass boost commences at 2,274 Hz (where it is up 3 dB) and levels off at 50 Hz (where it is 3 dB below maximum). Curve DBE has time constants of 120 and 3,180 μS, or turnover frequencies of 1,326 Hz and 50 Hz. Total bass boost—from above 20 kHz to below 20 Hz—is 33.1 dB for the 70-μS curve and 28.5 dB for the 120-μS curve.

Depending on tape type used, a cassette deck is supposed to conform to one of the two playback curves in Fig. 3. It bears repeating that the deck's *total* response—the combination of its playback-amplifier equalization and playback-head losses, not its equalization alone—must conform to these curves.

To see how this works in practice, let's return to the Harman/Kardon CD391 unit, whose unequalized response is shown in Fig. 2. The equalization supplied by that deck's record and playback amplifiers, and the resulting record-playback response, appear in Fig. 4. Curve ABC, consisting chiefly of bass boost, is provided by the playback amplifier, and curve DBE, consisting chiefly of treble boost, is supplied by the record amplifier. When the equalizations of ABC and DBE are applied to the unequalized record-playback response of Fig. 2, they produce the record-playback response of FBG in Fig. 4, which is substantially flat through the audio range.

It is to be noted in Fig. 4 that segment DB of record curve DBE includes a mild bass boost. This partly compensates for the fact that segment AB of playback curve ABC does not extend linearly all the way to the lowest frequencies but starts to level off (3 dB below maximum) at about 50 Hz—consistent with standard equalization. Further boost at the low bass end is supplied by the playback head's slight uptilt, as observed in Fig. 2. The net result of AB in playback, DB in recording, and playback uptilt is to maintain bass response a little short of flat. As shown by FB, bass response drops slightly below 35 Hz; it is about 1.5 dB down at 20 Hz.

At the extreme high end, we may note in Fig. 4 that this deck's record-playback response exhibits a trivial rise of about 1 dB. This is either because of slightly excessive treble boost due to component tolerances in the record equalization, or because the tape to which the record equalization was applied is a bit "hot" at the high end.

How close does actual playback-amplifier equalization (curve ABC in Fig. 4) come to the standard equalization (curve ABC in Fig. 3)? Figure 5 compares the two. In Fig. 5, DBE is the actual equalization and ABC is the standard. The two curves are very close. Below 400 Hz, segment DB of the actual curve is no more than 1 dB away from segment AB of the standard curve. This minuscule difference is probably due to component tolerances. Above 400 Hz, it appears at first sight that the actual and standard segments BE and BC part company too much. But it must be remembered that the industry standard requires the actual curve to include compensation

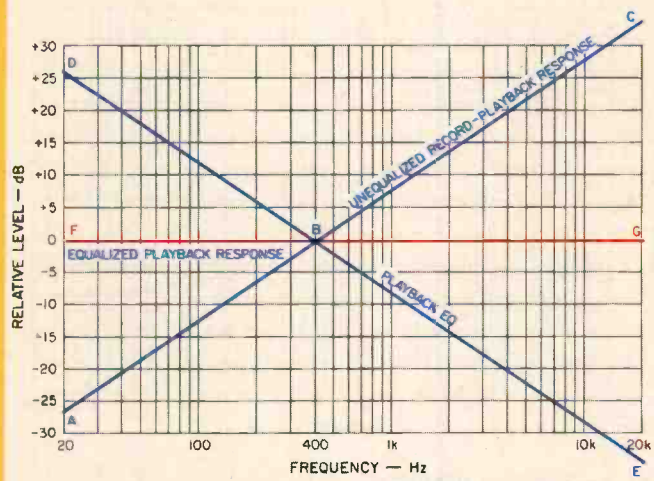


Fig. 1—Response and equalization in an ideal (lossless) tape recording system.

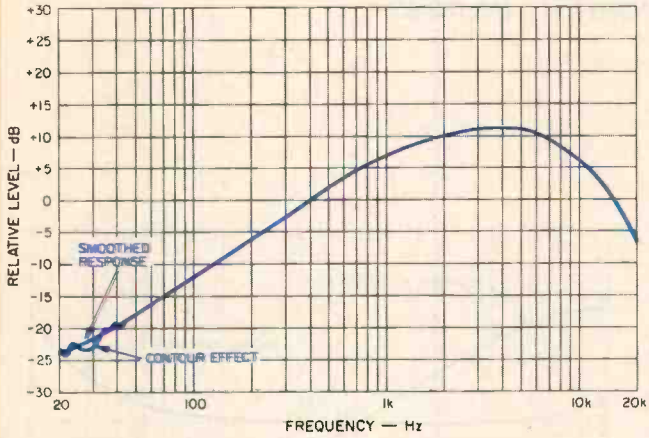


Fig. 2—Unequalized record-playback response of a two-head cassette deck (Harman/Kardon CD391), with Type II tape and appropriate bias.

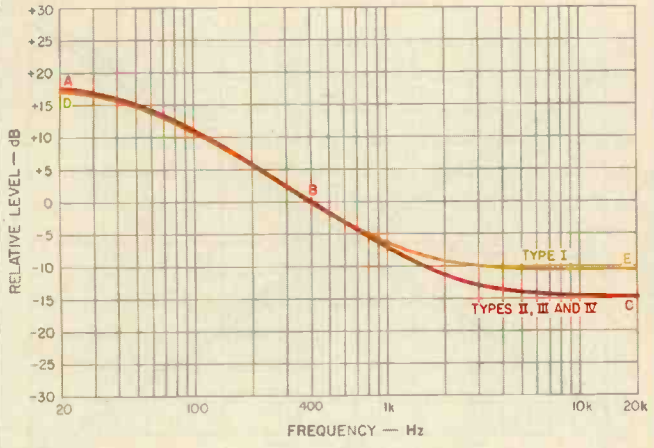


Fig. 3—Standard playback equalization curves for cassette, including both amplifier equalization and playback-head losses. Curve ABC, for Type II, III and IV tapes, has turnovers of 70 μS (2,274 Hz) and 3,180 μS (50 Hz); curve DBE, for Type I tape, has turnovers of 120 μS (1,326 Hz) and 3,180 μS.

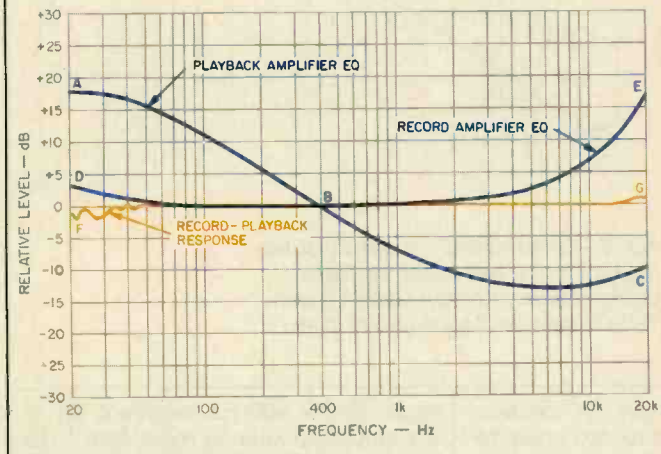


Fig. 4—Record and playback amplifier equalization of an actual deck (Harman/Kardon CD391 for Type II tape). Applying playback equalization ABC and record equalization DBE to the unequalized response of Fig. 2 yields the actual record-playback response, curve FBG.

for losses of the playback head. Therefore BE includes treble boost, reaching about 5 dB at 20 kHz, which essentially accounts for the difference between BE and BC. If one adds playback-head losses to BE, this brings the curve down so that it becomes BC.

Standardizing Playback Curves

As we shall bring out later, for a given cassette type, it is feasible to use more than one kind of playback curve in terms of the amount of bass boost provided. So why has the amount of bass boost been standardized? And why are there two standard curves for cassettes?

One reason is to extract the most from the tape in terms of extended treble response, minimum noise, and minimum distortion. These three desirables are conflicting; that is, an improvement in one respect necessitates a sacrifice in one or both of the others. Proper choice of turnover frequencies, particularly the upper one, can produce an optimum compromise among the conflicting requirements.

We can look at the standard playback curves of Fig. 3 in a different light than previously: We can view them as providing treble cut above 400 Hz. The greater the descent of the curve (the greater the treble cut), the more it reduces noise in the playback portion of the tape system. Therefore, the 70-μS curve initially appears preferable to the 120-μS curve.

However, things are not that neat. As we shall explain later, the amount of bass boost (or treble cut) employed in playback governs the amount of treble boost needed in recording. The greater the bass boost in playback, the greater the treble boost needed in recording. Thus, the 70-μS playback curve necessitates more record treble boost than does the 120-μS curve. But with increased record treble boost, there is increased risk of tape saturation, which results in distortion and impaired treble response. One could reduce the risk of tape saturation by lowering the signal level recorded on the tape, but this would reduce the signal-to-noise ratio. Alternatively, one could reduce the amount of treble boost needed by lowering the amount of bias current employed in recording. However, less bias entails more distortion. It is therefore necessary to look for a specific playback equalization, and thus a specific record equalization, which together permit an optimum compromise among the conflicting requirements for extended treble response, low noise, and low distortion.

The risk of tape saturation due to record treble boost varies with cas-

sette type; hence, so does optimum playback equalization. The risk is greater for Type I cassettes than for the three other types. Therefore, the industry has taken the position—with which some disagree—that 120-μS playback equalization is optimum for Type I cassettes, and 70-μS for the other three types.

The second reason for standard playback equalization is, of course, to provide compatibility among tape decks. It is highly desirable for a cassette recorded on one deck to provide flat response when played on another. This is possible only if all decks use the same—that is, standard—playback equalization.

Record Equalization

We have seen that for a given cassette type there is a standard playback equalization curve. It is logical to ask whether there is also a standard record equalization curve. Strictly speaking, the answer is no. The industry standard calls for each deck to supply whatever record equalization is required to produce substantially flat response when the deck incorporates standard playback equalization; hence, a standard record curve is not needed. Moreover, it could also be troublesome. For a given cassette type, equalization supplied by the record amplifier tends to differ somewhat from one manufacturer's deck to another's for the following reasons:

- Manufacturers may have different concepts of "substantially flat" response. Those who elect to maintain response to 20 kHz or beyond tend to use more treble boost than those who choose to go only to 16 kHz or so. Returning to Fig. 4, we see that very substantial treble boost is needed to maintain response to 20 kHz; in this example, treble boost reaches about 17 dB at 20 kHz. But the greater the treble boost, the greater the likelihood of tape saturation, with undesirable consequences for treble response, distortion, and noise, as discussed earlier. Therefore, a manufacturer may decide to forgo flat response past 16 kHz or so in exchange for lower risk of tape saturation; accordingly, he will use less record treble boost.
- The next reason has to do with width of the playback head's gap. The narrower the gap, the more extended the treble response in playback. A separate playback head can have a narrower gap, and therefore better treble response, than will a head used for both record and playback. If a deck is capable of extended playback response, it becomes desirable to extend treble boost in recording.

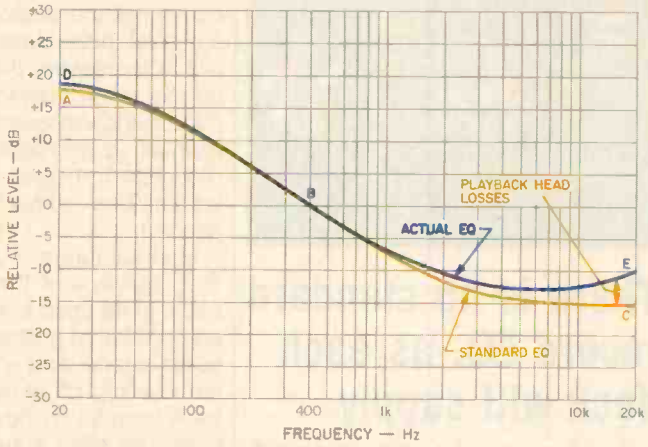


Fig. 5—Comparison of actual Type II playback-amplifier equalization of the CD391 with standard playback equalization, showing slight treble boost to compensate for playback-head losses.

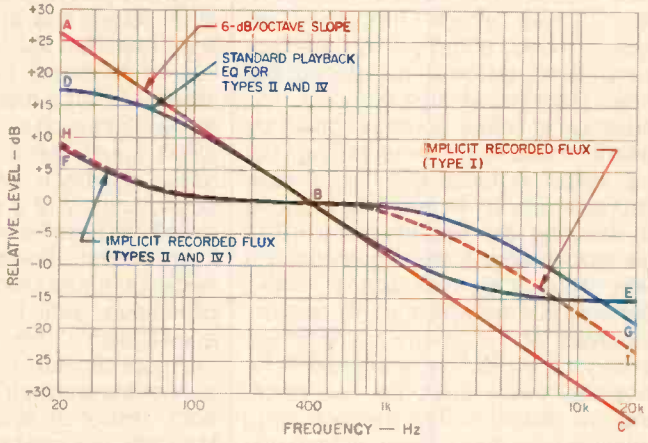


Fig. 6—For any tape type, recorded flux standards are implicit in the difference between the slope of an ideal playback head's equalization requirements (ABC) and standard playback equalization for that tape type. Curve FBG, the implicit standard flux for Type II and IV tapes, is derived from ABC and the 70-μS EQ curve (DBE). Curve HBI, for Type I tapes, is derived from ABC and the 120-μS curve shown in Fig. 3.

There is no standard record EQ, as each deck will supply whatever is required for flat response using standard playback EQ.

• Record equalization will also vary with the amount of bias current each deck manufacturer uses in recording. Bias current affects frequency response, noise, and distortion. As bias is increased, distortion is reduced, but treble response is also reduced. The reduction in treble could be offset by greater treble boost in recording, but this would increase the risk of tape saturation. Such risk could be reduced by lowering the recording level, but this would worsen the signal-to-noise ratio. Thus, the manufacturer seeks that bias current which, in his opinion, achieves an optimum compromise among the conflicting requirements for extended treble response, low noise, and low distortion. The decision as to optimum bias may differ a bit from one deck manufacturer to another; accordingly, so will the record treble boost each manufacturer uses.

• Deck manufacturers choose record equalization with respect to a specific tape. Since tapes of the same type but of different make or variety may differ somewhat in their treble characteristics, record treble boost will also vary.

• Some decks use Dolby HX Pro, which employs the high-frequency content of the audio signal as part of the total bias current. As the treble signal increases, the amount of bias current taken from the deck's bias oscillator is correspondingly reduced, to maintain a constant total bias. Such reduction in oscillator bias somewhat lessens the amount of treble boost needed.

Manufacturers may also differ in their concept of the amount of bass boost to be used in recording. We noted earlier that a slight amount of bass boost in recording is desirable to offset the levelling off of bass boost in playback from 50 Hz down. One manufacturer may elect a substantially full offset in order to maintain essentially flat record-playback response down to 20 Hz or so. Another may decide to maintain essentially flat response less far down, say to 40 or 50 Hz, and therefore will provide less bass boost in recording.

Standard Recorded Flux

Although there is no standard equalization curve with respect to the deck's record amplifier, there is an *implicit* standard with respect to the amount of magnetic flux (signal) recorded on the tape. As we saw in Fig. 1, if a signal were recorded flat (constant magnetic flux on the tape), the response of an ideal head (or a real head with amplifier compensation for its deviation from ideal) would rise 6 dB/octave. In this case, playback equalization would consist simply of a 6-dB/octave treble roll-off (or bass boost).

In practice, however, the playback system's equalization does not fall 6 dB/octave, but follows a standard equalization curve. This implies that the magnetic flux recorded on the tape cannot be constant if flat record-playback response is to be maintained: Magnetic flux must be altered in accordance with the difference between a line falling at a rate of 6 dB/octave with increasing frequency (ABC in Fig. 6) and the standard playback curve (DBE).

Subtracting the standard, 70-μS playback curve (DBE) from ABC, we get curve FBG as the implicit standard recorded flux for 70-μS cassettes. For flat response to be maintained from 20 Hz to 20 kHz, recorded flux must include a bass boost that reaches about 8.5 dB at 20 Hz and a treble drop that reaches nearly 19 dB at 20 kHz.

If this treble loss is permissible (and it is, in fact, mandatory), then it is not necessary to supply enough treble boost in recording to compensate for the entire 36 dB of record losses shown for a typical cassette deck in Fig. 2. Only 17 dB of treble boost need now be supplied by the recording amplifier—and, from Fig. 4, we see that the treble boost supplied by the deck in question reaches 17 dB at 20 kHz. In keeping with the principle that recording losses should be compensated in recording, and playback losses in playback, the remaining 5 dB of the 41-dB record-play treble loss (Fig. 2) is compensated for in playback equalization (Fig. 3).

The dashed curve HBI in Fig. 6 shows the implicit standard recorded flux for Type I (120-μS) cassettes, derived in the same manner as FBG. We've already seen the standard playback curve for Type I, curve DBE in Fig. 3. It is significant to note that in the treble range the recorded flux for Type I cassettes is about 4.4 dB less at 20 kHz than for the other types. Therefore, less record treble boost is needed for Type I.

The reason that recorded flux is only an implicit standard is that measuring it is a difficult laboratory procedure. Therefore, standards are based on playback equalization characteristics, which are more readily measured—and which, as we have just seen, imply standard recorded-flux curves.

Playback EQ and Record Treble Boost

Figure 6 has suggested that less record treble boost is required for Type I tapes than for the other types because of different playback equalization and, therefore, different recorded flux. Figure 7 shows specifically how choice of playback equalization, either 70- or 120-μS, affects the required amount of record treble boost for an actual cassette deck. Curve ABC repeats the unequalized record-playback response of the deck represented in Fig. 2, using Type II tape. In. Fig. 7, curve DBG shows the playback response if 70-μS playback equalization (ABC in Fig. 3) is applied to ABC. The difference between segments BI and BG is the re-

quired treble boost when 70-μS playback equalization is used. For example, at 10 kHz the playback response after playback equalization is about −9 dB. Hence, about 9 dB of treble boost is needed at 10 kHz to achieve flat record-playback response. As Figs. 4 and 5 indicate, 7 dB of this treble boost is supplied in recording, and the other 2 dB in playback.

Curve FBE in Fig. 7 shows the playback response that would result if 120-μS playback equalization were applied instead of 70-μS equalization. Less treble loss is now evident in playback so that less treble boost is needed in recording. For example, at 10 kHz the playback response is now only about 4.75 dB down, instead of 9 dB as before. (To achieve utterly flat response, record equalization would have to produce a very slight drop, less than 1 dB at most, between approximately 500 Hz and 5 kHz.)

Looking at the bass end, if 70-μS playback equalization is used, and if flat response is to be achieved, the required bass boost in recording is the difference between segments HB and DB. Such boost would reach about 5.5 dB at 20 Hz. Very similar record bass boost would be needed if 120-μS playback equalization were used instead.

(There is a seeming discrepancy: Fig. 6 indicates that, for flat response all the way down, recorded flux should be about 8.5 dB up at 20 Hz, while Fig. 7 indicates that bass boost of only about 5.5 dB is needed. However, we must recall from our discussion of Fig. 2 above that the playback head in question exhibits about 3 dB boost at 20 Hz, owing to the contour effect. This brings the required amount of record bass boost down to 5.5 dB at 20 Hz.)

Figure 7 shows us something important: How the choice of playback equalization affects the required amount of record treble boost. The greater the playback bass boost, the greater must be the record treble boost. Since Type I tape cannot safely accept as much record treble boost as the other types, 120-μS playback equalization (curve DBE in Fig. 3) is used for Type I, while 70-μS playback equalization (curve ABC in Fig. 3) is reserved for the other types.

Figure 7 reveals another important fact—that the unequalized record-playback response of a deck for a given type of tape does not precisely dictate the equalization needed for essentially flat response. We see in Fig. 7 that two kinds of playback equalization could be used—either 70- or 120-μS. By this token, other kinds could also be used, such as 90 μS, 100 μS, etc. And for each playback equalization characteristic, there would be an appropriate record treble boost.

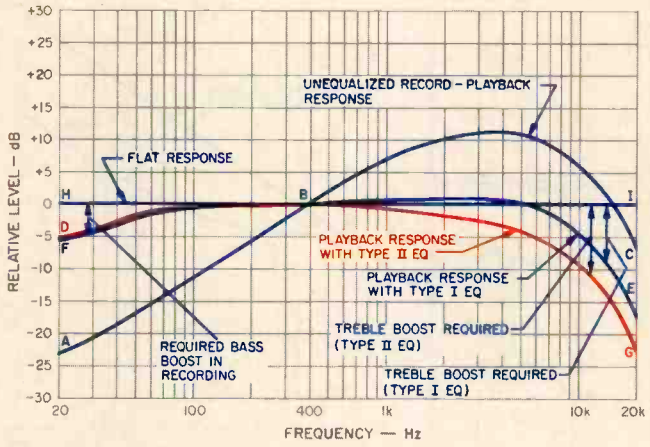


Fig. 7—How choice of playback equalization affects treble-boost requirements. This boost is primarily supplied in recording.

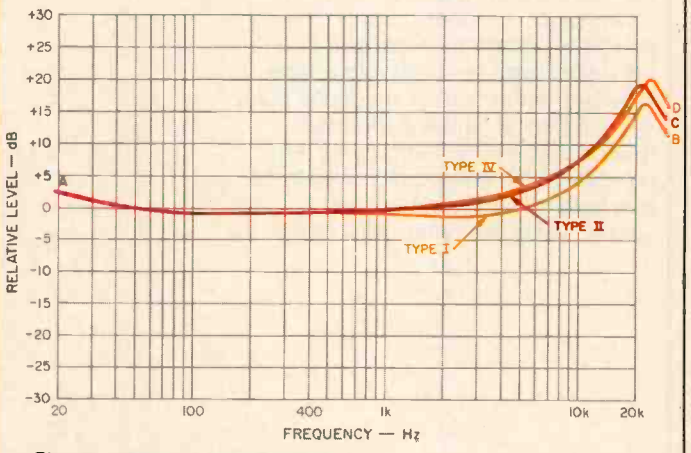


Fig. 8—Record equalization characteristics for an actual cassette deck (the Harman/Kardon CD391).

For the purpose of illustration, Fig. 8 shows the record equalization of an actual cassette deck for Types I, II, and IV tapes. Record treble boost is significantly less for Type I, in large part because of the difference in playback equalization between Type I and the others. (The difference between Type I treble boost and that of the others reaches about 3 dB instead of the 4.4 dB that we might expect on the basis of the difference between segments BE and BG in Fig. 7. This 1.4-dB variance is due to the different characteristics of the various tapes for which the deck in question is adjusted.)

A Controversy About Type II EQ

Some in the industry have questioned whether 70-μS playback equalization is the wisest choice for Type II tape. They would prefer a curve with an appreciably higher time constant than 70 μS, such as 120 μS. In other words, they would like less bass boost in playback and, therefore, less treble boost in recording. The greater treble boost entailed in 70-μS equalization

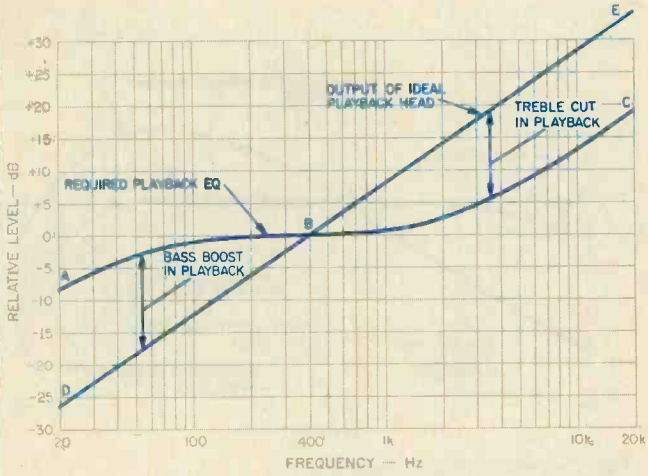


Fig. 9—The industry's revised (post-1965) way of expressing standard playback equalization. Curve ABC is not the equalization to be supplied by the playback system, but rather the response of a properly equalized playback system to the output of an ideal (lossless) head playing a tape recorded with constant magnetic flux. The difference between the ideal head's output (DBE) and curve ABC represents the equalization which the playback system must actually supply. Compare curve ABC of Fig. 3.

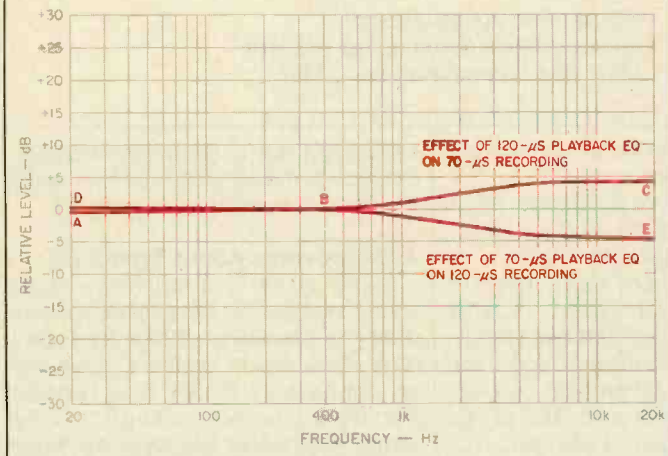


Fig. 10—Effect of playing 120-μS recordings with 70-μS playback EQ, and vice versa.

affords less recording headroom—i.e., less protection against tape saturation and its concomitant distortion and treble loss. They cite the increasing abundance of program material with strong high-frequency content, particularly on Compact Discs and premium phono discs, and the resultant need for adequate headroom. They would be willing to give up several dB of S/N (better with 70-μS equalization) in exchange for several dB more headroom (better with 120-μS equalization).

The controversy may be settled by continuing advances in the state of the art. Modern noise-reduction systems—principally Dolby C and dbx—afford signal-to-noise ratios in the 70- and 80-dB range. The recordist blessed with such S/N and seeking to avoid tape saturation can afford to lower the recording level several dB—say, by about 4.5 dB, which is the maximum difference between the record treble boost entailed in 70- and 120-μS equalization—and still have a very good signal-to-noise ratio. Developments such as Dolby HX Pro and the Dolby C treble recording characteristic reduce the risk of tape saturation.

Confusion About Playback EQ

Until about 1965, the industry expressed standard playback equalization in terms of the frequency contour the playback system should supply—primarily a bass-boost curve, as shown straightforwardly in Fig. 3. However, since 1965, playback EQ has been expressed in terms of the deck's desired output when playing a tape which produces constant flux in the core of the playback head at all frequencies, as shown in Fig. 9. Thus, the actual equalization is *not* curve ABC of Fig. 9, but the *difference* between this curve and the output of an ideal head (the 6-dB/octave slope of curve DBE). A graph of this difference would reproduce curve ABC of Fig. 3.

Effectively, the curve labelled "required playback EQ" in Fig. 9 is the inverse of that in Fig. 3, tilted to reflect the fact that it is referenced to a 6-dB/octave slope instead of the horizontal line of flat response. This has led to a frequent misunderstanding—that playback equalization consists largely of treble boost instead of bass boost.

Interchanging Equalization

Many readers have inquired about the effects of using equalization settings other than those normally recommended for specific tape types. The most obvious effects are slight alterations of treble response when playback and record equalization are mismatched. If a tape intended for 70-μS

playback is played back with 120-μS EQ, a slight treble boost will be heard. If a recording intended for 120-μS playback is played back with 70-μS EQ, there will be a slight treble cut.

In theory, this cut or boost will reach 4.4 dB at 20 kHz, as shown in Fig. 10. In practice, however, the difference may be more on the order of 2.5 to 3 dB, as indicated by the record equalization curves of Fig. 8. The differences between actual and theoretical treble response could be explained in terms of differences in actual equalization curves supplied by the deck in question, or differences in the treble response and saturation characteristics of various tape formulations, especially if the tape in use is not the tape which the deck manufacturer used in adjusting record equalization characteristics.

What if Type I tape were both recorded and played back with Type II or IV equalization, or Type II or IV tape were recorded and played back with Type I EQ? In each case, the treble changes in recording would just about balance those in playback, so overall record-playback response would be only slightly affected.

However, we must keep in mind that signal-to-noise ratio would always be affected, with 70-μS playback equalization producing less noise (higher S/N). After all, that is the reason for using 70-μS instead of 120-μS playback equalization.

It should further be kept in mind that use of Type II or IV record equalization with a Type I tape will increase the risk of tape saturation, and therefore of distortion and loss of extreme treble, unless the recordist deliberately reduces the recording level by several dB.

How Open-Reel Decks Compare

To round out the discussion of our subject, let's compare open-reel tape deck equalization with cassette equalization. Standard playback equalization for open-reel decks follows the five basic principles listed near the beginning of this article. The playback curves for open-reel look much the same as for cassette, save for differences in the upper turnover frequency and reduced need for playback treble boost to compensate for playback-head losses. In all cases, the lower turnover frequency remains 50 Hz (3,180 μS). For speeds of 1⅞, 3¾, 7½ and 15 ips, there are official standards for conventional (ferric oxide) tape and de facto standards for EE (extra efficiency—akin to Type II) tape.

Table I—Upper turnover frequencies and total bass boost for standard playback curves. The lower turnover frequency is 50 Hz (3,180 μS) in all cases.

	Upper Turnover Frequency (f_2)	Total Bass Boost
Cassettes, Type I (1⅞ ips)	1,326 Hz (120 μS)	28.5 dB
Cassettes, Types II, III, IV (1⅞ ips)	2,274 Hz (70 μS)	33.1 dB
Open Reel, Conventional Tape		
1⅞ ips	1,326 Hz (120 μS)	28.5 dB
3¾ ips	1,768 Hz (90 μS)	31.0 dB
7½ and 15 ips	3,183 Hz (50 μS)	36.1 dB
Open Reel, EE Tape		
1⅞ ips	2,274 Hz (70 μS)	33.1 dB
3¾ ips	3,183 Hz (50 μS)	36.1 dB
7½ and 15 ips	4,547 Hz (35 μS)	39.2 dB

As stated earlier, record and treble losses become less severe as tape speed is increased. Therefore, less record treble boost is needed at higher speeds in order to achieve a given amount of recorded magnetic flux. Or, for the same treble boost as before, one can achieve more recorded flux; this in turn entails greater playback bass boost, with a consequent improvement in signal-to-noise ratio (see Fig. 6 for the relationship between playback bass boost and recorded flux). In practice, the upper turnover frequency is chosen to afford some of each of the advantages gained from higher tape speed: Somewhat less treble boost, reducing the risk of tape saturation, and somewhat more playback bass boost, resulting in a higher signal-to-noise ratio.

Both for cassette and open-reel decks, and for the various speeds and tape types commonly used, Table I shows the upper turnover frequencies of the standard playback curves. It also shows, for each curve, the total amount of equalization (bass boost) from frequencies above 20 kHz down to below 20 Hz. Total bass boost (equalization) is given by 20 log (f_2 divided by f_1), where f_2 is the upper turnover frequency and f_1 is the lower turnover frequency. If you want to calculate the amount of bass boost at a given frequency, use this equation:

$$B_f = 10 \log \frac{f_2^2 + f^2}{f_1^2 + f^2}$$

where B_f is bass boost at the frequency of interest, f is frequency of interest, f_1 is the lower turnover frequency (always 50 Hz), and f_2 is the upper turnover frequency.

For example, assume we want to know the bass boost at 1 kHz for the playback equalization curve with time constants of 70 and 3,180 μS. First we convert time constants into turnover frequencies by dividing the constants into 159,155 so that f_1 equals 50 Hz and f_2 equals 2,274 Hz. Then:

$$B_{1000} = 10 \log \frac{2274^2 + 1000^2}{50^2 + 1000^2}$$

$$= 10 \log 6.156 = 7.9 \text{ dB.}$$

If you wish to use 400 Hz as the 0-dB reference, calculate the boost for 400 Hz and subtract this from the boost for the frequency of interest, yielding B'_f. For example, B_{400} equals 15.2 dB; subtracting 15.2 dB from 7.9 dB shows that B'_{1000} equals −7.3 dB when 400 Hz is the 0-dB reference. That is, the equalization curve at 1 kHz is 7.3 dB below its level at 400 Hz.

The principles of tape equalization, and their implementation in cassette decks, are complex. Luckily for the tape user, however, one can make excellent recordings without grasping these principles in detail. It is necessary only to grasp the deck's equalization switch, and set it to match the tape that is being used. A

CASSETTE QUALI

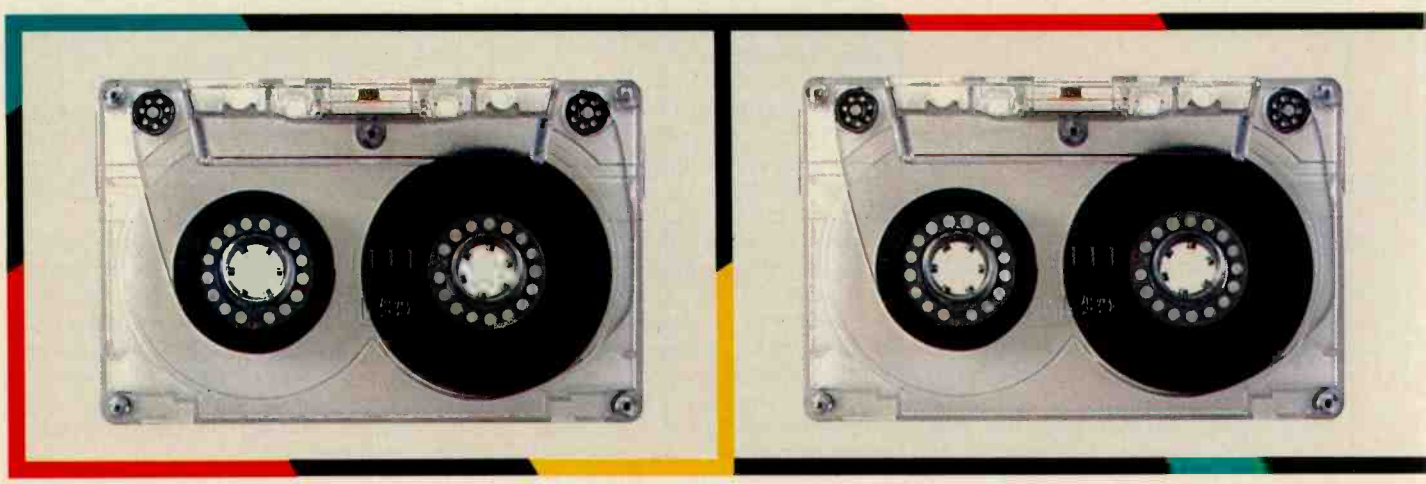
WHAT IS THE INDUSTRY

MIKE JONES

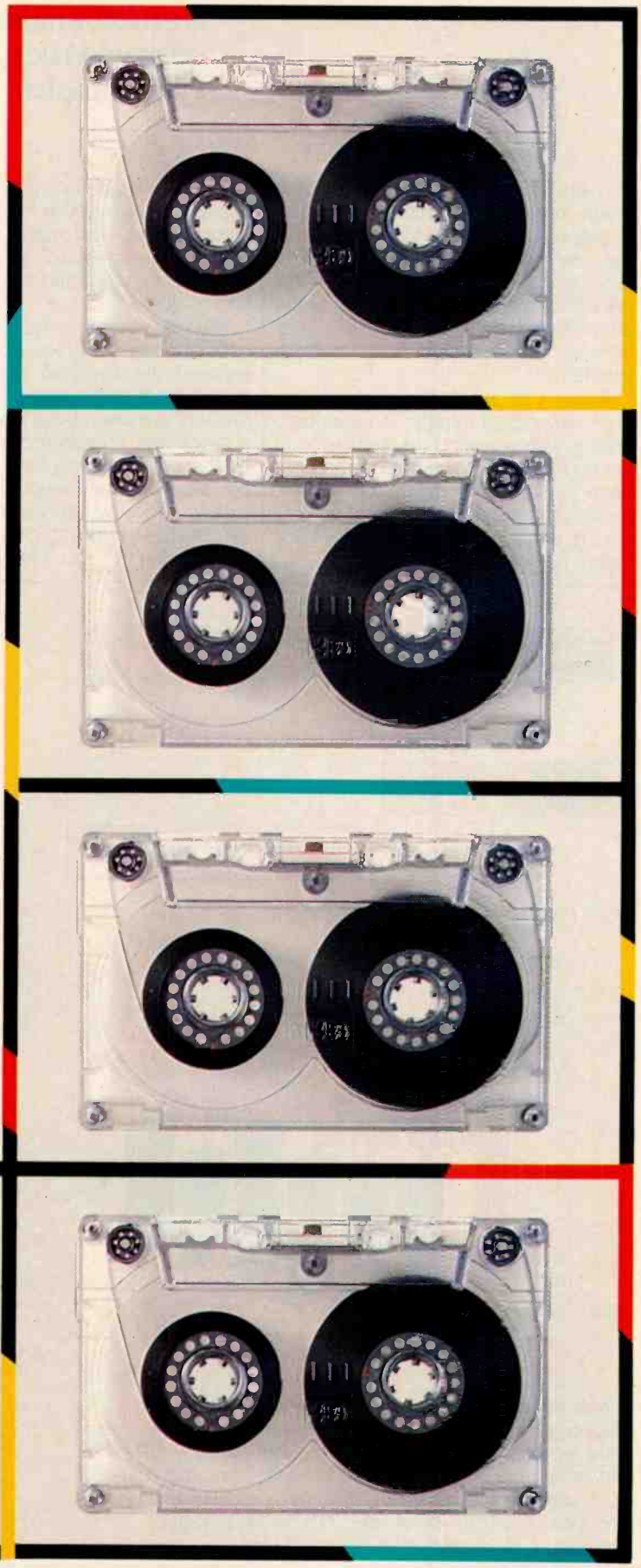
There was a time, not long ago, when the cassettes you recorded at home by copying LPs would sound superior to any of the music cassettes you could buy from your local record store. The same cannot be said today. The current music cassette, duplicated at high speed using Dolby HX Pro (see *Audio*, August 1984) and the latest tape formulation, is capable of superb fidelity. Its quality can compare favorably to mass-produced vinyl records—particularly those with more than 22 minutes recorded on each side.

Dolby HX Professional and new tapes are just part of the story, for in truth the music cassette has undergone major development during the last few years, benefiting from better cassette housings, improved mastering techniques, and new duplicating equipment. Another important factor has been the attitude of the duplicators themselves: They are newly and increasingly determined that their cassettes will be the best they can produce, comparable to those that can be produced at home. Indeed, the leading duplicators are so committed to improving quality that many of them attended a seminar organized by Electro Sound in California last year, following a similar event in London, to discuss various ways in which the quality of music cassettes could be improved even further.

Strange as it may seem, the largest obstacle to progress on quality is not a technical problem for duplicators but one of persuading the record companies to make full use of current technology—let alone what might be developed in the future. Despite the large profit margins involved, some record companies are willing to use only the cheapest materials for cassettes, in order to achieve maximum profits. They say that the consumers who buy their products do not care about quality, and the evidence given to support this claim is that they receive very few complaints. Boldly speaking, they have a captive market of 10- to 25-year-old music listeners who, if they wish to buy cassettes of their favorite groups, have to accept whatever quality the record company decides to produce. Why some record companies do not aim to give good value is quite beyond most analysts, especially



TY: DOING?



since they could obtain enormous improvements in quality using their existing equipment by paying more attention to detail during the transfer and manufacturing stages.

I believe that it is incumbent on the record producer to insist on good quality throughout; indeed, he can help make the necessary funds available by not allowing his group to waste valuable studio time, as is often the case.

Quality from the Beginning

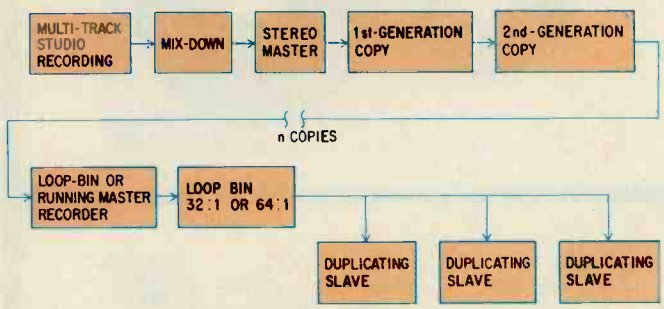
Even when the best materials are used, the sound quality of a cassette can be easily ruined by an inferior master, and many of the speakers and delegates who attended the California seminar expressed concern over this. Ideally, the source master from which cassettes are duplicated should be either a digital or a first-generation analog copy of the stereo master. If subsequent-generation analog copies are used, the signal-to-noise ratio and distortion will deteriorate, thus restricting the dynamic range. Unfortunately, many record companies do not seem to realize

Even when the best materials are used, a music cassette's quality can be ruined by an inferior master.

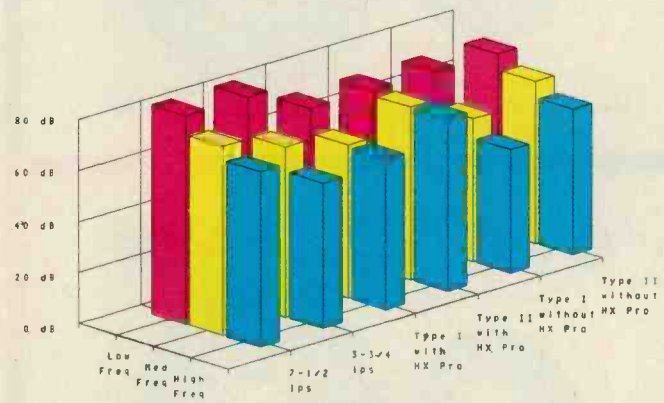
or care about this, often sending fourth- or fifth-generation tapes for duplication. Under these conditions, it is this running master—not the cassette tape or the duplication process—that will limit the sound quality. A far better alternative would be to use digital transfer, which avoids many of these problems.

Before I go any further, I should explain why digital transfer is superior to analog with respect to deterioration of the audio signal. Once a recording has been converted to digital format, and providing that any subsequent editing, mixing or transfer is executed in the digital domain, avoiding D/A and A/D converters, it will not matter how many copies you make from the initial digital recording, or how many generations you produce—they will all sound identical to each other and will undergo no loss of quality.

The use of chrome tape and the advent of Dolby HX Professional have increased the dynamic range of cassettes, so that the use of high-quality masters is more crucial than ever. This subject was considered so important by the seminar organizers that an entire session was devoted to it. Ken Gundry of Dolby Laboratories gave an extremely interesting presentation on how Dolby HX Pro can be used to extend the dynamic range of music cassettes at high frequency, up to 10 dB at 15 kHz. When you listen to a cassette recorded with HX Pro, the improvement can be quite dramatic, with ferric tape sounding like chrome and the latter like metal. Some material similar to what Ken presented is shown here. In addition to demonstrating the beneficial effects of HX Pro on cassette tape, he also showed how easy it is for the performance of the running master to restrict the quality of the cassette, especially when the cassettes are duplicated at up to 64 times normal speed. Ideally, what we need is a method of extending the dynamic range of the running master as well as that of the cassette; this is exactly what is achieved by fitting Dolby HX Pro to the recorder on which the running master is recorded.



Block diagram of cassette duplication.



S/N in three frequency ranges, for master tapes and duplicated cassettes. From left to right, the first two sets of bars represent 1-inch, 4-track tape with Dolby B NR. The remaining four sets of bars are for cassettes duplicated at 32:1 speed ratios, using Dolby B NR. Frequency ranges are: Low, 1 kHz for open reel, 375 Hz for cassette; medium, 1 to 10 kHz; high, 15 to 20 kHz.

Two manufacturers, Otari and Studer, currently produce the new type of mastering machines. Studer has also improved the phase response and tape guidance of their recorder to increase the stability of the tape as it passes across the heads. The result is a cleanup of the phase response at the top end of the spectrum and an improved stereo image. This has proved necessary because the masters for duplicating cassettes at 64:1 are normally recorded at 3¾ ips.

Upgrading or replacing existing equipment, to enable a duplicator to take advantage of Dolby HX Pro, is an expensive business. While there is no doubt in my mind that it is worthwhile, some duplicators say that they cannot tell the difference between cassettes which have been recorded with HX and those which have not. If this is the case, then they should look very closely at their system or their duplicating methods and masters, for something is definitely wrong.

Any doubters should try listening to the prerecorded cassettes, currently being produced by Capitol and EMI Records, which carry the "XDR" logo. Not only were Capitol and EMI the first companies to use Dolby HX Pro on both sides of the Atlantic, they were also the first to develop a system whereby they could control the consistency and quality of the cassettes they produce on an international basis. The XDR program is one of continual devel-

The key to cassette quality is getting record companies to make full use of current and future technology.

opment and one that benefits the consumer a great deal. Unlike the "Chrome for Quality" logo, the XDR symbol means that the cassette has been produced to exacting standards which cover the entire recording chain from studio to final product. If just one part of the chain falls below specification, then the XDR logo is not used.

I hope that Dolby Laboratories will control the use of the HX Pro logo in a similar way so it, too, will become a symbol of quality. There is no doubt in my mind that BASF missed a golden opportunity to improve the standard of prerecorded cassettes when they allowed the industry to use the "Chrome for Quality" logo without any effective control as to how or when it was used. Now all it really states is that chrome tape has been used, which doesn't say anything about the quality of the recording—unlike XDR or Teldec's Direct Metal Mastering (DMM) logo, both of which do.

The Basic Particle

Having decided to produce the highest quality cassettes possible, what tapes are available to the cassette duplicator? The most common type is coated with gamma iron oxide, more commonly known as ferric, and it is similar to many of the Type I blank cassettes that you can buy. While gamma oxide tape has been around since the late '50s, the tape we use today is nothing like the product that was produced at that time. As Frank Diaz of Columbia Magnetics explained at the seminar, a new ferric particle is developed every five years or so. Modern ferric tapes are quieter, offer more dynamic range, and are far more stable than their predecessors.

But is ferric good enough, or is there something better? Judging the issue on purely technical grounds, I have to say there is a better product, chrome tape, and I believe that the majority of the experts who attended the seminar would agree with me. Chrome tape's superiority is largely due to the efficiency and shape of the chromium dioxide particle and the way in which it outperforms pure ferric formulations for most applications, including audio, video and data. Indeed, chromium dioxide could be regarded as the Rolls-Royce of magnetic particles.

In audio recording, chrome's output level is similar to ferric's at low frequencies, but it provides a higher output at short wavelengths, which enables it to handle synthesized music and digital recordings with minimum compression. Because the chromium dioxide's particle size is smaller and more uniform than its ferric counterpart's, chrome can be packed onto the tape more evenly and with greater density, thus reducing bias noise and tape hiss and increasing output. Of particular interest to the critical listener is the substantial reduction in modulation noise that is obtained with chrome; this feature, in my view, makes its universal use for music cassettes well worthwhile. In addition, an old problem has been overcome by the introduction of new manufacturing methods; print-through has been reduced to a point where the figures obtained for chrome are now lower than those for many cobalt-doped tapes.

So, in pure audio terms, chrome has a lot going for it, and those recordings duplicated on chrome have a clarity and transparency that would be hard to obtain from any ferric tape. But because of commercial interests, chrome has not received the universal support from the industry that it should have obtained on purely technical grounds. Like Dolby HX Pro, some duplicators cannot hear any improvement when they use chrome, but again, this is likely due to problems with their equipment or low-quality masters. What they must realize is that to achieve the excellent results that chrome is capable of, the duplicator must pay a great deal of attention to detail if there's to be an audible difference in the finished product.

Because of the impact chrome has had on the industry, other tape manufacturers who do not have licenses from DuPont to produce chrome have produced alternatives such as Magnetite (from Agfa) or CS-1 (from Capitol). The initial results obtained with these new products are very promising, and in subjective listening tests they come close to those obtained with chrome. The important thing to remember is that all of them are a vast improvement over standard ferric formulations, *providing* they have been duplicated correctly and from a good-quality master.

High-speed cassette duplication frequently uses a continuous-loop master tape running at high speed through a loop bin. In this Electro Sound 8000 system, the master runs at 240 ips, while slave units record onto large pancakes of cassette tape at 240, 120 or 60 ips. Quality increases as the slave speed and speed ratio to the final cassette go down.

Cassettes recorded with HX Pro improve dramatically, with ferric sounding like chrome and the latter like metal.

Cassette Housings

Another seminar session dealt with cassette housings, and the majority of those attending agreed that, while the tracking accuracy of cassette housings has improved a great deal in recent years, there is still room for improvement. In truth, higher quality recordings place a greater demand than ever on the cassette housing (or shell), which has to be made more precisely so it can guide the tape across the playback head more accurately. Poor tracking will have the same effect as a playback head which is in need of azimuth adjustment.

Tape-tracking errors due to cassette-shell defects, such as the slanted pins shown in the lower drawing, have the same effects as playback-head azimuth alignment errors.

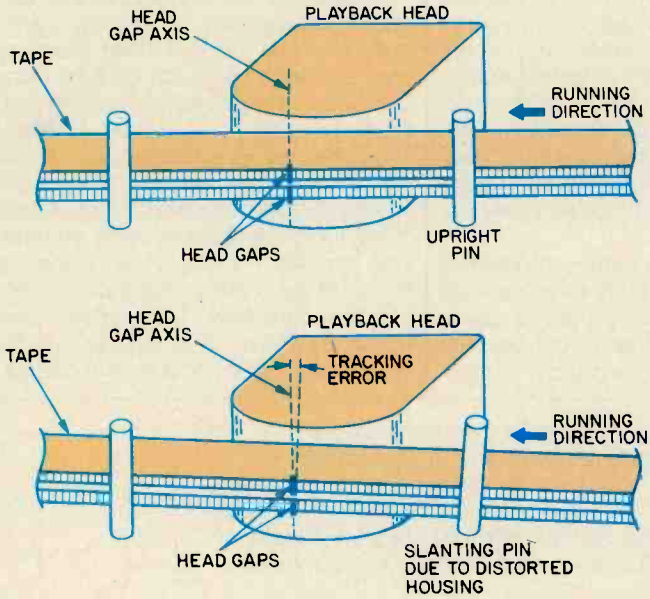


Table I—Tape speeds in various duplicating systems.

Electro Sound and Gauss Duplicating Systems

Duplicating Ratio	Running Master Speed	Real-Time Master Speed	Slave Speed
32:1	240 ips	7½ ips	60 ips
64:1	240 ips	3¾ ips	120 ips
128:1	240 ips	1⅞ ips	240 ips

New Otari System, ½-Inch Only

Duplicating Ratio	Running Master Speed	Real-Time Master Speed	Slave Speed
32:1	480 ips	15 ips	60 ips
64:1	480 ips	7½ ips	120 ips
128:1	480 ips	3¾ ips	240 ips

Concern was expressed at the seminar over the way some consumers store their cassettes, particularly those who use cassettes in cars, where temperatures can easily climb above the softening point of plastic. The point to remember is that the plastic body of the cassette will distort long before it melts. Distorted housings will not track well, nor will they sound right.

I had the pleasure of moderating the final session of the seminar, where the attendees took a look into the crystal ball at the future of the industry. Of course, the conversation soon came 'round to the Compact Disc and alternative digital systems, such as the digital cassette. Most agreed that the Compact Disc will soon become the major competitor to cassettes, especially for the classical market, and that vinyl would eventually fade away. Although digital cassette systems are being developed in Japan, manufacturers have not yet agreed on a single common standard. Because of the public's general awareness of the Compact Disc and of improved recording technology, a great deal of pressure will be put on the duplicating industry to improve the quality of cassettes even further. Pressure will also be put on the record industry to make use of current technology and future improvements. The danger is that the record companies may, in actual practice, do the opposite: Master from low-quality or noisy masters, as happened with the early Compact Disc releases.

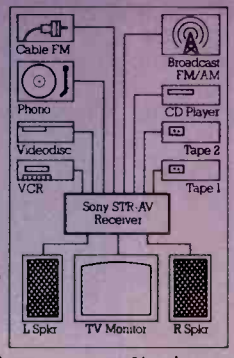
As technology pushes forward we should take advantage of it in order to enrich our enjoyment of music. Under the leadership of companies such as Electro Sound, the duplicating industry has demonstrated that the quality of prerecorded cassettes can be very high indeed. However, it will only be through increased and continued public pressure for quality recordings that the market will more widely exhibit such quality. So long as sales and profits do not suffer because of low quality, record companies can hardly be blamed if they let quality slide by not investing in newer and better equipment and materials. They are, after all, in business to make money, and they need to be shown that Gresham's Law (that bad money drives out good) does not apply to music cassettes.

Sony introduces the audio receiver made for videos.

Rock videos are the most exciting thing to hit television since the legends of rock 'n' roll first gyrated across the stage.

But you shouldn't have to listen to them or some rock opera on a speaker designed for a soap opera.

And thanks to Sony, you don't have to. In fact, our new receivers are the only ones that allow you to enjoy MTV, HBO and other cable simulcast programming on something built for great music. Your stereo system.



These remarkable receivers enable the FM simulcast portion of your cable to be directly hooked into your system.* In a sense, it serves as a kind of "nerve center" for all your audio components and your video components, as well. Which is why you'll grow into it, rather than out of it.

As impressive as all this sounds, it's nowhere near as impressive as the quality of the receiver itself.

Our new Audio Signal Processor, for instance, generates exceedingly low levels of noise and distortion. And our feather-touch pushbutton controls are also part of the most flexible tuning system ever built into a receiver. Direct Access™ Quartz Synthesis Tuning. It eliminates the need for fine tuning. It also eliminates the need for something else: wasting time. (It can pick up preset stations faster than a radar detector picks up police cars.)

Our new receivers also have other virtues. Like the option of Sony's Remote Commander® unit which allows you to control all your Sony audio components without even a remote possibility of ever having to get out of your chair.

One of the features you'll find most impressive, however, is the price. Which is extraordinary when you stop to consider there's nothing else like them at any price.

So go to your Sony dealer and listen to our new STR-AV receivers. Once you do, rock videos will start to sound as colorful as they look.

THE ONE AND ONLY SOUND OF SONY.™

*Check your local cable company for service availability and any additional requirements. Model shown is STR-AV560, 60 watts per channel (continuous RMS, both channels driven, 8 ohms, 20 Hz—20kHz, .08% THD).

TV picture simulated.

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1 ADS CD3 COMPACT DISC PLAYER

Manufacturer's Specifications

Frequency Response: 20 Hz to 20 kHz, ±0.25 dB.

S/N Ratio: Greater than 100 dBA re: 0 dB.

THD: Less than 0.01%, 20 Hz to 20 kHz, at 0 dB; less than 0.1%, 20 Hz to 20 kHz, at −20 dB.

Channel Separation: Greater than 86 dB, 20 Hz to 20 kHz.

Phase Shift: Less than 5°, 20 Hz to 20 kHz, between or within channels.

Output Level: Fixed, 2.0 V rms at 0 dB, ±0.5 dB; variable, 0 to 2.0 V rms; headphone, 0 to 3.0 V rms into 30 ohms.

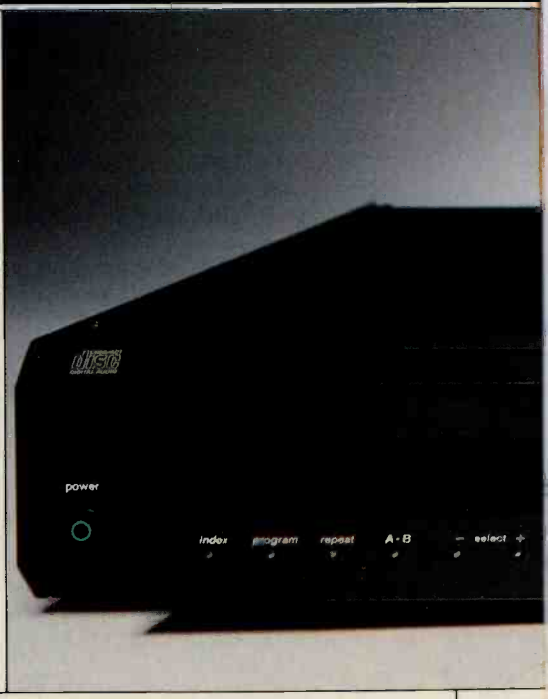
Dimensions: 17.5 in. (44.5 cm) W × 2.8 in. (7 cm) H × 14.8 in. (37.7 cm) D.

Weight: 17½ lbs. (7.9 kg).

Price: $895; optional RC1 remote-control unit, $99.

Company Address: One Progress Way, Wilmington, Mass. 01887.

For literature, circle No. 90



ADS obviously intends this, their first Compact Disc player, to be part of their highly regarded Atelier series of audio components. Not only is the styling of the CD3 consistent with that of the other components in that series, but its performance and features clearly identify it as a top-of-the-line product. As was pointed out to me by Richard Moore of ADS, the CD3 is the company's second fully digital product. Some of you may remember the ADS10 Acoustic Dimension Synthesizer, a digital time-delay unit which used A/D and D/A adaptive delta-modulation conversion techniques developed by DeltaLab. The CD3 is an international product, in the best sense of the phrase, with the developmental engineering work done on a cooperative basis by engineers from ADS and its sister firm, Braun Electronic GmbH, of West Germany, while a highly regarded Japanese company does the actual assembly work in that country.

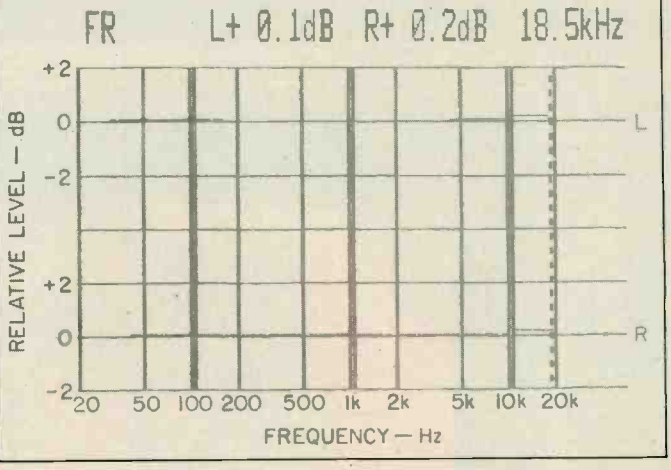
The CD3 can handle and play discs with up to 99 tracks, and as many as 30 selections can be programmed in random sequence. Using the optional remote control, any 30 of the 99 tracks can be programmed, with any selection accessible immediately; using the front panel controls, only the first 30 tracks are programmable.

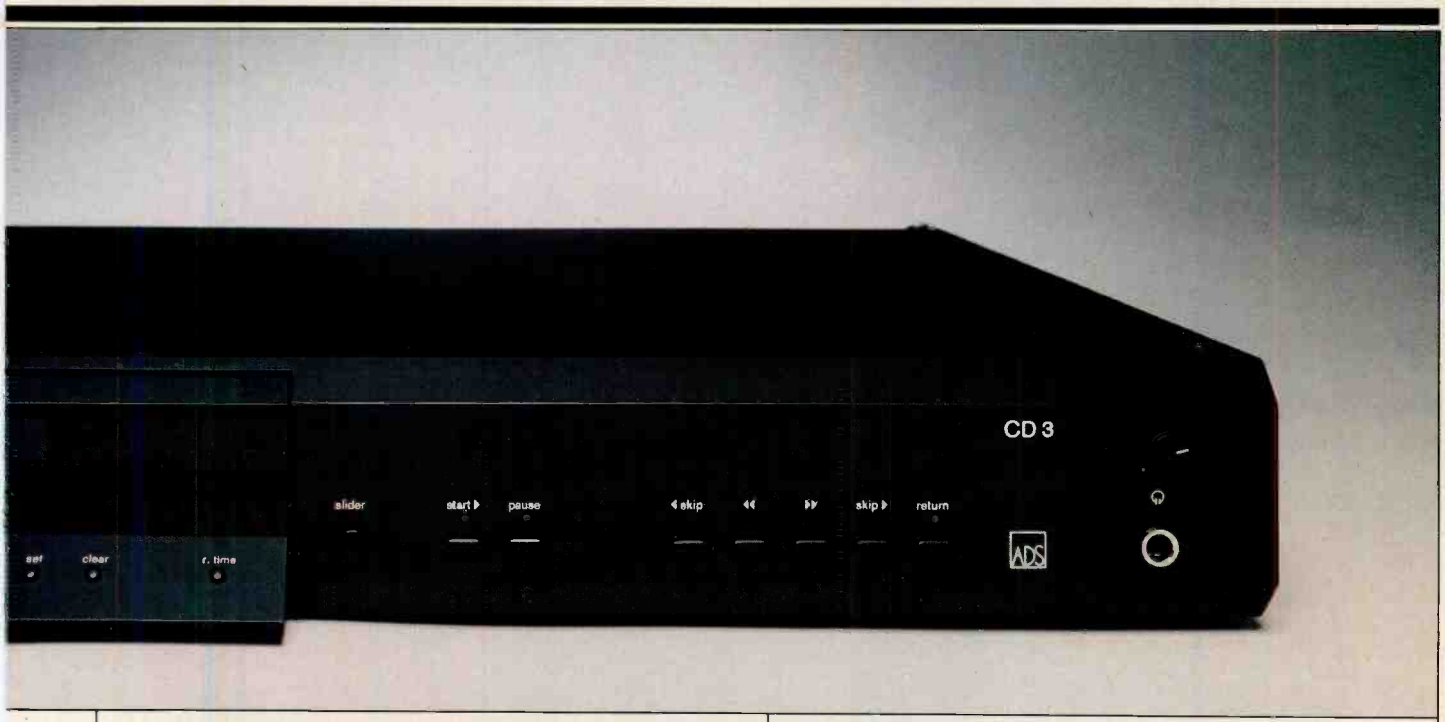
The controls have been grouped in a most logical fashion, with the more often-used basic controls placed together on the front panel in full view. The more specialized and less often-used controls are on a push-to-release, pivoting panel below the disc drawer. These controls allow the more sophisticated user to perform such functions as toggling between display of elapsed and remaining time, toggling between track and index numbers, programming selections, and choosing any portion of the disc for repeat play.

I have often been asked what differentiates a really superior CD player from an "adequate" one. The ADS CD3 may help to answer the question, for it is definitely in the superior class, as evidenced by some of its mechanical innovations as well as by its electronic and sonic performance. The smoothly operating, motor-driven loading drawer, for example, cradles the CD on soft cushions to prevent any damage to the disc itself. The slider responds quickly, smoothly, and noiselessly. Like other ADS Atelier components, the CD3 uses steel top and bottom covers for mechanical strength and shielding. The spindle motor is an extremely quiet, d.c., brushless type.

I found the laser tracking-servo system to be quite resistant to external shock and vibration applied to the sides of

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



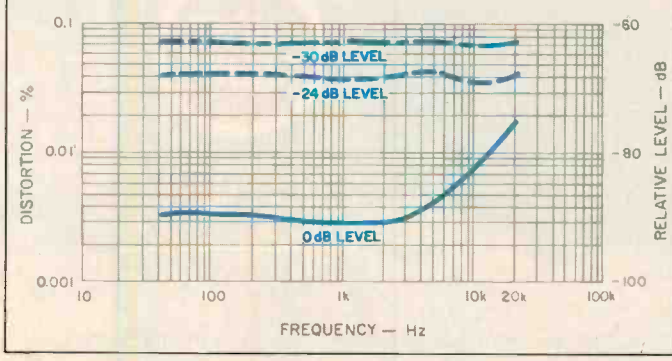


the unit. The sample I tested showed some sensitivity to mechanical shock applied vertically, but I am told by ADS that a cure is being worked out by shock-mounting the transport. In any case, vertical shock is the least likely type of mechanical vibration to occur in actual use.

Circuit Highlights

The CD3 employs two-times oversampling (88.2 kHz) with digital filtering. Separate digital-to-analog converters are used in each channel, with full 16-bit linear conversion. Hypersonic, multiple-pole, analog filters with cutoffs above 35 kHz are used for improved spurious-response rejection. These filters exhibit extremely flat frequency and phase response in the audio band and, according to ADS, have less than 5° of phase shift at 20 kHz. I found that the extremely quiet and low-distortion analog stages placed no dynamic-range limitations on this player.

Fig. 2—THD vs. frequency at three signal levels.



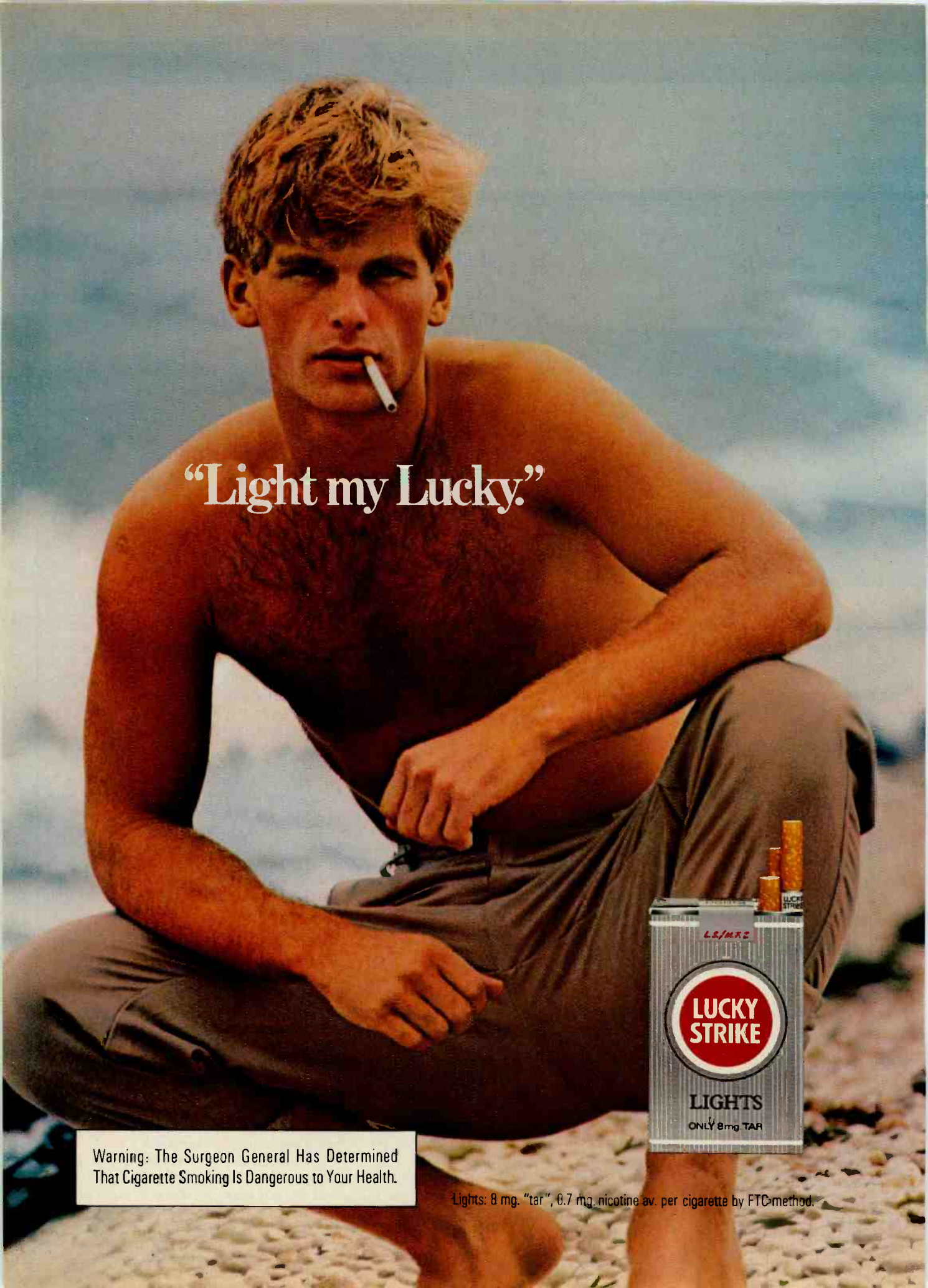
The CD3 employs advanced digital circuitry for tracking and control functions and for signal processing. This VLSI circuitry is under the control of two internal, eight-bit microcomputers which operate together for rapid control of tracking and error-correction circuits, and for rapid response to front-panel or remote-control command inputs.

Control Layout

The controls on the CD3 are, above all, designed to perform complex functions while remaining extremely simple to use. For example, pushing the power button, with a disc in place, will place the mechanism in the pause mode and give a readout of the total number of tracks on the disc and the total playing time. Loading of the disc drawer can be done by pressing the "Start" button or touching the "Slider" button. A "Pause" button functions as its name suggests, while the "Skip" button moves the pickup to the beginning of the next track if play is in progress. If "Skip" is depressed for longer than 0.5 S, the track or index number increases by one every half-second. Releasing the button advances the pickup to the track or index number shown at the time of release. Fast-forward and fast-reverse operate at three times normal speed when these buttons are first pressed, and at 20 times normal speed if the buttons are held down for more than 5 S. The return button sends the pickup back to its rest position and switches the disc-drive motor off.

The display area above the slider drawer incorporates a four-digit, seven-segment display for indicating elapsed or remaining time, and a two-digit, seven-segment display for showing the selected track or index number.

The only other features visible on the front panel are a headphone jack and pop-out headphone level control, both at the far right, and an indication of where to push on the



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Lights: 8 mg. "tar", 0.7 mg. nicotine av. per cigarette by FTC method.

The CD3 is definitely in the superior class, as evidenced by some of its mechanical innovations as well as its electronic and sonic performance.

swing-down slider drawer to expose the programming and display controls. These handle elapsed- or remaining-time display, track or index selection and display, memory clear, and A-B play (automatic repeat between any user-selected start and end point). The CD3's rear panel has fixed and variable output jacks, with a level control for the latter.

The optional RC1 wireless remote control is designed to operate all ADS Atelier remote-controllable components, not just the CD3. It operates like a flip-up telephone/address selector, with seven overlays which show key designations for each of the components it can control. I did not have the remote-control unit on hand when I tested the CD3, but am told that the CD player will be the first ADS component controlled by this hand-held remote unit, with other components to follow.

Measurements

Frequency response, measured for both the left and right channels, was flat to within 0.2 dB from 20 Hz to 20 kHz (see Fig. 1). Output was extremely linear at all recorded levels, deviating from perfect linearity by no more than 0.2 dB over the range from maximum recorded level (0-dB reference level) to −80 dB.

Harmonic distortion at 0-dB recorded level was about as low as I have measured for any CD player: 0.003% at mid-frequencies and no more than 0.18% at 19 and 20 kHz, where many earlier generation CD players exhibited much higher distortion. SMPTE-IM distortion measurements were also extremely low, with readings no higher than 0.002% at maximum recorded levels. Twin-tone IM measurements resulted in readings of 0.0025% at 0-dB level and 0.008% at −10 dB. Figure 2 shows harmonic distortion as a function of frequency for test signals at three recorded levels. As with all digital audio systems, harmonic distortion increased linearly as signal level decreased, reaching about 0.075% at −30 dB. As for undesired "beats" within or without the audio spectrum, they were practically nonexistent in this unit—a direct result of the oversampling, digital filtering and full 16-bit linear D/A conversion techniques used in the CD3.

Signal-to-noise ratios for the CD3 were outstandingly high, measuring more than 98 dB, unweighted, and between 102 and 104 dB, A-weighted. The spectral distribution of residual noise is shown in the S/N analysis graphs of Figs. 3A and 3B.

At low and mid-frequencies, separation (Fig. 4) ranged from just over 83 to 84 dB. At higher frequencies, separation decreased slightly—more so in R to L than L to R. At 20 kHz, separation in both channels was still 74 dB, far more than is required for a very satisfactory stereo presentation. Output from the fixed-level jacks measured 2.04 V, while maximum level from the variable outputs was 3.24 V.

Figure 5 shows the CD3's reproduction of a 1-kHz, square-wave signal. The shape of the square wave confirms the fact that this player employs the now-preferred digital-filter approach. The very low level of ripple observed on the top and bottom of the waveform is not so much the result of phase shift (virtually none in this unit) as it is the absence of higher order odd harmonics (above 20 kHz) which are not present in the reproduced square wave. The digitally generated unit-pulse signal on my Philips test disc was repro-

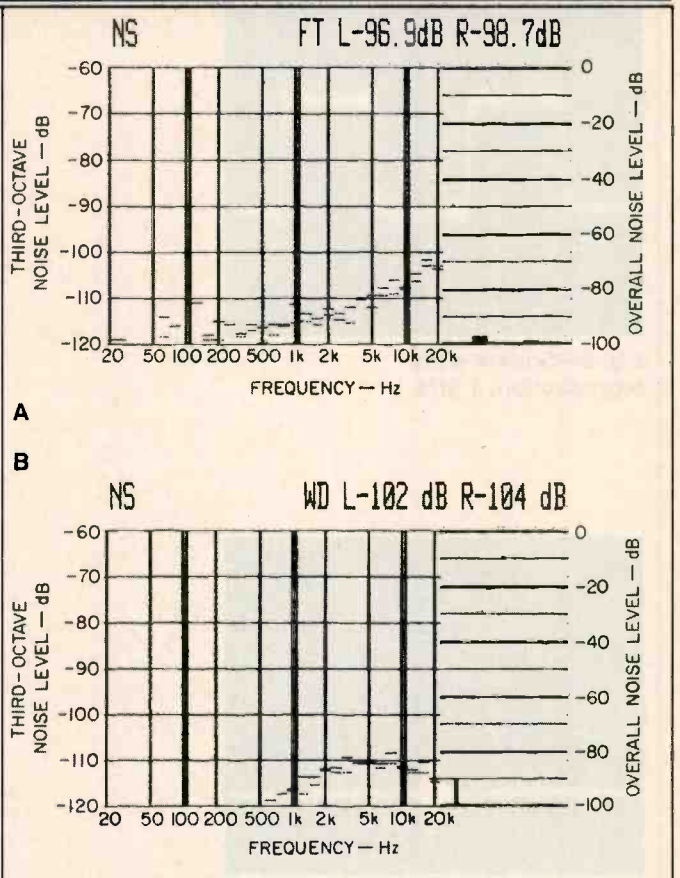

Fig. 3—S/N analysis, both unweighted (A) and A-weighted (B).

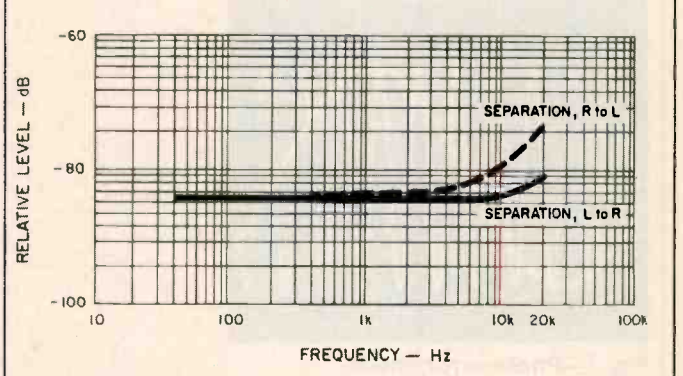

Fig. 4—Separation vs. frequency.

More and more CD players, including this one, zip right through my defects disc without missing a beat. I'll have to find a more severe test!

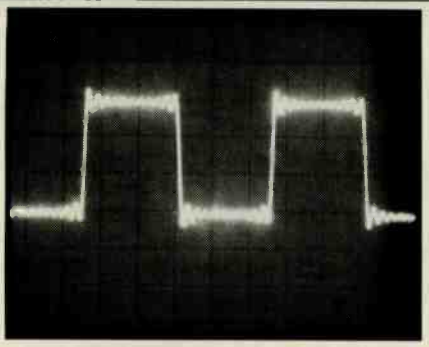

Fig. 5—Square-wave reproduction, 1 kHz.

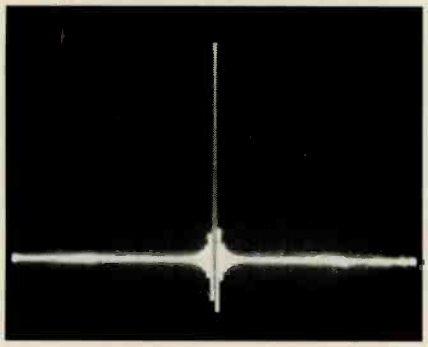

Fig. 6—Single-pulse test.

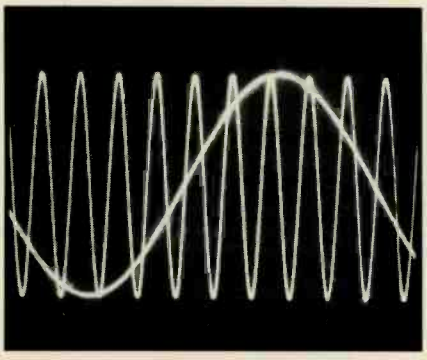

Fig. 7—Phase-error check using tones of 200 Hz and 2 kHz.

duced with the waveshape shown in Fig. 6; again, a result that is typical of CD players which employ this advanced type of digital filtering and oversampling.

While I lack the means to check out ADS's claim of minimal phase shift between channels or within a channel, the 'scope photo of Fig. 7 does show that there was no measurable phase shift between a 200-Hz signal recorded on the left channel and a 2-kHz signal output from the right. The simultaneous zero-axis crossing in the positive direction of both signals confirms this.

More than two years ago, when I subjected the earliest CD players to my special "defects" test disc (a disc with an increasingly wide opaque wedge, a series of black dots meant to simulate dust particles, and a simulated fingerprint smudge), it was a rare event when a player's optical tracking system and error-correction system could play through these imperfections without mistracking or muting. Now, more and more current-generation players, including the ADS CD3, zip right through this problem disc without missing a beat. The maximum width of the opaque wedge on the test disc is 900 microns. ADS tells me that their CD3 could easily handle a width as great as 1.5 mm (1,500 microns). It looks as though I am going to have to come up with a more severe tracking test for CD players! Lateral vibration and shock of more than mild severity also resulted in no mistracking, but, as mentioned earlier, downward (vertical) external shock on the top surface of the unit did result in momentary muting and, in extreme cases, mistracking.

Use and Listening Tests

The ADS CD3 ranks among the best-sounding CD players I have tested thus far; it reproduces well-engineered CDs with smoothness and clarity. I was particularly impressed with its sound quality during very soft musical passages, where earlier CD players have sometimes been less than outstanding.

Ergonomically, the ADS CD3 is a gem. At the time I tested the unit, the owner's manual was not yet available, yet I had no trouble figuring out what the controls did and how they were to be used. If you do most of your listening to CDs from start to finish, or want to select tracks of a disc as you listen (skipping those you don't want to hear all the way through), you may not even have to refer to the owner's manual. The display area includes a transparent window which, with its rear illumination and mirror optics, allows you to watch a CD spin while it plays. I find this not only desirable but comforting, since it assures me that all is well inside the drawer and that my favorite CDs have not been swallowed up.

If there is one aspect of the ADS CD3 that bothered me just a little, it was the fact that the remote control is not included as part of the standard package. I understand that this particular remote is intended to be used with several ADS Atelier components, and therefore it is probably a costlier item to produce. Still, adding an extra $100 to what is already a fairly expensive CD player may discourage some people from considering this particular CD player. On the other hand, given an opportunity to audition this player and operate its elegant controls, others may well feel that price is of secondary importance when such a magnificently crafted instrument is involved. *Leonard Feldman*

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2

AKAI GX-R99 CASSETTE DECK

Manufacturer's Specifications
Frequency Response: 20 Hz to 18 kHz, ±3 dB; to 19 kHz with CrO_2 tape; to 21 kHz with metal tape.
Harmonic Distortion: 0.5%.
Signal/Noise Ratio: 60 dB; 75 dB with Dolby C NR.
Input Sensitivity: 70 mV.
Output Level: Line, 410 mV; headphone, 1.3 mW at 8 ohms.
Flutter: 0.028% wtd. rms, ±0.08% wtd. peak.
Fast-Wind Time: 90 S with C-60 cassette.
Dimensions: 17.3 in. (440 mm) W × 4.1 in. (105 mm) H × 14.6 in. (372 mm) D.
Weight: 19.1 lbs. (8.6 kg).

Price: $799.95.
Company Address: P.O. Box 6010, Compton, Cal. 90224.
For literature, circle No. 91

The GX-R99, Akai's top-of-the-line cassette deck, offers many performance and convenience features, including what the manual calls a "four-way approach to best recording." The first part of this approach is the Super GX 3-Head Quick-Reverse System. The three-head configuration, of course, provides off-the-tape monitoring while recording; it also allows head design to be optimized for the separate record and playback functions. Akai states that the heads, made of glass and crystallized ferrite, have wide dynamic range and excellent resistance to wear. The record and playback heads share a small platform which rotates when the tape reverses, allowing recording as well as playback in both directions. Precisely placed stops ensure good alignment in forward and reverse play.

The second part of the four-way approach is the closed-loop, double-capstan, direct-drive transport. The two capstans are of slightly different diameter to prevent resonance buildup, but the transport is otherwise symmetrical for uniform transport performance in both directions. An "inverse-current" chrome-plating process gives the capstans a harder, slightly rougher surface than usual, for greater durability and a better grip on the tape.

The third part of Akai's approach is the unusual and sophisticated CRLP (Computer Recording Level Processing) system. It does more, much more, than simply adjust levels: CRLP will set the optimum record EQ and bias for the tape being used, measure the tape's MOL characteristics at 400 Hz and 8 kHz, and set the recording level to the

maximum possible without causing undesirable distortion and tape saturation. It will do all this with the push of a single button in less than 15 S. The bias and EQ tuning is particularly speedy, taking just 2 S or so, even with two rechecks of the adjustments. This all sounds a bit fantastic, but as my measurements showed, CRLP does indeed do marvelous things.

The fourth special feature is what Akai calls their High Tuned DC Amplifier. The use of coupling capacitors is minimized and many high-quality devices are used, including some custom-made components. Amplifier operation is stable, due in part to the high-speed tracking regulator in the power supply. The Dolby NR block is separated from the main amplifier block to eliminate mutual interference.

Control Layout

At first look, with the power turned off, the front panel of the GX-R99 looks very neat and perhaps a bit too simple, with relatively few pushbuttons and no controls or indicators in evidence. However, when the "Power" button at the upper left is actuated, the large center panel, which had appeared black, illuminates to show the unit's many indicators and annunciators. (At this point the display format reflects the way the deck had been set when it was turned off.) Just below this panel is what appears to be a horizontal black bar labelled "CRLP" and bearing a small pushbutton labelled "Open/Close." A light push causes a drawer to move out from the front panel, revealing an array of light-touch switches with good-sized push pads. (These will be discussed later, in conjunction with the display panel.)

At the upper left of the display is a pair of large, bluish-white arrows that show the direction of record/play. Just to their right, an annunciator set shows exactly what has been selected with the Dolby NR switches ("On/Off," "B/C," and "MPX Filter On/Off") that are located in the bottom row of pushbuttons just to the right of the display panel. To the right of these annunciators is the "Rev Mode" indicator, which illuminates, as needed, to show continuous play (the power-on condition), forward and reverse record/play, and single-direction record/play. The tape-reverse button is to the right of the display, just above the counter-mode control buttons; these are labelled "Reset," "Mode" (for selecting four-digit tape counter, elapsed time, or remaining time), and "Tape" (for setting "C90/C60/C46/LC46" in the remaining-time mode). The counter itself, with a counting-mode indicator, is in the upper-right corner of the display panel. In the remaining-time mode, the counter first shows "C90," and "Tape" is used to step to another length, if needed. After the cassette has been in record/play for a short time, an internal calibration process leads to the display of the remaining time in minutes and seconds. Both remaining- and elapsed-time modes retain a basic calibration even in fast-wind, making this useful combination of features even more valuable.

Just below the counter control buttons are two others: "QMSS" (Quick Memory Search System) and "IPLS" (Instant Program Locating System). When in record or play mode, a push of "QMSS" will rewind the tape to counter zero and switch the deck into play mode. Pushing "IPLS" will enable the deck for fast-winding, which is started with a push of the transport-control button to advance to the beginning of the next selection or to return to the beginning of the present selection for automatic playback. When engaged, "IPLS" appears in the display panel, just below the large direction arrows mentioned earlier. This is a nice touch, serving to remind the user that in this mode only the directions of fast-wind are referenced to the direction of record/play at the time. Pushing the play and fast-forward buttons at the same time obtains "Intro Scan," which fast-winds to the beginning of a selection, plays 10 S, fast-winds to the next beginning, and so on.

There are many other things which appear on the display, and they are perhaps best explained in conjunction with a discussion of the switching contained in the "CRLP" drawer. To the left are eight switch pads for control and display of levels: "Level/Balance," "Level −/+, Balance L/R," "Manu. Off (CRLP)," "Memory A," "Memory B," "Peak/VU," and "Spectrum." Below the reverse mode and counter displays are a horizontal scale and bar display for either "Vol" from "0" to "10" or "BAL" from "L" to "C" to "R," with four steps each side of "C." Once "Level/Balance" has been used to select one of these, "Level −/+, Balance L/R" can be pushed down on the left for reduction in volume, or to shift the balance to the left channel. A quick push will get one reduction/shift step; a longer one gets a series of steps. Similarly, a push down on the right will either increase volume or shift balance to the right.

If a particular level setting is worth keeping, a push of "Memory A" (or "B") will store (for recall later) that setting—a very useful feature for repeated recording from the same FM station, for example. A small, red LED in each memory button indicates if it has been selected. The record levels can be controlled automatically with CRLP (more on this later), but for manual control it is necessary to push "Manu. Off (CRLP)." It's not as confusing as it sounds, for "Manu." lights up when actuated, and "Off (CRLP)" tells the user that if "Manu." is off, CRLP will control levels.

The "Peak/VU" and "Spectrum" buttons provide selection among three metering modes. With "VU" the two horizontal bar-graphs are for left and right channels, with the scale from "−30" to "+8" in between. The segments are bluish white to "0" and red above that. In "Peak" mode, the scale is shifted to show levels 8 dB higher, with markings from "−17" to "+15." Selecting "Spectrum" gets an automatic switch to peak dynamics, but the upper bar-graph is now used to show levels in a band around 400 Hz, and the lower one shows the levels around 8 kHz. At the left end of the scales, "M. Low" and "High" appear in red, along with "Spectrum"—reminding the recordist of the special nature of this function. If the deck is in record mode, two little light squares appear along a dashed red line, with "MOL" and an arrow at the end. These squares show the maximum record levels for acceptable distortion for both low and high frequencies. (This outstanding feature will be discussed further below.) To the left of the MOL-limit line are annunciators for the tape type: "Norm/CrO_2/Metal."

In the right-hand section of the "CRLP" drawer are the "Rec Operation" switch pads: "Rec Pause" (with red status light), "Auto Mute," "Fader," "CRLP Rec," "Play" for either direction (with flashing arrow to match expected direction of

"Blank Search" finds the next unrecorded portion of tape that's at least three minutes long—handy when adding new material to a partially recorded tape.

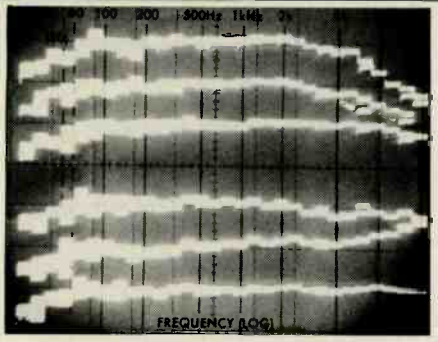

Fig. 1—Record/playback responses to pink noise, with (solid traces) and without (dashed traces) Dolby C NR, at Dolby level (top traces) and at −20 dB (bottom traces), for TDK AD-X (Type I), Maxell UD-XL II (Type II) and Sony Metallic (Type IV) types (top to bottom in each set). Vertical scale: 5 dB/div.

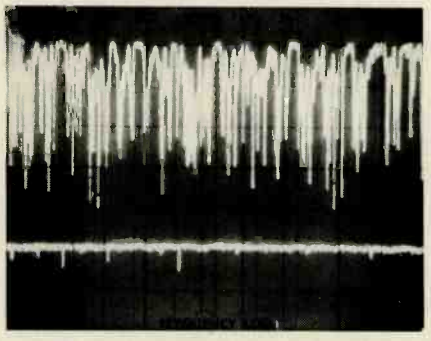

Fig. 2—Level variations for 17-kHz tone in record/playback mode (top) and straight playback (bottom). Scales: 10 dB/div. and 1 S/div.

Fig. 3—Input/record levels for 500-Hz tone burst without (top) and with (center) CRLP. Bottom trace shows CRLP action with the source level increasing from 30 mV to 5 V. Scales: 40 dB/div. and 5 S/div.

recording), "AT Bias" for stepping from "Std" to "Under" to "Over" bias (each with its own indicator), "Monitor Tape/Source" (with helpful annunciators above the left end of the meter display), "Rec Cancel," and "Blank Search" (which has a red indicator).

Here are a few brief comments on some of these functions before a more detailed discussion of CRLP. A push of "Fader" when in "Rec Pause" will initiate recording with a fade up from zero to your preset recording level. When it is pushed during recording, there will be a down fade, followed by an auto-mute of 4 S and a return to "Rec Pause." Pushing "Rec Cancel" during recording will rewind the tape to the beginning of the just-recorded section, mute the recording for 4 S, and then put the deck in "Rec Pause." "Blank Search" initiates a fast-wind to locate the next blank section on the tape which is at least 3 minutes long, then automatically puts in a 4-S auto-mute section with a stop at that point. If no such open portion is found on the first side of the tape, the deck will automatically continue the search in the reverse direction.

For all of the useful features described above, the best is yet to come, for CRLP is a marvelous system. The whole process starts with a push of "Eject" on the left side of the bottom transport-control bar. ("Stop" is at the right of this bar, with fast-wind and play-direction control bars above; all three bars are at the far right of the front panel.) After the tape has been dropped into the carrier, the auto-tuning procedure begins when you push "Rec Pause." The cassette compartment closes automatically and the calibration recording begins, while a "Tuning" annunciator flashes in the display. In just a few seconds, the record sensitivity bias and EQ are adjusted for the best results, and a steady "Tuning" display shows that the process is complete. In this short time, analysis is also made of the 400-Hz MOL for a 3% distortion limit and of the saturation limit at 8 kHz. The little squares of the MOL display show the results of this speedy and very useful calibration. In recording, "Rec" appears, right under "Tuning."

If the deck is set for automatic level setting (non-manual), the level will be set automatically with 10 S of music and will reduce the level later if there are further increases in the music. If the content of the program is such that there is a desire to shift the MOL to closer match the high-frequency content of the music, "AT Bias" can be set to "Under" or "Over" for recalibration. The new MOL display will show the new low- and high-frequency limits. With the meters switched to "Spectrum," the actual 400-Hz and 8-kHz levels can be compared to the limiting levels. Because of the speed of the CRLP calibration, checking the possibilities is very convenient. Level setting, whether automatic or manual, is referenced continually to the distortion and saturation limits in the recording.

The cassette compartment at the left of the front panel can be pushed closed, but it is much easier to push the button for the mode desired and have it close automatically. Between the compartment and the "CRLP" drawer are the pushbutton switches for "Timer Start" and "Rec/Play." Pushing down a little hinged flap on the lower right of the front panel reveals the headphone jack and the horizontal-slider, output-level control. The gold-plated, stereo in/out phono

All three tape counter modes were helpful, and I really liked the remaining- and elapsed-time modes; very few decks have both.

jacks and a socket for the optional remote control are on the back panel.

I removed the steel top and side cover of the GX-R99 for a look inside. The soldering was generally excellent, with flux restricted to some points that had been hand-soldered. There were two large p.c. boards, somewhat larger than half-chassis size, stacked one above the other and containing most of the circuitry. Quite a few discrete transistors were noted on the top p.c. board, which was a bit springy. There were also other cards for motor control, power supply, etc. All parts were identified by number. There were five fuses in clips, more than in a typical deck. The GX-R99 was very quiet in all modes—it was one of the quietest decks I have ever checked—and the drive had fairly rigid construction. The chassis was quite rugged, with three front-to-back rails at the sides and near the center.

Measurements

In my first check, the playback responses showed a high roll-off at the highest frequencies. Cross-checks with other alignment tapes and in the reverse play direction confirmed the initial results. There was no evidence of damage to the head mounting from shipment, but realignment was made for both directions, after which very good results were obtained with both equalizations. (The reader should be aware that misalignment can occur before putting *any* deck to use—it's best to have the dealer check/correct before purchase.) Tape play speed was about 0.7% slow, and level indications were slightly low (about 0.5 dB).

The Akai CRLP system did an excellent job of matching a great many tapes. The best results were obtained with TDK AD-X (Type I), Maxell UD-XL II (Type II), and Sony Metallic (Type IV). Very good results for Type I tapes came from BASF Pro I Super, Fuji FR-I, Konica GM-I, Maxell UD and UD-XL I, Memorex MRX1, Nakamichi EXII, Sony AHF and BHF, TDK AD, and Yamaha NR and NR-X. For Type II tapes, substantially all formulations yielded very good results; for Type IV tapes, BASF Metal IV, Denon DXM, Konica Metal, Magnex Studio 4, Maxell MX, Nakamichi ZX, TDK MA-R and Yamaha MR were very good.

The record/playback responses were run at Dolby level and 20 dB below that, both with and without Dolby C NR, with the best-performing tapes of each type. Figure 1 shows the responses using pink noise as the source, and Table I lists the −3 dB points using a discrete tone. The results were fairly good at 0 dB, but not impressive. At −20 dB, the results were excellent, and the Dolby C NR tracking was outstanding.

Level variations made it difficult to find the high-frequency −3 dB point in record/play mode, especially at 17 kHz. The effect diminished above and below that frequency, and disappeared entirely during playback with the recording circuits turned off. The variation was 30 dB or more (Fig. 2) during record/play, but in straight playback mode the level variations were very minor. I concluded that there was some form of coupling between the record and playback heads or circuits.

Table II shows a number of record/playback characteristics, with results from very good to excellent. The bias in the output during recording was very low.

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

	With Dolby C NR				Without NR			
	Dolby Lvl		−20 dB		Dolby Lvl		−20 dB	
Tape Type	Hz	kHz	Hz	kHz	Hz	kHz	Hz	kHz
TDK AD-X	19.4	9.2	20.0	15.2	19.2	8.0	19.7	16.8
Maxell UD-XL II	19.6	9.1	17.8	18.3	19.7	7.7	17.6	18.8
Sony Metallic	19.2	13.2	18.2	20.4	19.2	10.4	18.0	23.1

Table II—Miscellaneous record/playback characteristics, using Dolby C NR.

Erasure	Sep.	Crosstalk	10-kHz A/B Phase		MPX Filter
At 100 Hz	At 1 kHz	At 1 kHz	Error	Jitter	At 19.00 kHz
65 dB	42 dB	−87 dB	40°	15°	−35.1 dB

Table III—400-Hz HDL_3 (%) vs. output level (0 dB = 200 nWb/m).

		Output Level					HDL_3 =
Tape Type	NR	−10	−8	−4	0	+4	3%
TDK AD-X	Dolby C	0.15	0.19	0.24	0.34	0.42	+7.7 dB
Maxell UD-XL II	Dolby C	0.11	0.15	0.36	0.95	2.5	+4.8 dB
Sony Metallic	Dolby C	0.10	0.15	0.27	0.53	1.4	+6.6 dB

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

	IEC A Wtd. (dBA)				CCIR/ARM (dB)			
	W/Dolby C NR		Without NR		W/Dolby C NR		Without NR	
Tape Type	@ DL	HD = 3%	@ DL	HD = 3%	@ DL	HD = 3%	@ DL	HD = 3%
TDK AD-X	68.3	76.0	52.5	60.2	67.5	75.2	50.1	57.8
Maxell UD-XL II	71.0	75.8	56.9	61.7	69.6	74.4	54.0	58.8
Sony Metallic	69.4	76.0	55.4	62.0	68.0	74.6	52.1	58.7

Table V—HDL_3 (%) vs. frequency at 10 dB below Dolby level.

		Frequency (Hz)						
Tape Type	NR	50	100	400	1k	2k	4k	6k
Sony Metallic	Dolby C	0.16	0.13	0.10	0.13	0.18	0.50	0.70

Table VI—Input and output characteristics at 1 kHz.

Input	Level		Imp.,	Output	Level		Imp.,	Clip (Re:
	Sens.	Overload	Kilohms		Open Ckt.	Loaded	Ohms	Meter 0)
Line	70 mV	6.5 V	105	Line	409 mV	406 mV	109	+18.4 dB
				Hdphn.	1.13 V	0.43 V	81	

Table III lists the figures for HDL_3 (third-harmonic distortion) for the three tapes, with Dolby C NR, from −10 dB to the point where HDL_3 equals 3%. The distortion at 0 dB was quite low for TDK AD-X and Sony Metallic, but not so for Maxell UD-XL II.

Table IV shows the signal-to-noise ratios for the three tapes, with and without Dolby C NR, for both IEC A and CCIR/ARM weightings. The results are very good, and a match for most premium-priced decks.

For the recordist who would benefit from its many features, this deck deserves to be compared to other decks of its type—at any price.

The levels of HDL_3 from 50 Hz to 6 kHz, at 10 dB below Dolby level with Sony Metallic and Dolby C NR, are presented in Table V. These figures are quite good, but the rise in distortion for the higher frequencies is disappointing, albeit not unexpected with the earlier observation of the drooping 0-dB responses.

(Note: All tests were run with the "Std" setting of the "AT Bias" control. Slightly different results would have been obtained with the other two bias settings.)

I decided to test the accuracy of Akai's CRLP MOL indications after calibration, using several different tapes and all three bias settings. The 400-Hz MOL indication was always placed at a level in the range of HDL_3 equals 2.7% to 3.1%, and the 8-kHz indication was always as close as checking permitted to a level with 1 dB of saturation. This was a very impressive result, showing both consistency and accuracy in the measurement and display of these two parameters.

Miscellaneous input/output characteristics are presented in Table VI. Take note of the low line-output impedance, very tolerant of other equipment's input impedances. Incidentally, the headphone output (shown with the IHF-standard, 50-ohm load in Table VI) delivered 1.3 mW to an 8-ohm load, right to specification. The input-level attenuation, controlled in "Manual," was the same in both channels—within 1 dB for almost 80 dB down from no attenuation. The steps were about 0.25 dB down to −2, then 0.5 dB to −5, about 1 dB to −10, 1.5 dB to −15, 2 dB to −30, and 3 dB from there to maximum attenuation. I judged that an input level of 150 mV would make for good resolution on the level control when making adjustments. The output-level slider sections tracked very well over their entire range, with a narrow enough attenuation range (only 20 dB over most of its travel) to make precise adjustment easy. The balance control reduced level about 5 dB at either extreme. Levels were high for all of the phones I tried; some low-sensitivity phones might cause problems. The output polarity was reversed in "Source" but not in "Tape."

The bar-graph meters had excellent resolution, with 24 segments for each channel and single-dB steps from "−7" to "+8." Almost all of these single-dB points were within 0.5 dB of actual, and all points were within 1dB, including "−25" and "−30," where most meters show very poor calibration. In VU mode, the action was slightly slow, with 365 mS required for full response and with decay about 500 mS. In "Peak" mode, the response met all of the requirements for peak-responding meters, actually being on the fast side for response to a tone burst and the following decay. The meters showed correctly the effect of the burst being offset either in the negative or positive direction, proving they are true peak-responding meters—which most cassette decks' meters are not.

The measured flutter was very low, both in forward and reverse record/playback, 0.027% wtd. rms and ±0.042% wtd. peak. No tape-play speed changes were detected for line voltages from 110 to 130 V. Play-speed variations were within ±0.02% over a 2-minute period. The fast-wind time for a C-60 cassette was 95 S, slower than most decks, which might frustrate those in a rush. Loose loops were automatically taken up when cassettes were loaded. Mode changes, including the switch to stop mode when the tape ran out, took about 1 S.

Use and Listening Tests

The owner's manual provides a great deal of detail on the GX-R99's many features, and there are numerous illustrations that support the text. There is good use of bold-face type and notes to aid the user.

All of the controls and switches were completely reliable throughout the testing, and I was constantly reminded of how well designed the control logic is. I found, for example, that the user can opt for flying-start recording (by pushing "Rec Pause" while holding "Play" down), but only if the tape in use has been calibrated—helpful, but not mentioned in the manual. I also found the "QMSS" will get a fast-wind back to "00.00" from *any* mode, another plus that's not mentioned in the manual. The GX-R99 "Auto-Monitor" seemed right so much of the time, automatically switching to "Source" with "Rec Pause," but going to "Tape" with tape movement in record or play modes.

The calibration/tuning with CRLP took about 3 S unless level calibration was included. The level adjustment appeared to cover quite a level range, and I threw in a bench test at this point to verify what it was. The topmost trace of Fig. 3 shows the level from a 500-Hz tone burst as applied to the deck, with the level increasing about 30 dB over time. The middle trace is the result of the action of CRLP, which kept the tone-burst record level at about 0 dB. The bottom trace shows the action on a burst that was increased in level from 30 mV to 5 V, a range of 45 dB. The lowest levels were below the deck's sensitivity and could not be brought up further, but the increasing levels were controlled perfectly. I liked the use of manual level control as well, in conjunction with the excellent metering, including the very helpful spectrum and MOL display. I found all three counter modes helpful, and I really appreciated having the remaining- and elapsed-time modes—very few other decks have both. I was further impressed by the fact that the time modes kept a basic calibration during fast-wind, and I was pleasantly surprised when the remaining-time readout corrected itself shortly after a fast-wind to about 4 minutes from the end of the tape—finally showing "00.00" just as the tape heads reached the leader.

Playback was very good and quite satisfying, albeit not a match for my reference deck. When monitoring off the tape during recording, however, there was some veiling of high-frequency details, due to the coupling effect mentioned earlier.

For test material, I used dbx-encoded discs, including recordings of Ravel's "Bolero" and Shostakovich's "Festival Overture," among others, by Morton Gould and the London Symphony Orchestra.

For a deck with many features and considerable sophistication, the Akai GX-R99 is easy and very convenient to work with. For the recordist who would benefit from its many features, especially the CRLP system, this deck should be included in any comparisons made among other multi-convenience decks at whatever price. For what it offers, the price of the GX-R99 is more than reasonable.

Howard A. Roberson

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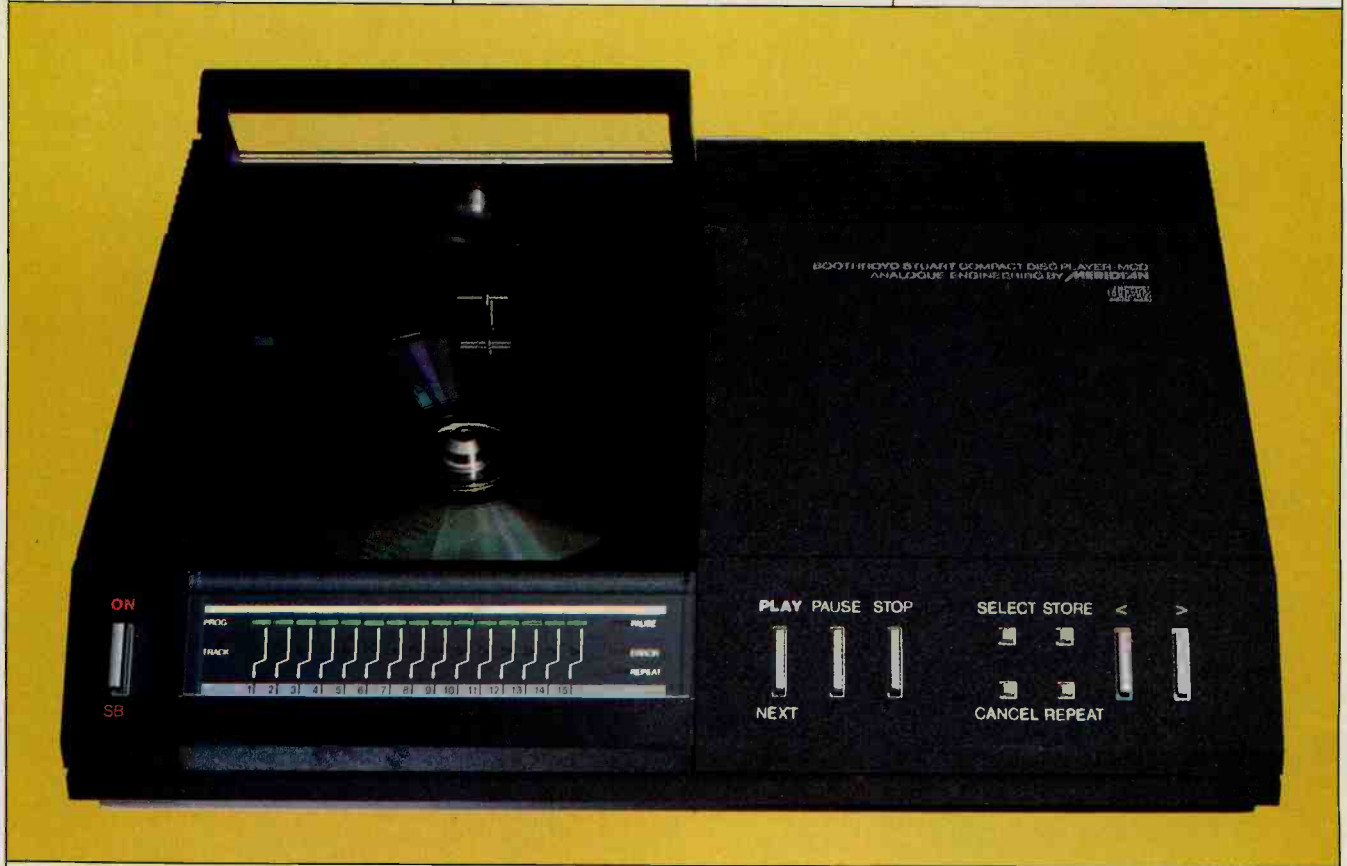
Manufacturer's Specifications
Frequency Response: 20 Hz to 20 kHz, ±0.3 dB.
S/N Ratio: Greater than 90 dB (20 Hz to 20 kHz).
Dynamic Range: Greater than 90 dB.
Channel Separation: Greater than 86 dB (20 Hz to 20 kHz).
THD: Less than 0.005%, including noise, at 0-dB recording level.
Output Level: 2.0 V.
Power Consumption: 35 watts.
Dimensions: 12½ in. W × 3 in. H × 10½ in. D (31.8 cm × 7.6 cm × 26.7 cm); with cover open, 7 in. H (17.8 cm).

Weight: 11 lbs. (5 kg).
Price: $689.
Company Address: c/o Madrigal Ltd., 2081 South Main St., P.O. Box 781, Middletown, Conn. 06457.
For literature, circle No. 92



First, let me clear up the questions which have probably already been raised by the photo of the Meridian MCD (which looks remarkably like one of Magnavox's early CD players) and the Madrigal company address. To begin with, Madrigal is the U.S. company that is now distributing products made by those innovators from Great Britain, Messrs. Boothroyd and Stuart, whose Meridian-brand electronics and transducer products have won worldwide acclaim. As for the similarity in appearance between the MCD player and the Magnavox FD1010 (actually, the lowest cost CD player made by Philips in The Netherlands), Madrigal and Meridian make no secret of the fact that they have taken the Philips player and modified it with improved analog electronics and other refinements. In fact, the owner's manual that accompanied my sample is the Magnavox pamphlet normally supplied with their FD1010; only a single, additional sheet of paper, inserted in the printed manual, tells us about the modifications installed by Boothroyd-Stuart to

create the MCD. I hope all of this intercorporate complexity is now clear, so that we can get on with an examination of what Magnavox, Philips, Meridian, Boothroyd-Stuart, and Madrigal have wrought!

Control Layout

The MCD player is one of the few currently available units that do *not* employ a slide-out drawer for inserting CDs. Instead, CDs are placed onto a top-loading turntable which is normally covered by a hinged, transparent-plastic door. Boothroyd-Stuart suggest that, while microphonics are not as big a problem in CD players as they are in conventional analog turntables, the added stability of such a turntable mount is one of the reasons why they chose to modify this particular player. I can't easily verify whether this enhances performance, but certainly the fixed turntable (as opposed to one on a slide-out drawer) can't be doing any harm to the quality of reproduction.

Controls and indicators are all located on a forward-sloping panel, angled for easy viewing and handling. A power on/off button is at the extreme left; to its right are a bank of 15 LEDs which indicate both the number of tracks on a disc and the track that is currently being played or selected. "Pause," "Error," and "Repeat" indicator lights are positioned just to the right of the track LEDs.

To the right of center-panel are three buttons, labelled "Play/Next," "Pause," and "Stop." The "Play/Next" button is used both for initiating disc play and for advancing the laser pickup to the next track during play. Further to the right are a "Repeat" button (for replaying either the entire disc or the programmed track selections) and the "Select," "Cancel," and "Store" buttons used for programming. Each press of "Select" or "Cancel" advances the track indicator to its next LED. To program selections sequentially, advance to each desired track with the "Select" button, then press "Store." To program out unwanted tracks, follow the same procedure, but use "Cancel" instead of "Select." Nonsequential programming is harder: To go back to prior tracks, you must press (or hold down) the "Select" button until the track indicator passes the 15th LED and cycles back from the beginning to your next desired track.

Since there are only 15 LEDs in the display, you cannot program track numbers beyond 15, though the "Play/Next" button will allow you to skip ahead to higher numbered tracks providing you keep a mental note of where you are.

Two pushbuttons with directional arrows, at the extreme right of the control panel, are used to search silently forward or backward to a particular musical passage. Connection from the MCD to your amplifier is made by means of the usual left and right output jacks that are found on the player's rear panel.

Measurements

Figure 1 shows the frequency response for both channels of the Meridian MCD. Once again, I have expanded the vertical scale to 2 dB per vertical division in order to accentuate any slight deviations from perfectly flat response. The maximum deviation was only −0.2 dB at 20 kHz for the left channel and −0.4 dB for the right.

Harmonic distortion at mid-frequencies was 0.007% for a

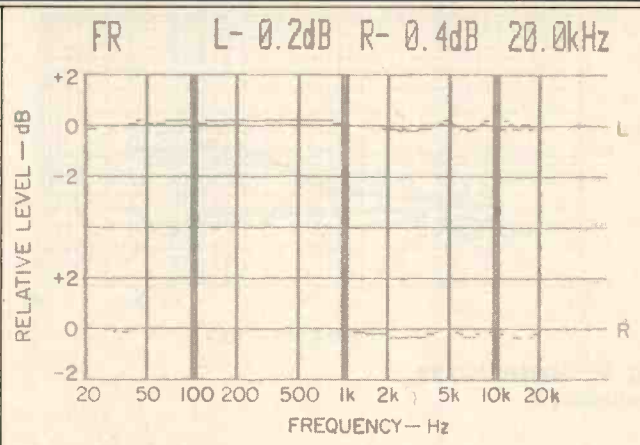


Fig. 1—Frequency response, left (top) and right channels.

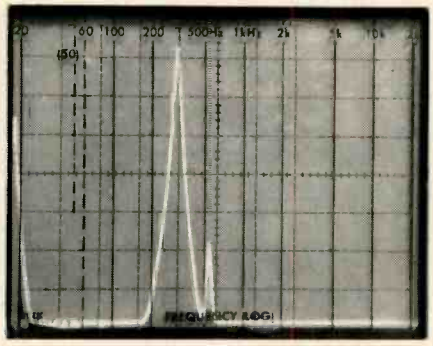


Fig. 2—Spectrum analysis shows 20-kHz test signal (large spike) and inaudible beat tone at approximately 24 kHz (small spike).

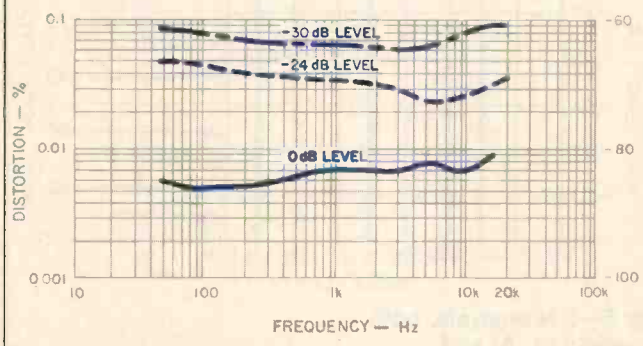


Fig. 3—THD vs. frequency at three output levels.

Unlike other players, the MCD's harmonic distortion was uniformly low over the entire frequency range, showing no rise at higher frequencies.

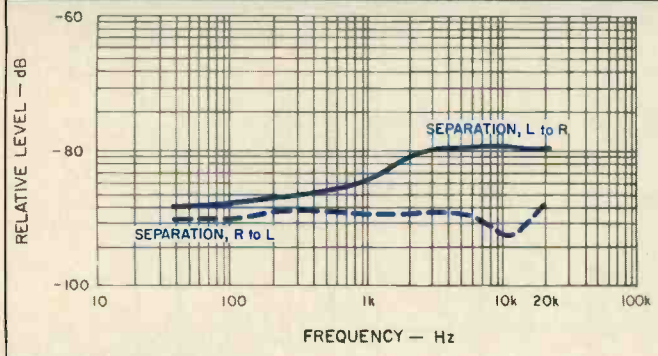


Fig. 4—Separation vs. frequency.

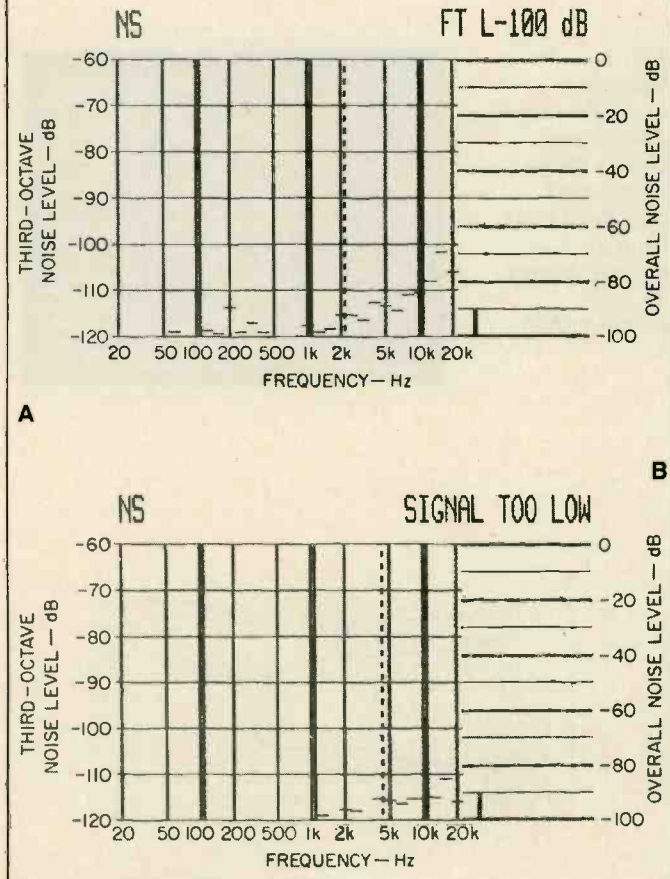


Fig. 5—S/N analysis, both unweighted (A) and A-weighted (B).

test signal at maximum recorded level, and it remained practically constant over the measured frequency range, never rising above 0.008%. In this, the MCD is unlike most other CD players, which usually exhibit rising distortion characteristics at higher frequencies. It may well be that Meridian's improved analog-output amplifier circuitry is in part responsible for this uniformly low distortion level.

Figure 2 shows the usual "beat" frequency component which occurs above 20 kHz when I try to measure THD for high frequencies (in this case, 20 kHz). The extra "blip," seen to the right of the desired 20-kHz signal, is at approximately 24 kHz (the sweep is linear from 0 Hz to 50 kHz in 5-kHz steps), and results from the interaction of the 20-kHz signal with the 44.1-kHz sampling rate of the CD format. The spurious component is, of course, not audible, nor should it be characterized as harmonic distortion.

Figure 3 plots harmonic distortion versus frequency for maximum recorded level as well as for −24 and −30 dB levels. As usual, THD increased at lower recorded levels, but remained an insignificantly low 0.06% even at −30 dB. Output linearity was extremely accurate—to within 0.1 dB—from 0-dB recorded level down to −60 dB. At −80 dB, linearity was off by only 0.3 dB.

Figure 4 shows stereo separation or crosstalk for each channel over the range of frequencies tested. Separation ranged from 79 to 89 dB for the left-to-right channel measurements and from 88 to 92 dB for the right-to-left channel measurements. Obviously, Boothroyd-Stuart's analog output stages were designed to provide good isolation between channels and to achieve the lowest possible distortion and good signal-to-noise ratios.

As for signal-to-noise ratios, they were superb. I measured 100 dB, unweighted, in the absence of a signal, referenced to maximum recorded level. This result, together with a third-octave plot of noise distribution, is shown in Fig. 5A. When I tried to measure the noise level through an A-weighting network, my Sound Technology test instrument objected by displaying the message "SIGNAL TOO LOW" (see Fig. 5B).

SMPTE-IM distortion measured 0.005% at maximum recorded level and increased to a still insignificant 0.03% at −20 dB. Using twin-tone test signals of 19 and 20 kHz, whose sum was equivalent to 0-dB (maximum) recorded level, I measured a CCIF distortion of only 0.0035%. This twin-tone IM distortion increased only slightly, to 0.0063%, at −10 dB recorded level.

Figure 6 shows how a 1-kHz, digitally generated square wave on my test disc was reproduced by the MCD. If you have read my previous CD reports, you will recognize immediately that this player uses digital filtering combined with an oversampling technique. But look more closely at the photo, and see if you don't agree that the reproduced square wave seems to have less "ripple" in it than those produced by other players using the same kind of filtering and D/A conversion. Could it be that some of the imperfections in a reproduced square wave come from the less-than-perfect analog output stages of some CD players—those output stages that have been reconfigured by Boothroyd-Stuart in this MCD?

As for the reproduced unit-impulse signal (Fig. 7), here I

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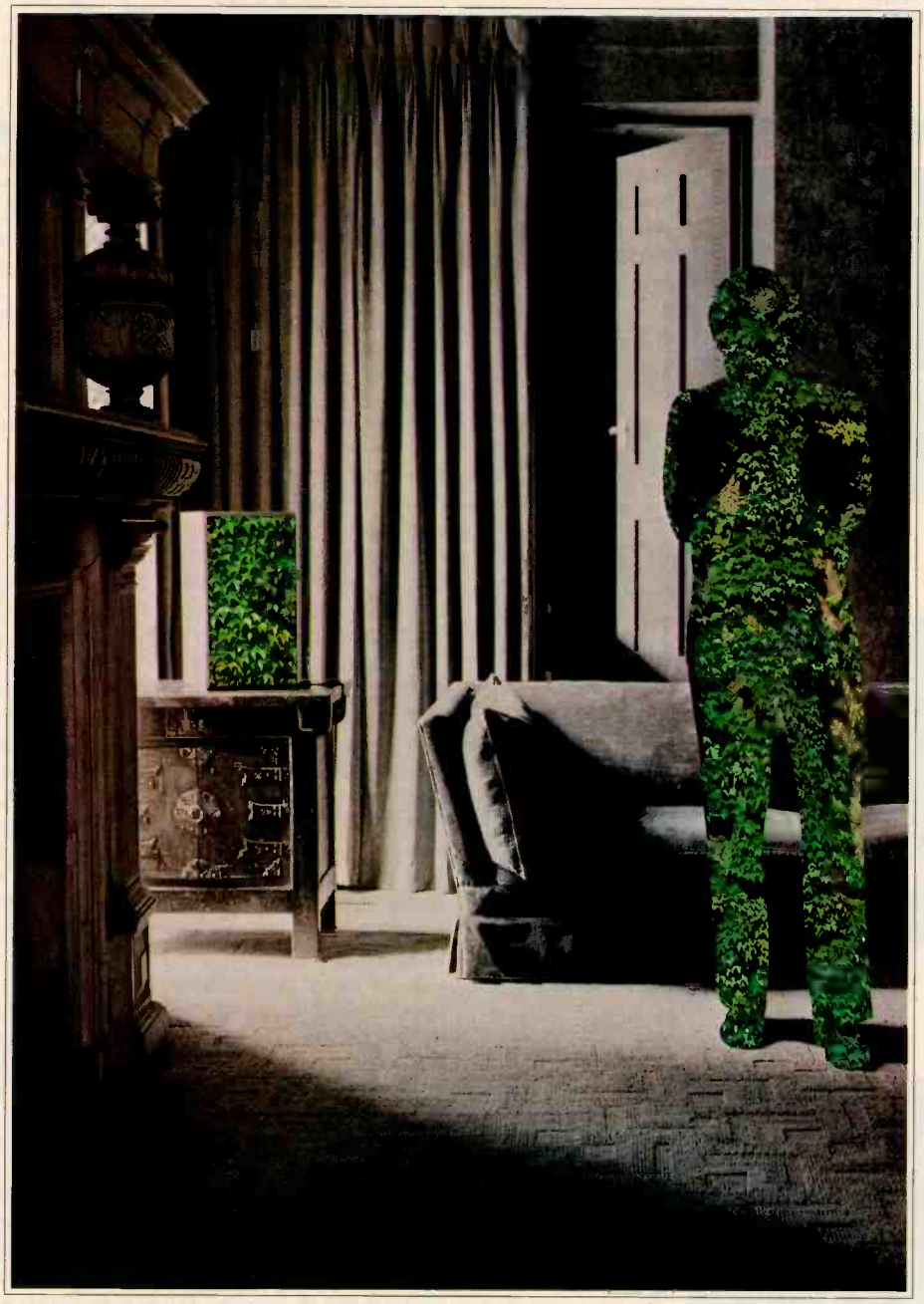

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It was no surprise that the MCD could handle all the defects on my test record, or that it showed excellent resistance to mistracking when tapped.

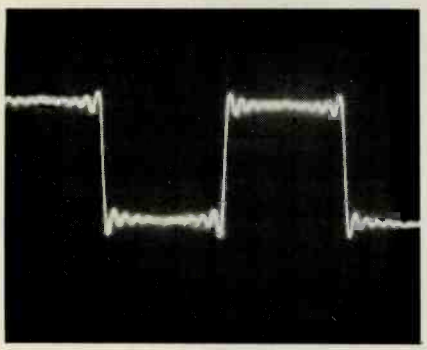

Fig. 6— Square-wave reproduction, 1 kHz.

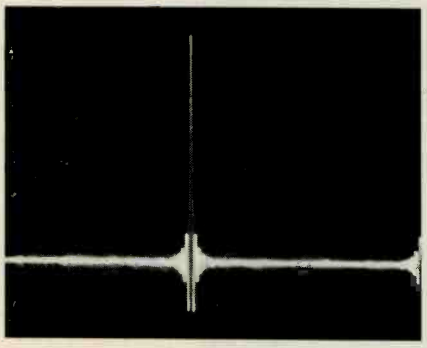

Fig. 7— Single-pulse test.

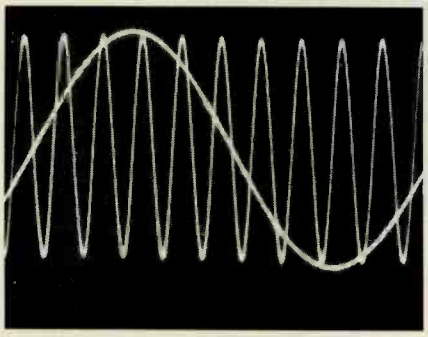

Fig. 8— Phase-error check using 200-Hz and 2-kHz tones.

didn't see any difference between it and the usual 'scope display I get when testing other players that employ this basic type of circuitry. As you might expect, too, there was no evidence of phase error when comparing the 200-Hz output of one channel with the simultaneous, 2-kHz output of the other channel, as seen in Fig. 8. Both sine waves are supposed to cross the zero axis at the same time and in the same direction, and so they do.

It came as no surprise to me that the MCD player was able to play through all the defects in my special error-correction test disc. After all, the original Magnavox FD1000, whose successor was modified to create the MCD version, was also able to play through 900 microns of opaque wedge, simulated dust spots 800 microns in diameter, and a simulated fingerprint smudge. Nor was I surprised to find that the player exhibited excellent resistance to mistracking when it was tapped lightly on its top surface and side panels. I can't necessarily attribute this excellent resistance to outside vibration and shock to the disc-loading method, since I have tested drawer-mount CD players which did as well. I *can* say that the MCD player did as well as the very best units that I have tested in this respect.

Use and Listening Tests

I wish I still had the early Magnavox CD player I tested more than two years ago. I would have loved to be able to conduct a blind or even a double-blind A/B test of the MCD player against that Philips-built unit. (*Editor's Note: Audio* reviewer Laurence L. Greenhill did conduct a similar test, comparing the MCD to a Philips CD101 player; his evaluation appears below.) As I recall, the early Magnavox players earned rave reviews from me and from others as far as their sound quality was concerned. But you must remember that two years ago my collection of CDs used in listening tests was much smaller—and there were fewer discs that I could truly call well-recorded, in terms of CD technology and recording technique. Furthermore, hearing memory is, as we all know, extremely short. For all that, it still seems to me that while the MCD player does produce superb sound from every standpoint, I just can't say with complete confidence whether its sound quality really exceeds that of the earlier Magnavox model.

I do have one criticism of the MCD player—or, more precisely, of Boothroyd-Stuart's selection of this particular model as the one to modify. Why did they have to choose the least easily programmable of Magnavox's line of CD players—and the one which accesses desired tracks so slowly? (Meridian does say, though, that later units will have a new control chip for faster access; my sample came from the first production run.) I know that, to many people, this won't seem a problem, especially if they listen to discs straight through. But to listeners who favor popular music, and who play discs that may well contain more than 15 selections, the rather primitive search and programming capabilities of the MCD may well prove to be an irritant.

My best suggestion for anyone considering the purchase of this player would most definitely be to do some serious listening to it—and to competing models. If your ears are keen enough to convince you that the sounds you hear from the MCD are audibly better than those you hear from other CD players, then you must make a couple of other decisions. Are you willing to forgo the fancy programming and random-access frills in return for that better sound quality? If so, are you willing to spend a couple of hundred extra dollars for the sound improvement you hear?

Leonard Feldman

Controlled Listening Test

Do Meridian's modifications produce a different-sounding CD player than the original Philips unit? To answer this question, I invited an audiophile friend, Arnis Balgalvis, to


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The Meridian and Philips had distinct, subjective personalities, but these impressions couldn't be statistically confirmed during controlled tests.

join me for an unbiased comparison of the Meridian MCD unit with a stock Philips CD101. Both machines were auditioned for 20-minute periods to identify their sonic characteristics. Then they were plugged into the ABX Co.'s CS-5 comparator system with RM-2 relay module, a device which allows rapid changeover between components with as much time between changeovers as the listener requires. This instrument randomly selects either CD player for a blind test when the listener pushes a randomizing button; the identity of each test trial selection is stored in the comparator's memory for later retrieval. The listener's task is to correctly identify the player chosen by the relay module.

Tests were run using a Levinson ML-7 preamp and ML-9 amplifier connected to Snell Type A/III loudspeakers by Hitachi oxygen-free copper, single-crystal speaker wire. Two identical samples of each Compact Disc, one for each player, were used for evaluation, with the two machines synchronized to the same musical note on the paired discs. Output levels of the two machines were quite close, matching to within 0.05 V (approximately ±0.5 dB), as shown by VTVM measurements at the amplifier outputs using the Philips Audio Frequency Test Sample NR.3 (CD 410 055-2).

The two players had distinct sonic personalities when connected directly to the Levinson preamp's high-level inputs. The early Philips player had substantially more bass, but sounded zippier, with more etched highs and an overall sonic hardness when compared to the Meridian. The latter seemed subdued and muted by comparison, with softer transients and less midrange harshness; it had better depth of imaging but an airier, less solid bass.

These subjective impressions could not be confirmed by the five controlled listening tests which followed. Each test consisted of 16 trials; 12 correct answers were required for the listener to be considered statistically accurate in identifying a player. One of the listeners scored 10 and 11 correct on two separate trials, doing little better than if he had been guessing. The other listener, who claimed he was listening for the Philips player's bass emphasis, scored in the significant range, getting 14 and 15 correct out of 16 attempts. But his score on a third test fell to 10 out of 16 correct after he synchronized the two players' musical outputs more exactly. The signals from the two players were temporarily mixed with a Y-connector while making cueing adjustments. This suggests he may have been detecting synchronization errors to identify the Compact Disc players, not their sonic attributes.

The sonic differences evident on direct, open listening were not statistically confirmed during the double-blind, controlled tests using the equipment listed above. This suggests that the Meridian player's electronic improvements yield only a subtle sonic upgrade.

Laurence L. Greenhill

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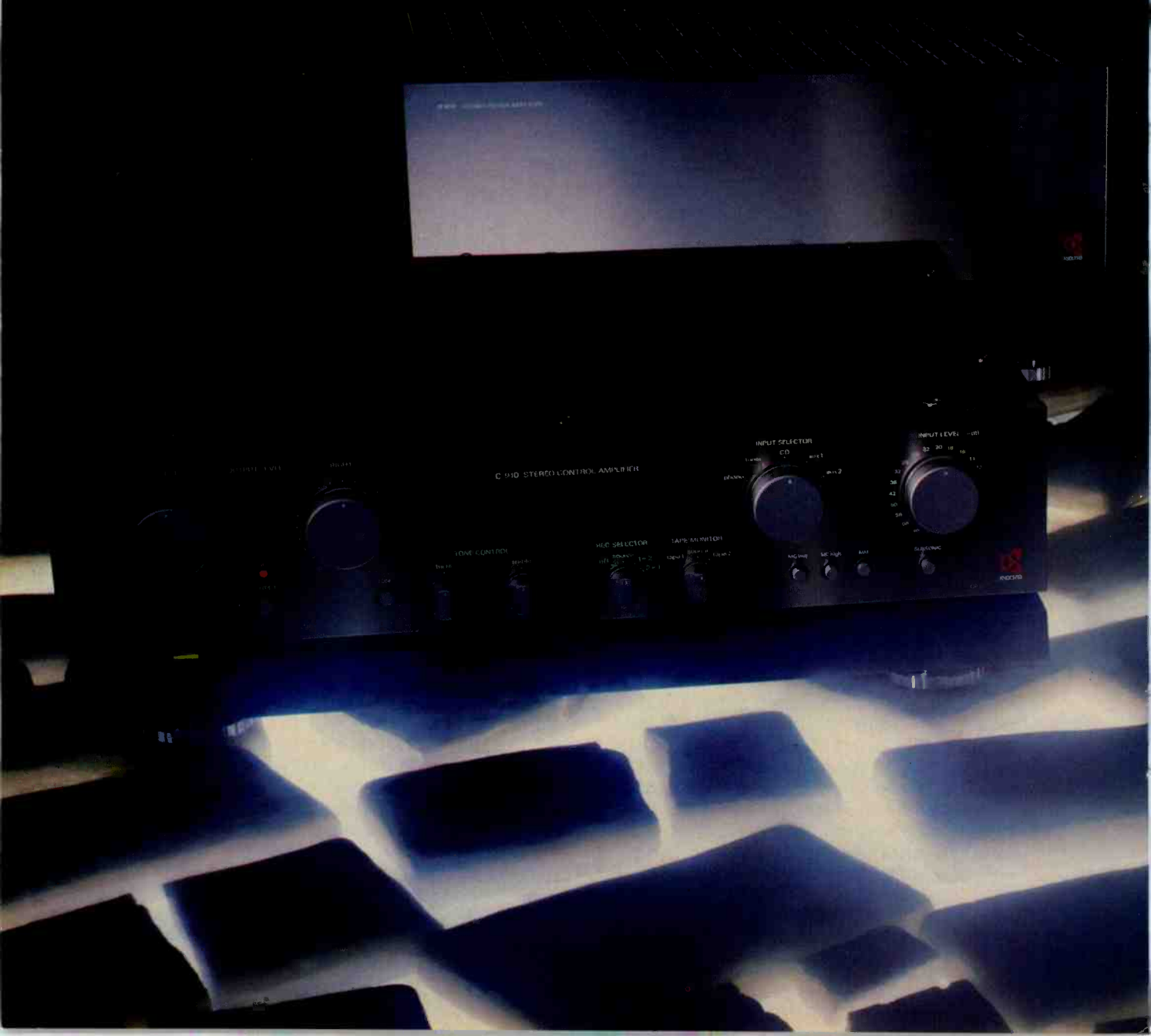
LEAVE THE WORLD OF MASS-MARKET HI-FI. ENTER THE NEW STONE AGE.



Kyocera believes there are two distinct categories of audio components: hi-fi and high fidelity. Hi-fi is mass produced for a mass market. The principal design objective is reduced cost. High fidelity is made by perfectionists for perfectionists. The principal design objective is sonic excellence. This is the inspiration behind the Kyocera 910 Series.

COMPONENTS FROM THE NEW STONE AGE.

In creating the 910 Series, Kyocera has harnessed the potential of an entirely new generation of materials: Fine Ceramics. Recognized for their rigidity, thermal stability, and anti-resonant properties, these "21st Century" materials are finding new uses in everything from high-efficiency car engines to computers. And now Kyocera puts Fine Ceramics to work in the fight against audio resonance.

Most mass-market hi-fi is defenseless in the face of vibration and resonance. Not only can resonance interfere with the signal content; it can even generate spurious signals of its own, which impair sonic resolution. Kyocera attacks this problem with a Ceramic Compound Resin (CCR) base formulated for incredible resistance to vibration. Kyocera bolts circuit boards, power transformers and heat sinks directly onto the CCR base. And Kyocera encases sensitive, low-level circuits in Fine Ceramic Linear (FCL) modules for minimum vibration in the pursuit of maximum sonic resolution.

A PREAMP THAT'S DISCRETE.

In the world of mass-market hi-fi, integrated circuits reduce cost at some sacrifice in sound quality. Kyocera believes that ICs do have their place—far away from the audio chain. That's why the Kyocera C-910 Control Amplifier uses 100% discrete components in the audio circuit.

ABSOLUTE POWER.

Even mass-market amps perform well in the laboratory. But they struggle under real-world conditions. Like low-impedance loads and dynamic digital material. The Kyocera B-910 Power Amplifier has a huge 600 VA seamless core power transformer and giant 27,000 μF filter capacitors to confer absolute power, driving all loads, under all operating conditions.

A MOST INTELLIGENT TUNER.

Most mass-market tuners have only one antenna input and one IF section. In contrast, the Kyocera T-910 switches between two antenna inputs and two IF sections for first-class reception. What's more, the T-910 is smart enough to remember the right settings for each preset station.

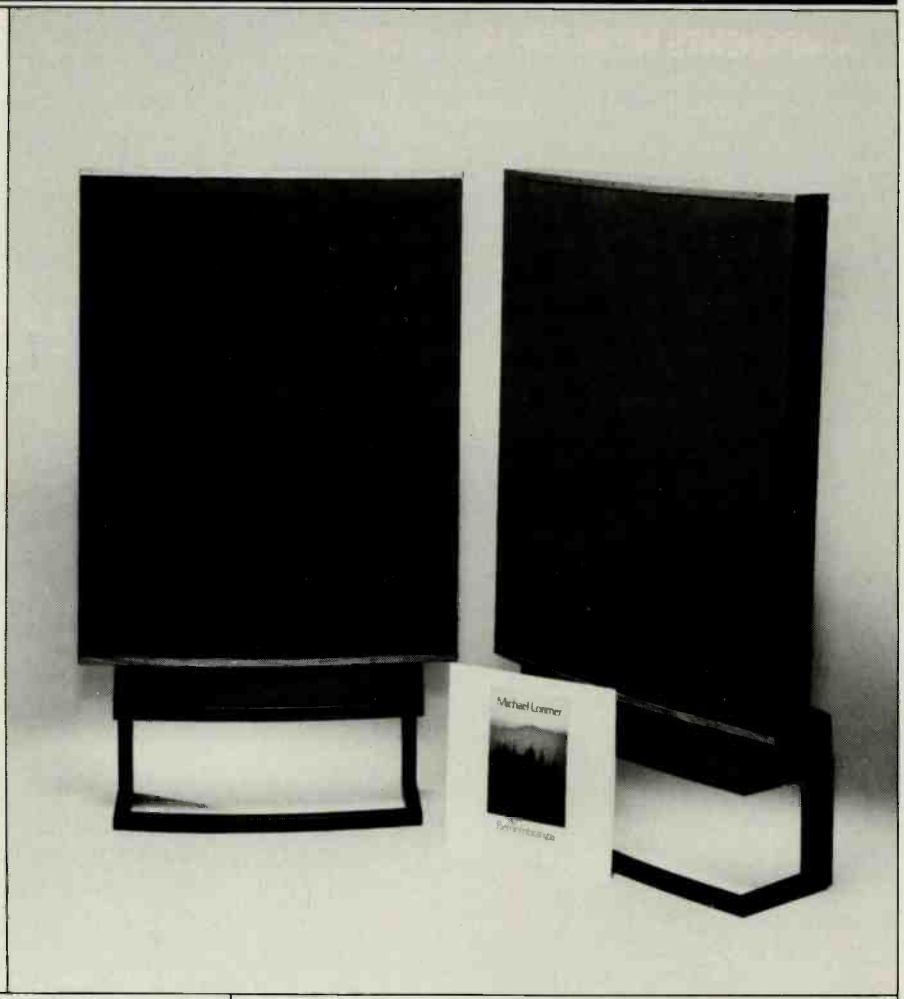
How much does all this cost? In mass-market terms, the Kyocera 910 Series is admittedly expensive. But even in The New Stone Age, one thing remains true. You get what you pay for.

KYOCERA

Built right from the ground up.

4

QUAD ESL 63 LOUDSPEAKER



Manufacturer's Specifications
System Type: Full-range electrostatic.
Nominal Impedance: 8 ohms.
Sensitivity: 86 dB SPL for 2.83 V rms at 1 meter.
Maximum Input: 40 V, peak.
Frequency Response: 35 Hz to 20 kHz, ±6 dB.
A.c. Supply: 240-200/120-100 V, 50-60 Hz, 5 VA.
Dimensions: 36⅜ in. H × 26 in. W × 10⅝ in. D (92.5 cm × 66 cm × 27 cm).
Weight: 41.1 lbs. (18.7 kg).
Price: $2,450 per pair.
Company Address: 695 Oak Grove Ave., Menlo Park, Cal. 94025.
For literature, circle No. 93

Quad is a name long-known and highly respected in high-fidelity sound reproduction. Not one to rush into production with a new widget simply because everyone else makes one, Peter Walker has quietly maintained a product line of superb quality and essentially unchanging design. In a business where "breakthrough" designs are more like a fashion fad, having a half-life measured in months, it is refreshing to see that true and unchanging quality persists.

The Quad Electrostatic Loudspeaker 63 is a newer product of Peter Walker's persistent search for quality; rumor has it that the 63 stands for the year when the design was begun. The ESL 63 is a full-range, electrostatic loudspeaker doublet, that is, the diaphragm radiates sound freely to the rear as well as to the front. Full-range electrostatic loudspeakers need a large surface area to radiate any appreciable sound output at the lower frequencies. This normally causes dispersion difficulties at the higher frequencies, where a large diaphragm can be many wavelengths in extent. Peter seems to have very effectively solved this problem with the inventive use of wave-controlling patterns on the conductive surfaces which determine the active radiation from the diaphragm. This remarkable feat is dismissed in company literature with typically British understatement: "Signal is fed to the electrodes via sequential delay lines, and the motion of the diaphragm produces a sound pressure pattern which is an exact replica of that from an ideal source placed some 30 cms behind the plane of the diaphragm."

Since it is an electrostatic transducer, the ESL 63 must be powered from the a.c. line. Here I must insert a word of warning: Internal protection circuitry prevents the ESL 63 from being damaged by excessive power-amplifier signal—well and good, but the 63s protect themselves by short-circuiting the speaker line. If the ESL 63 is energized from the a.c. line, this short-circuit protection comes into action only at high power-amp levels. But if the a.c. is switched off, the ESL 63 protects itself at low signal levels. This means that unless your amplifier is protected against dead short circuits, you could damage it by attempting to listen to music when one or both Quads are unplugged from the a.c. line or are turned off. This is, in my opinion, a booby trap for the unwary user. The speaker is protected, but you might blow your amplifier. Of course, you might never do such a thing, but perhaps a babysitter or child might turn the system on when you are not there. I recommend leaving the ESL 63s on at all times (the drain is small) and, if you have

AT LAST.

Harman Kardon's striking new line of car audio products leads you to a higher fidelity on the road. Elevating car audio standards, these dynamic components smoothly outdistance the competition by reflecting the excellence so finely honed by Harman Kardon in their home audio products for over thirty years.

Three new in-dash cassette/tuners and three power amplifiers blaze new trails. Each in-dash unit incorporates the renowned Harman Kardon design philosophies that enable them to deliver an exceptional frequency response of 20Hz to 20kHz ± 3dB. Each amplifier boasts High instantaneous Current Capability, Low Negative Feedback and Ultrawidebandwidth.

The previously unexplored realms of car audio are now within reach, for those tuned to a higher fidelity. From Harman Kardon.

harman/kardon

240 Crossways Park West, Woodbury, NY 11797. In Canada, Gould Marketing, Montreal.
For more information call toll-free 1-(800) 633-2252 ext. 250.

This speaker is a dipole radiator: Almost as much sound comes out the back as comes out the front.

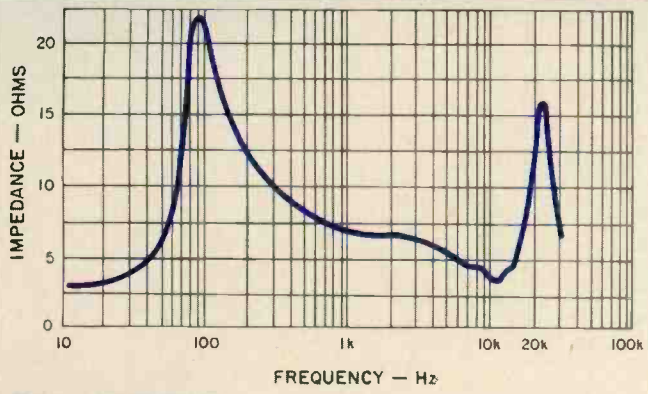


Fig. 1—Impedance.

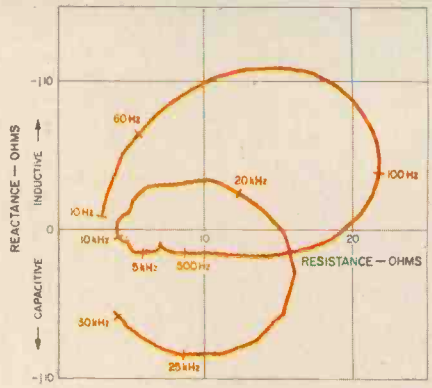


Fig. 2—Complex impedance.

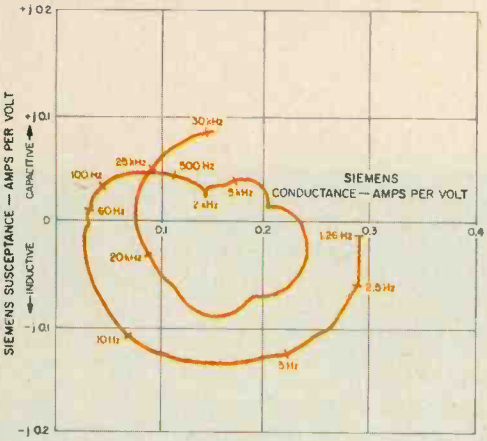


Fig. 3—Complex admittance for 2 V rms drive.

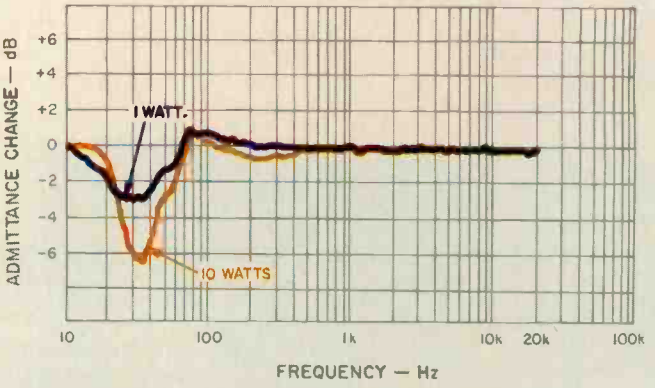


Fig. 4—Change of admittance, at 1 watt and 10 watts, relative to admittance at 0.1 watt.

any doubts about your amplifier's vulnerability, placing a 3-A, slow-blow fuse in the speaker line.

Standing 93 cm high, with a 15-cm base, the ESL 63 should be placed on a reasonably firm surface; a toddler could readily pull them over if the speakers were placed on a soft or yielding surface. The rear terminals are well marked, and no problems should be encountered in connecting the speaker to a good amplifier.

Measurements

Compared to a conventional moving-coil loudspeaker, the ESL 63 presents an unusual load to the power amplifier. The measured magnitude (modulus) of impedance is plotted in Fig. 1. Although rated as an 8-ohm system, the ESL 63's impedance remains well below that value over most of the audio frequency range. This measured curve agrees well with that supplied by Quad in the user manual; however, the curve supplied with the system stops at 20 kHz, indicating, by inference, a continuing rise of impedance with frequency. The measurement in Fig. 1 shows that this rise is due to a resonance at 22 kHz, and that the impedance falls rapidly at higher frequencies.

This is more clearly seen in the complex impedance plot, Fig. 2. The higher frequency resonance is now seen to be of such a nature that the impedance above 25 kHz is a potentially more difficult load to drive than that for any frequency lying below 20 kHz. At 30 kHz, for example, the ESL 63 presents a 6-ohm value at a capacitive angle of 60°. It is also clear from this plot that the impedance will continue to fall with increasing frequency above 30 kHz. Care should be taken that the power amplifier used to drive the ESL 63 is capable of driving such a load at very high frequencies. Although properly traced LP records may not have ultrasonic components, and CD players most certainly will not, a slightly mistracking cartridge could generate distortion in this range, which a distorting amplifier could crossmodulate down to the audible range. The ESL 63 might then be improperly blamed for bad sound caused by certain combinations of cartridges and amplifiers.

The complex admittance curve, plotted in Fig. 3, also shows this high-frequency effect. The admittance curve is a measure of the amperes drawn per volt of amplifier drive. Because the actual impedance is closer to 4 ohms rather than 8 ohms, I recommend that the 63s be considered 4-ohm (or 0.25-siemens) systems. Accordingly, the data of Fig. 3 are taken at an actual drive level of 2 V rms (correspond-

When it first hit the street, Car and Driver called it, "what the Firebird and Camaro could have been."*

Dodge Daytona Turbo Z. It eats zero to fifty in a mind-rushing 5.39 seconds. Fast enough to swallow the Z28.** And it doesn't need a hefty V-8 to do it. Just four cylinders, turbocharged and fuel-injected. That kind of performance has helped make Chrysler the world's largest manufacturer and seller of turbocharged cars.

But Turbo Z isn't simply impatient with distance and speed. It comes thoroughly dressed to thrill with a quick, close-ratio 5-speed. Fast, 14 to 1 rack-and-pinion steering.

"STUNNING OVERACHIEVER"

— Car and Driver

Power front disc brakes. Nitrogen filled shocks for flat handling through curves and around corners. And massive 15-inch Shelby wheels fitted with Goodyear Eagle GT performance radials.

Outside, Daytona Turbo Z looks like it means business—with an aggressive aerodynamic shape that includes front air dam and rear spoiler.† Inside, more of the same. Deep buckets with adjustable lumbar and thigh supports for the driver. Between the buckets, an integrated console. There's full instrumentation, too. Tach. Gauge alerts. Turbo boost gauge. Elapsed time indicator. Graphic message center. The works. A six-speaker AM/FM stereo and leather wrapped steering wheel are standard. So is Dodge's 5/50 Protection Plan.††

Ask your Dodge dealer about buying or leasing†† your very own "stunning overachiever."

Dodge
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AN AMERICAN REVOLUTION

*"... Dodge has proved that a small, turbocharged front-wheel-drive car can be considered the potential equal of the fabled rear-wheel-drive V-8's." Car and Driver, Sept., 1983. **NHRA tests of standard vehicles. †Shown with optional dealer-installed ground effects. ††5 years/50,000 miles, whichever comes first. Limited warranty on engine, powertrain and outer body rust-through. Excludes leases. Deductible applies. Ask for details.*

BUCKLE UP FOR SAFETY.

The ESL 63 comes the closest to perfect phase response of any speaker I've tested in nearly 20 years of measurement.

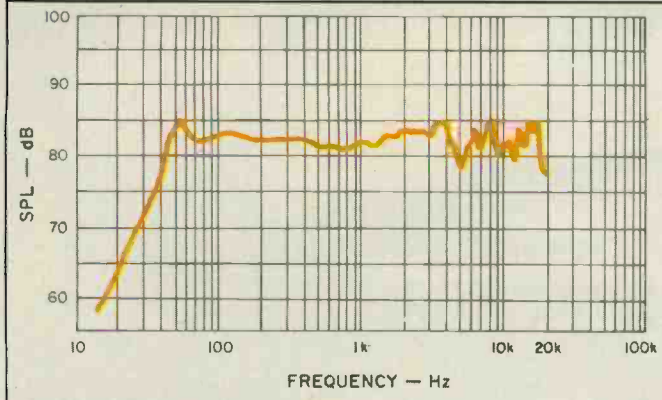


Fig. 5—One-meter on-axis sound output level with a constant drive level of 2 V rms.

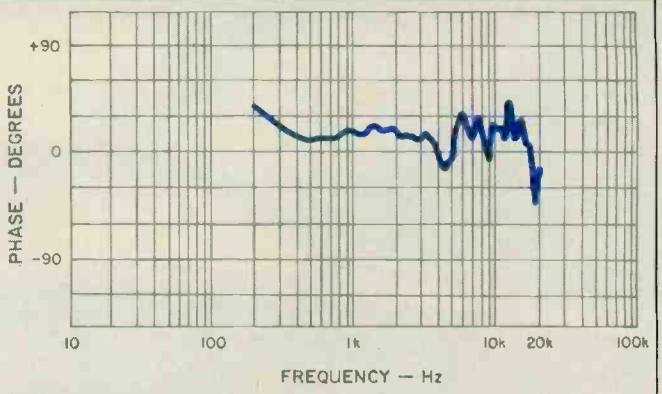


Fig. 6—One-meter on-axis phase response.

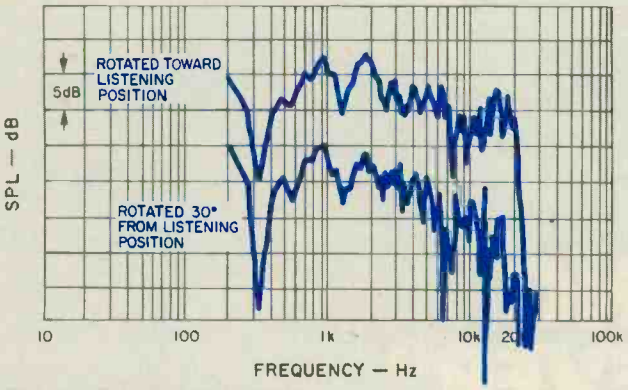


Fig. 7—Three-meter room response.

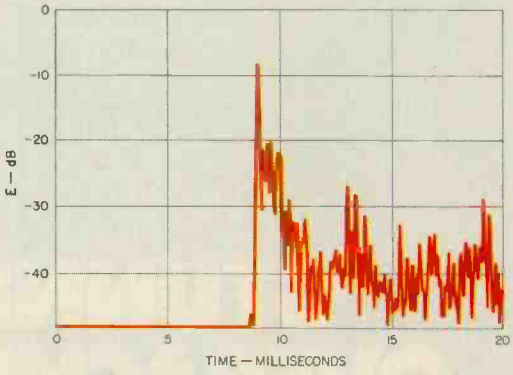


Fig. 8—Energy-time curve for 3-meter room response.

ing to 1 average watt into 0.25 siemens). Measurement extends from 1.26 Hz to 32 kHz. As the admittance curve of Fig. 3 travels away and upward from the origin, the loudspeaker becomes harder for a conventional constant-voltage power amplifier to drive.

The admittance of the ESL 63 changes with drive level. Figure 4 is a plot of this change. Relative to a drive level of 100 mW, the 1-watt admittance decreases by 3 dB at 30 Hz, then rises by 0.5 dB at 80 Hz. The 10-watt admittance drops by 6 dB (a full half) at 35 Hz, increases by 0.5 dB at 80 Hz, and then drops by 0.75 dB at 250 Hz. This means that the ESL 63 is an easier bass load to drive at higher power, but also that it is somewhat nonlinear.

Anechoic frequency-response measurements were performed at an actual distance of 1.5 meters and corrected for an equivalent reference distance of 1 meter. Figure 5 is the measured amplitude response, and Fig. 6 is the measured phase response, both for an axial microphone position. These measurements are for a constant voltage level of 2 V rms, since I am treating the system as a 4-ohm load. These measurements have been corrected for air-path time delay, so that a perfect phase response would correspond to the 0° axis in Fig. 6. The ESL 63 comes the closest to this perfection of any speaker system which I have tested in nearly 20 years of such measurement. A positive-going voltage applied to the "+" terminal produces a positive-going pressure at the listening position. Both the amplitude and phase response are exceptionally good throughout the audio frequency range. The ripples above 4 kHz are caused by internal grille reflections, which are down about 15 dB from the direct sound. Usable response extends from 30 Hz to 20 kHz.

The 3-meter room response is shown in Fig. 7. This measurement was made in the same position, and with the actual power amplifier and speaker cable configuration, that I used for the listening tests. The microphone was placed where I sat, 3 meters from the loudspeaker and 1 meter above a carpeted floor. My only concession to measurement was to remove the listening chair and, of course, myself, from the microphone position. The speaker was 1 meter in front of a draped wall, and rotated so that back radiation did not reflect toward the listening position; as recommended by Quad, the ESL 63 was placed on the carpeted floor. Two measurements are shown in Fig. 7; both correspond to the frequency response of the first 13 mS of sound to arrive at the listening position. The upper curve

In listening, I heard an unusual characteristic, a fuzz on upper-register transients, and I had to create a new test to measure the effect.

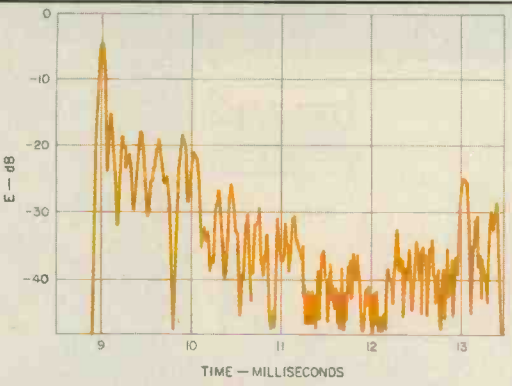


Fig. 9—Expanded energy-time curve for 3-meter room response.

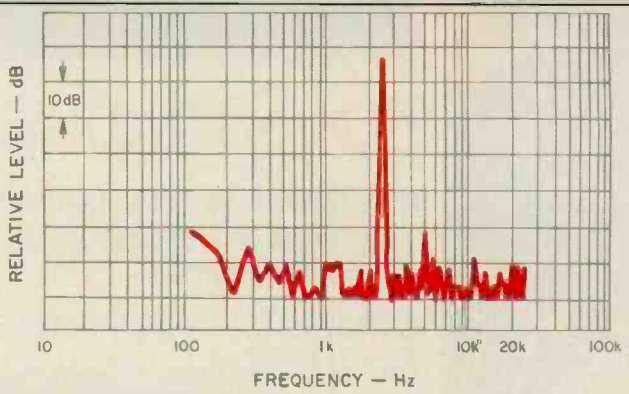


Fig. 10—FFT for steady-state tone at 3 meters.

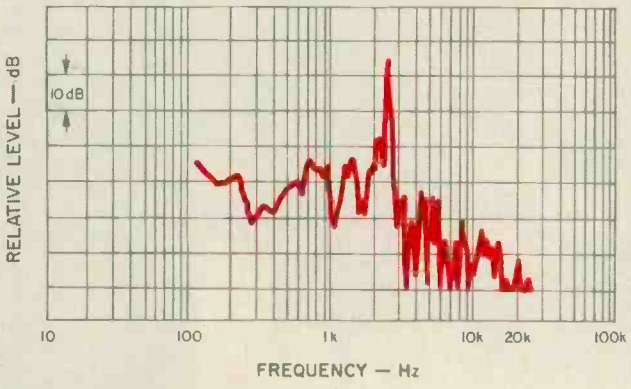


Fig. 11—FFT for transient tone at 3 meters.

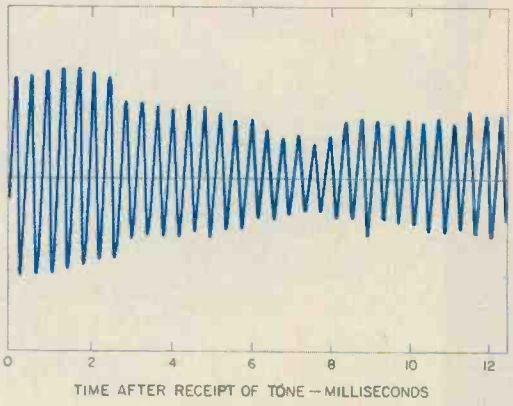


Fig. 12—Time signal for FFT of Fig. 11.

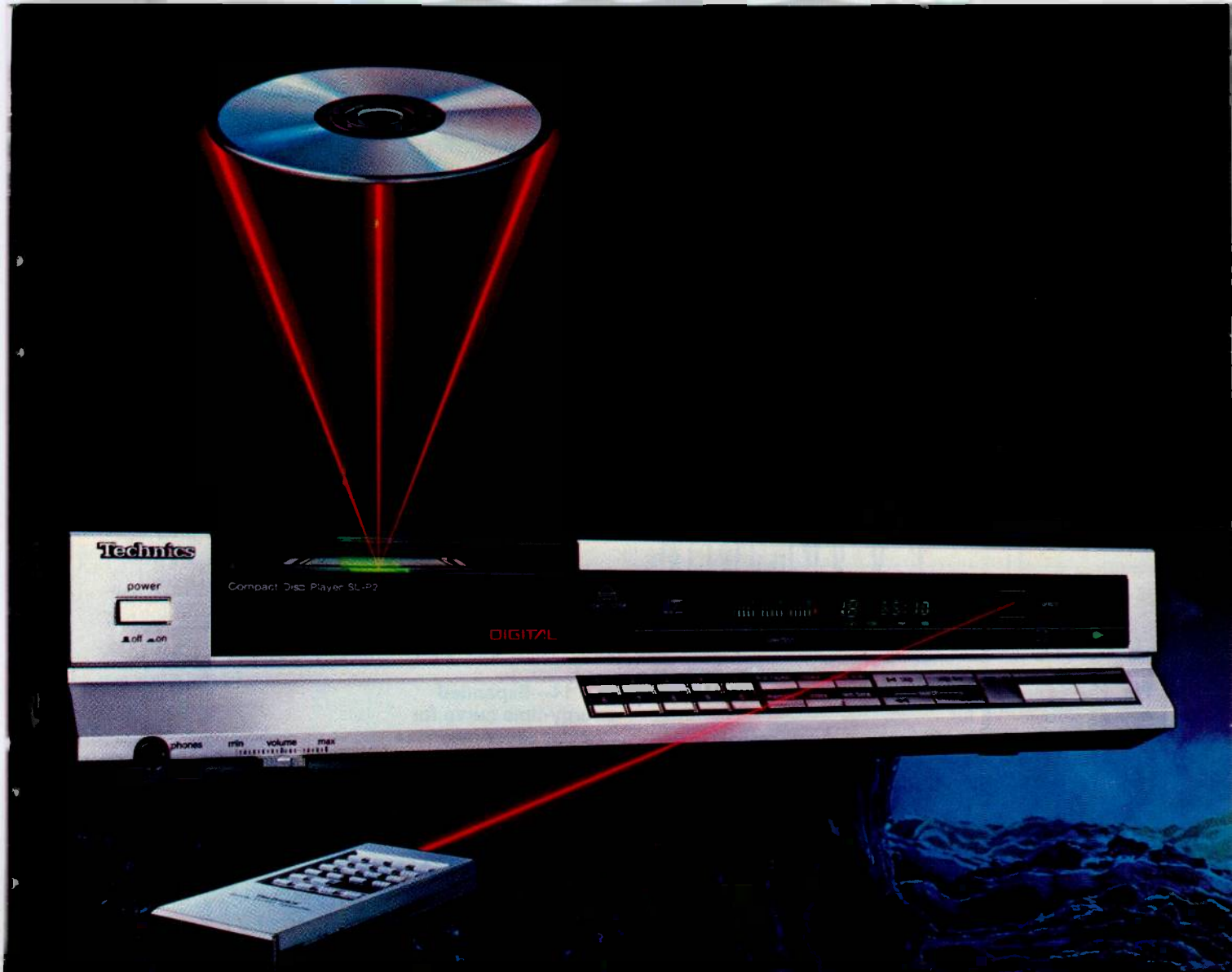
shows response when the ESL 63 is rotated toward the listening position, and the lower curve shows response when the speaker is rotated to direct its sound 30° off-axis from the listening position. (During the earlier listening tests, I had the speakers directed toward me.) The curves are displaced by 10 dB on this plot for clarity of presentation.

I have devoted this substantial discussion to the room test for the simple reason that previously, during the listening tests, I had heard an unusual distortion which I was not able to measure during subsequent laboratory tests. What I heard was a "fuzz" on upper-register transients, in the 1 to 5-kHz range. Thinking it might be distortion in the program material, which the clarity of the ESL 63 was revealing, I borrowed a high-quality CD player and made comparative listening tests using identical program passages from direct disc and CD—and I still heard the fuzz.

The sound was similar to certain types of harmonic distortion, yet the ESL 63 proved to have exceedingly low levels of such distortion in the laboratory tests. The 3-meter room test provided a clue. I regularly perform many more measurements than are submitted for these reviews. One such measurement is the full energy-time curve (ETC) of the 3-meter listening condition. Figure 8 is the ETC corresponding to the upper curve in Fig. 7, reflecting the condition I used when listening, and here was the clue: The first 3 mS of sound had a most unusual arrival pattern. This caused the irregular response in the frequency spectrum of early sound, which is evident in the 3-meter room measurement of Fig. 7. Figure 9 is an expanded ETC, showing the first 4 mS of sound.

But where is the distortion I heard? It seems, from both the frequency response and the time response, that the first 3 to 10 mS may be where the problem lies. I heard the distortion on sibilants in female vocals and in tones which were characterized by rapid attack followed by sustain. I found (or believe that I found) the distortion by measuring transient tones in the actual listening location. But I had to create new software and a new test in order to do it.

Figure 10 is an FFT measurement of 16 mS of sound due to a sine-wave signal at 2.65 kHz. This is an actual microphone measurement for the sustain tone at 93 dB SPL at the 3-meter listening position, and it was captured 250 mS after the tone was applied, corresponding to steady state. It is nearly perfect, with less than 0.5% second-harmonic distortion. This is the frequency having the largest measured harmonic distortion at a level of 93 dB at the listening



Introducing a slight improvement on perfection. The new Technics Compact Disc Players.

Technics compact disc players. And the compact disc. Together they've given you what no conventional audio system can: the perfection of musical reality. Instead of the conventional stylus, Technics compact disc players use lasers and computers. So there's none of the noise. None of the distortion. And none of the wear and tear that affects ordinary records.

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COMPACT disc DIGITAL AUDIO

You also get sophisticated, convenient controls for accurate, rapid response to your commands: 5-step Random Access Programming so you can play any selection. In any order. Auto Music Scan lets you sample the first few seconds of each song. Automatically. Full information fluorescent displays let you keep track of tracks, playing time and other player functions.

And all of this can be controlled from across the room with Technics wireless, infrared remote control.

So enjoy an improvement on perfection. With the full range of Technics compact disc players, including the SL-P2, SL-P3 and very affordable SL-P1.

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Technics
The science of sound

Horizontal dispersion is more restricted than vertical dispersion. For uniform sound, aim them at the listener.

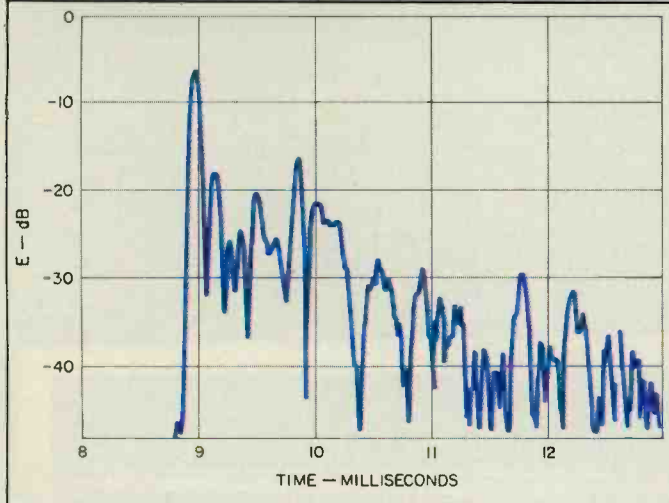

Fig. 13—Expanded energy-time curve for 3-meter room response, speaker on floor.

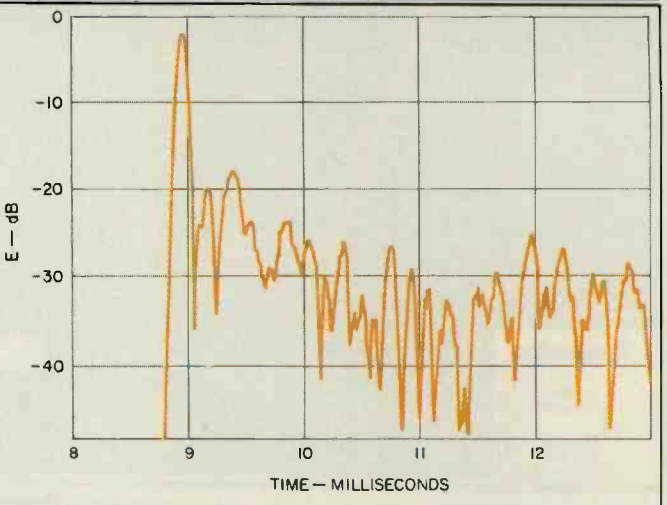

Fig. 14—Expanded energy-time curve for 3-meter room response, speaker raised 60 cm.

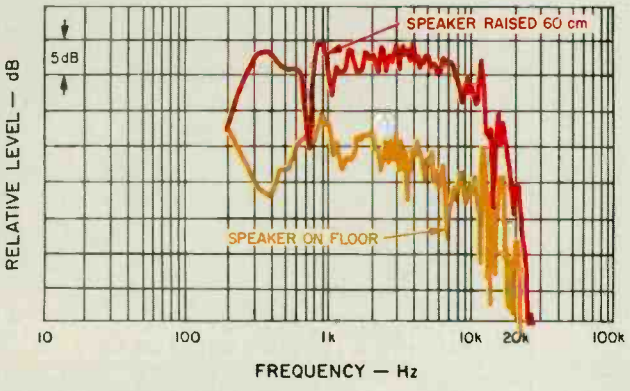

Fig. 15—Three-meter off-axis frequency response for speaker raised 60 cm (upper trace) and on floor (lower trace).

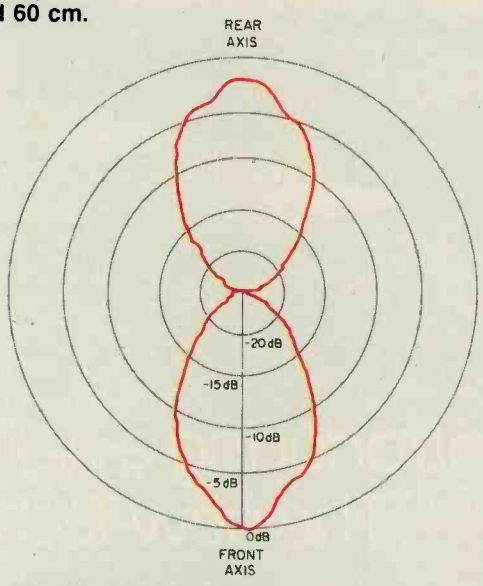

Fig. 16—Horizontal polar-energy response.

location and in the 1 to 10-kHz range; quite low, even at its worst. By comparison, a tone of 1 kHz has less than 0.15% distortion at this same level. What I heard is clearly not steady-state harmonic distortion.

Now look at Fig. 11. This is the same 16-mS window, with the same Hanning-weighted FFT, but now measured immediately after the first sound arrived at the listening location. Suddenly, there is fuzz. The otherwise pure tone is accompanied by a nonsymmetrical distribution of sound extending from 100 Hz to beyond 15 kHz. Figure 12, which is the time signal whose FFT is given in Fig. 11, reveals why this occurs. The oscilloscope display shows that the early reflections interfered with the direct sound. The result of this ensemble of sounds is a combination of amplitude modulation and phase modulation of the 2.65 kHz "carrier." We no longer have one source; we have an ensemble of sources for the early sound.

But what is there about the ESL 63 which made this effect so prominent in my listening situation? Comparison of the room ETC (Fig. 9) with the anechoic ETC (Fig. 20) shows the existence of early scatter from the floor. The ESL 63 is too close to the floor. In order to verify this hypothesis, and to exonerate rearward-radiated sound from this dipole source, measurements were performed in a worst-case condition with the speaker's sound axis offset 30° in the listening room. Figure 13 is the ETC for the floor-mounted configura-

Stereo TV. Not stereotype TV.

"Give My Regards To Broad Street" is available on Beta and VHS Stereo Hi-Fi Videocassettes from CBS/FOX VIDEO. © 1985 CBS/FOX VIDEO.

The NEC CT-2020A offers all the features of the CT-2505A plus a flat square (FS) black stripe picture tube for increased image area and a linear, undistorted picture; 142 channel CATV-ready quartz synthesized PLL tuner and on-screen time display.

With almost 50% of U.S. TV stations planning to broadcast stereo this year, naturally many manufacturers are jumping on the stereo TV bandwagon. That's why NEC wants to remind you of something before you buy any TV, stereo or otherwise. The TV itself.

NEC Stereo Receiver/Monitors incorporate decades of the Company's industrial and professional video experience. In fact, the 20" CT-2020A and 25" CT-2505A offer *all* the features that make NEC a favorite among serious video users.

Besides receiving stereo or Second Audio Program (SAP) Multiplex Broadcasts directly and playing them back through built-in stereo amps and speakers, the CT-2020A/2505A's feature CATV-ready tuners with full function wireless remote control and Skip Memory; and a complete assortment of antenna, video and audio connection facilities. These stereo NEC Receiver/Monitors also incorporate comb filters, auto flesh control, black stripe matrix picture tubes and smoked glass anti-glare shields for the utmost in picture sharpness, contrast and resolution.

No matter how good the idea of stereo TV may sound, combining stereo with an NEC Receiver/Monitor sounds even better.

NEC®

NEC Corporation, Tokyo, Japan

NEC Home Electronics (U.S.A.) Inc.,
1401 Estes Avenue, Elk Grove Village, Illinois 60007, (312) 228-5900

Enter No. 38 on Reader Service Card

The 63s give a good sense of program dynamics. Horns are well articulated, and certain percussive material comes alive.

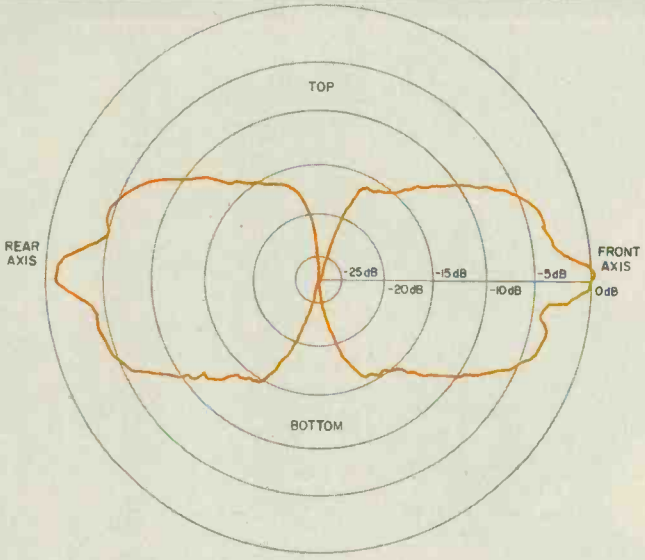

Fig. 17—Vertical polar-energy response.

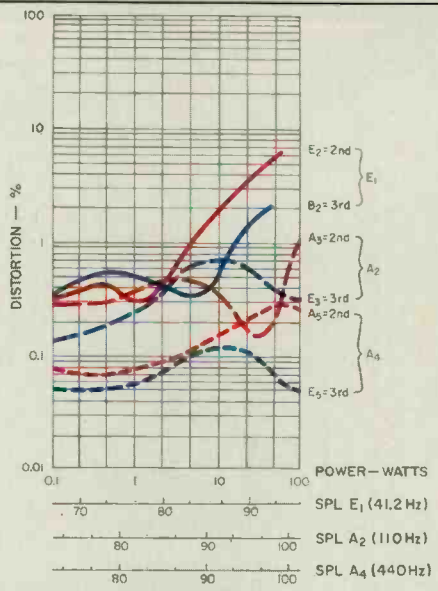

Fig. 18—Harmonic distortion for the tones E_1 (41.2 Hz), A_2 (110 Hz), and A_4 (440 Hz).

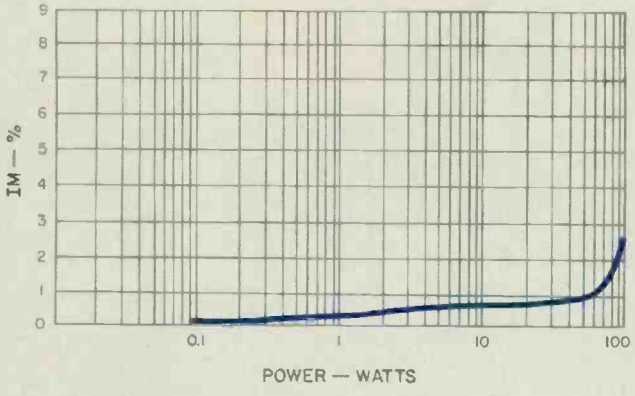

Fig. 19—IM distortion on 440 Hz produced by 41.2 Hz (E_1) when mixed in one-to-one proportion.

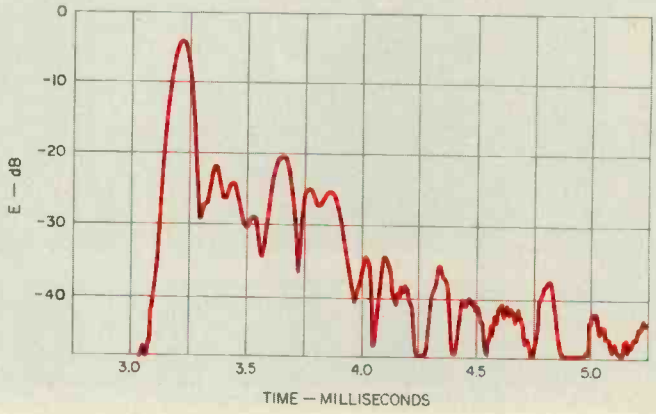

Fig. 20—Energy-time curve taken at 1 meter with grille in place.

tion. Figure 14 is the same measurement with the speaker is raised 60 cm above the floor on a flat stool. Figure 15 shows the 3-meter, off-axis response when the speaker is raised 60 cm (upper curve) and when it is placed on the floor (lower curve). The early sound is much smoother in the raised position. And, yes, much of the fuzz (but not all of it) went away when listening to the raised ESL 63s.

Final note: The ESL 63s are very sensitive to the room and where you place them in that room. They should never be placed directly on a hard floor; I recommend elevating them, if possible. However, these speakers are heavy and can be tipped over by a vigorous toddler, so use caution in placing them at higher elevations if children or pets are going to be around.

Figures 16 and 17, the horizontal and vertical polar-energy patterns, are relevant to the preceding discussion on placing the ESL 63s for best sound. These are measurements of the integral of the square of the linear amplitude frequency response for all frequencies from 20 Hz to 20 kHz. These show that the 63 is a dipole radiator; almost as much sound energy comes out of the back as comes out the front, and with essentially the same polar pattern. However, the horizontal dispersion (the left-right response) is more restricted than the vertical dispersion. If you want to

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Stereo imaging is excellent and midrange timbral balance is very good, but reproduction of piano and human voice falls short.

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obtain the most uniform direct sound, aim the speakers at the listening location. The vertical response indicates that these speakers need to be raised above the floor and should never be placed directly under a shelf or any other overhanging reflecting surface. These speakers cannot be safely tipped; otherwise I would recommend raising the speakers off the floor and twisting them 90° (so that top and bottom become sides) for best lateralization of stereo imaging. Care needs to be taken that the rearward-radiated sound does not reflect off nearby surfaces in such a way that it comes directly back to the listening position with less than about 20 mS of time delay.

Harmonic distortion for tones of E_1 (41.2 Hz), A_2 (110 Hz), and A_4 (440 Hz) is shown in Fig. 18, with 1 watt corresponding to 2 V rms drive. What is remarkable about these measurements is that not only is the distortion quite low throughout the full power range, but distortion is almost independent of power level for the two higher tones. This is an extremely clean response.

The measured IM distortion on A_4 (440 Hz), caused by simultaneous reproduction of E_1 (41.2 Hz) at the same drive level, is plotted in Fig. 19. The distortion is quite low right up to an equivalent drive level of 100 watts. This is an extremely clean sound. The nature of the distortion is principally phase modulation on A_4 caused by E_1.

In the crescendo test, an inner musical voice of A_4 was completely unaffected (less than 0.02-dB change) by superimposed broad-band noise which had a 20-dB higher average level, even up to a combined voltage of 80 V peak to peak, at which point the speaker's protective network nipped off the signal.

In transfer linearity, sound power at 100 average watts drive showed less than 0.1-dB compression for a tone of 440 Hz, compared to a drive of 0.1 watt. Middle C, 262 Hz, was compressed by about 0.3 dB at higher drive, while E_1 (41.2 Hz) increased by 1 dB at 10 watts, relative to 0.1 watt.

The axial 1-meter ETC is shown in Fig. 20. It is apparent from this measurement that the earliest-arriving sound is virtually flawless up to 20 kHz. But low-level internal reflections, from within the enclosure, cause interference that persists for about 0.75 mS. I suspect that the protective grille and its supporting structure are the source of these early reflections. The nature of this ETC suggests an accurate reproduction of percussive sounds in the highest registers, but a slight blurring of transients whose energy is concentrated in the 2 to 5-kHz range.

The combination of the distortion measurements (HD, IM, crescendo, and transfer linearity) and the ETC indicate that stereo imaging, both lateralization and depth, should be excellent and remain stable over full program dynamics.

Use and Listening Tests

I had a great deal of difficulty placing the ESL 63s for acceptable stereo sound. The configuration I finally chose was the one used in the 3-meter room test (described above), with the two speakers subtending slightly more than 60° at my listening location and both rotated to face directly toward me. I placed them 1 meter in front of a draped surface in order to lessen the effect of the rearward sound which contributes to the reverberant field.

My comments in this part of the review are based on my personal opinion, and I cannot support them with any tangible evidence save my listening experience. I was not favorably impressed with the listening qualities of the ESL 63. In my opinion, their sound does not live up to their high pedigree.

Stereo imaging is excellent, and midrange timbral balance is very good, but I could not achieve the accurate illusion of piano or human voice, no matter how I positioned these speakers in my room. In addition, I was bothered by an upper-midrange harshness and fuzz, which I have described above.

The 63s do give a good sense of program dynamics. Trumpet and other horns are well articulated, and certain percussive material literally comes alive with these speakers. This accuracy of dynamics is somewhat flawed by the speakers' inability to handle very high peak SPLs since the protective circuitry shuts the speaker down before damage can occur, but well below the peak sound level that some listeners may prefer.

As I said at the outset, I was a bit apprehensive about Quad's technique of speaker protection. The terminals are shunted whenever damaging voltages are applied to the speakers. Putting a short-circuit across the terminals of a high-power amplifier when the signal gets too high for the speaker seems to me a bit like dropping a steel plate in the path of a fast automobile when its speed gets too high for the road conditions. In that case, I am not sure who is protecting whom. However, I did deliberately trip the ESL protection quite a number of times when playing high-quality CDs and LPs, with absolutely no problems; the offending channel simply went mute for a few seconds and then came back on, none the worse for wear.

My prejudices notwithstanding, the ESL 63s are accurate in their imaging of orchestra and are exemplary reproducers of percussive program material. *Richard C. Heyser*

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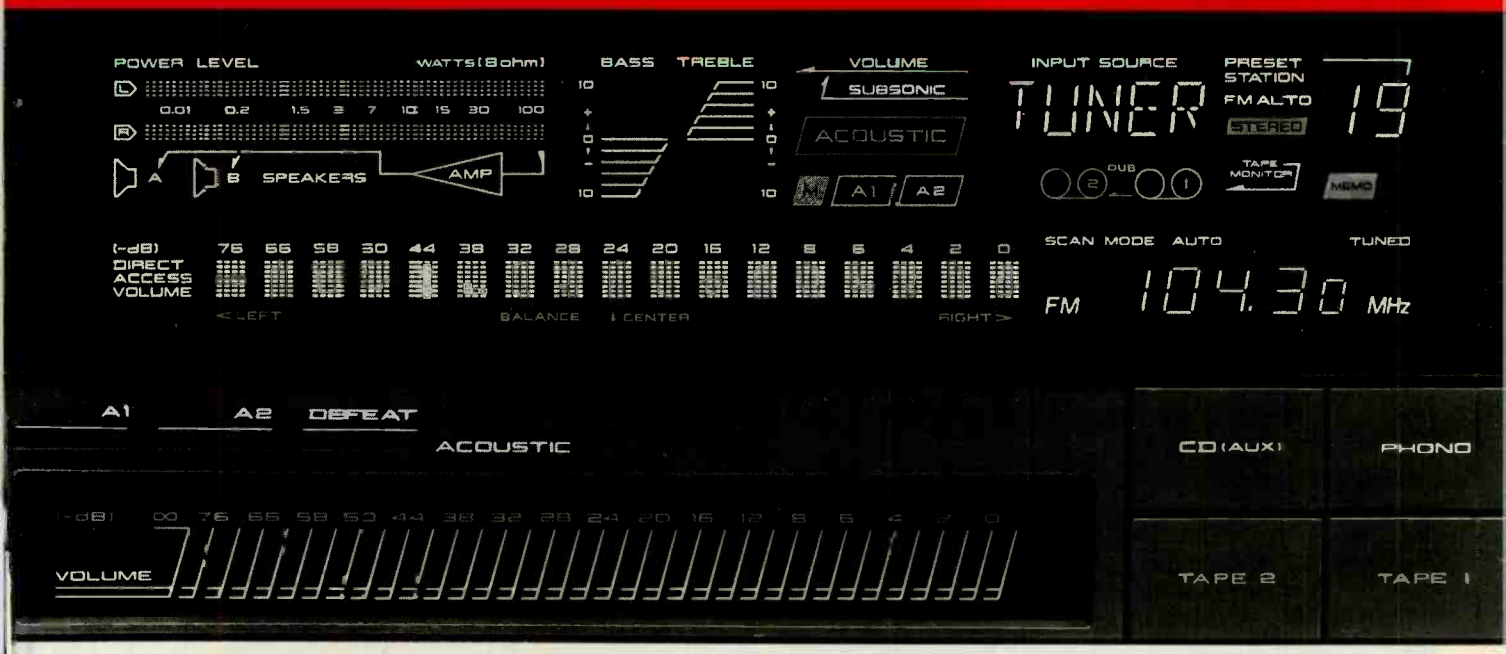

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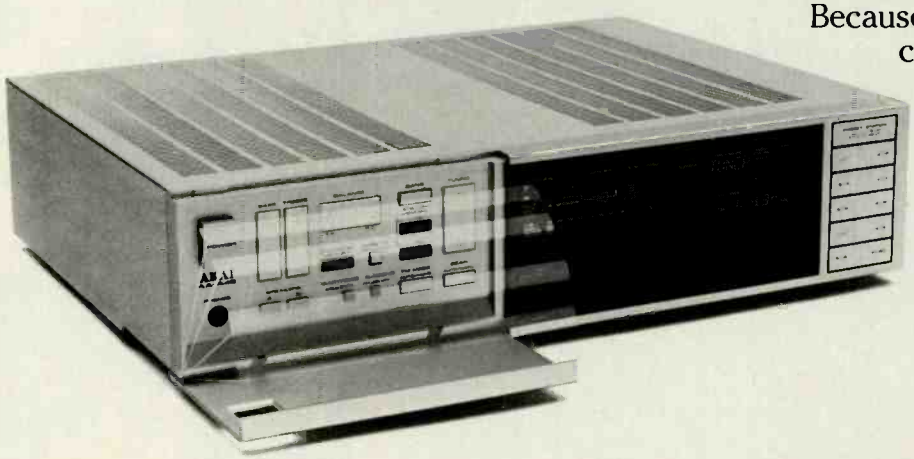

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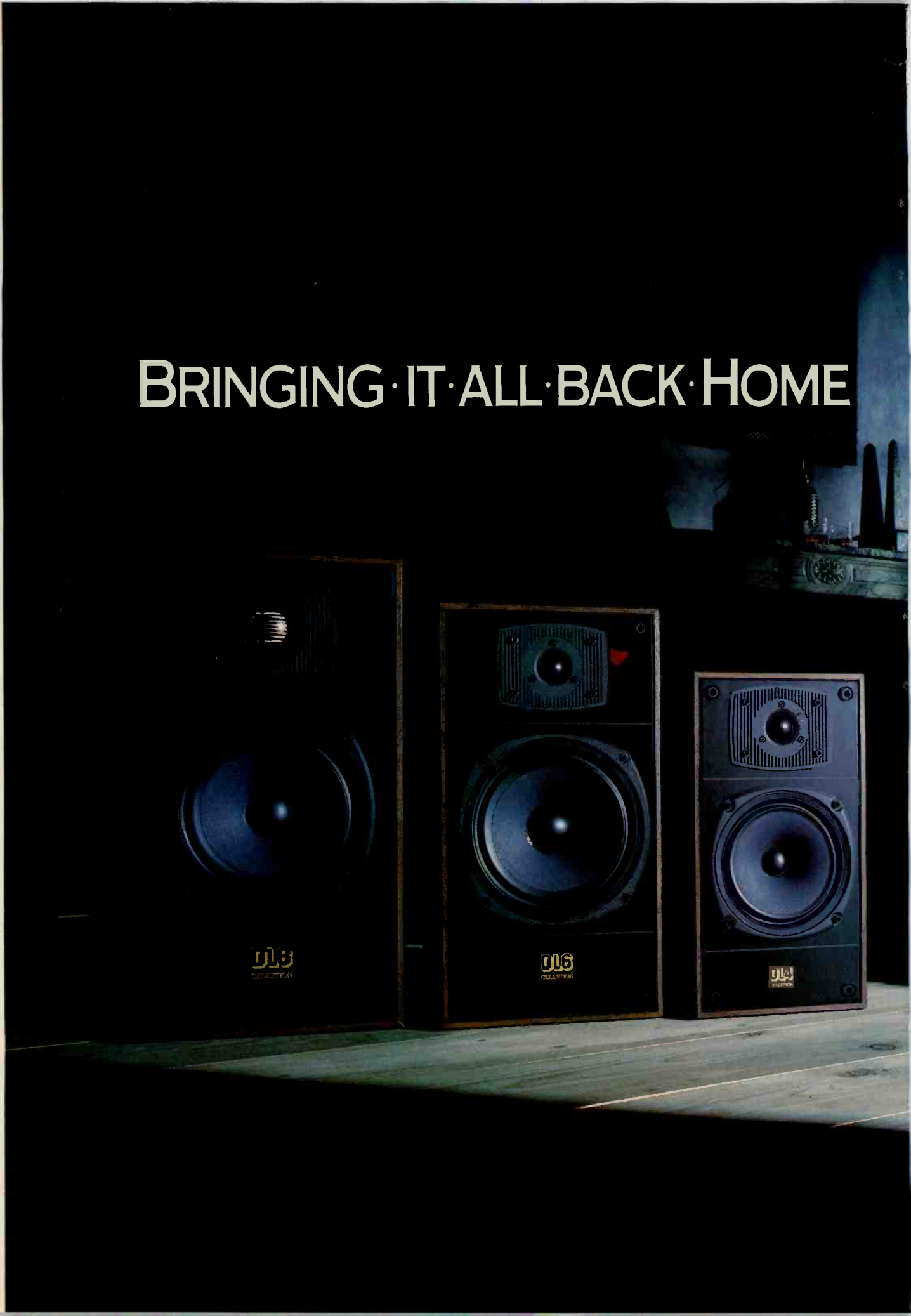

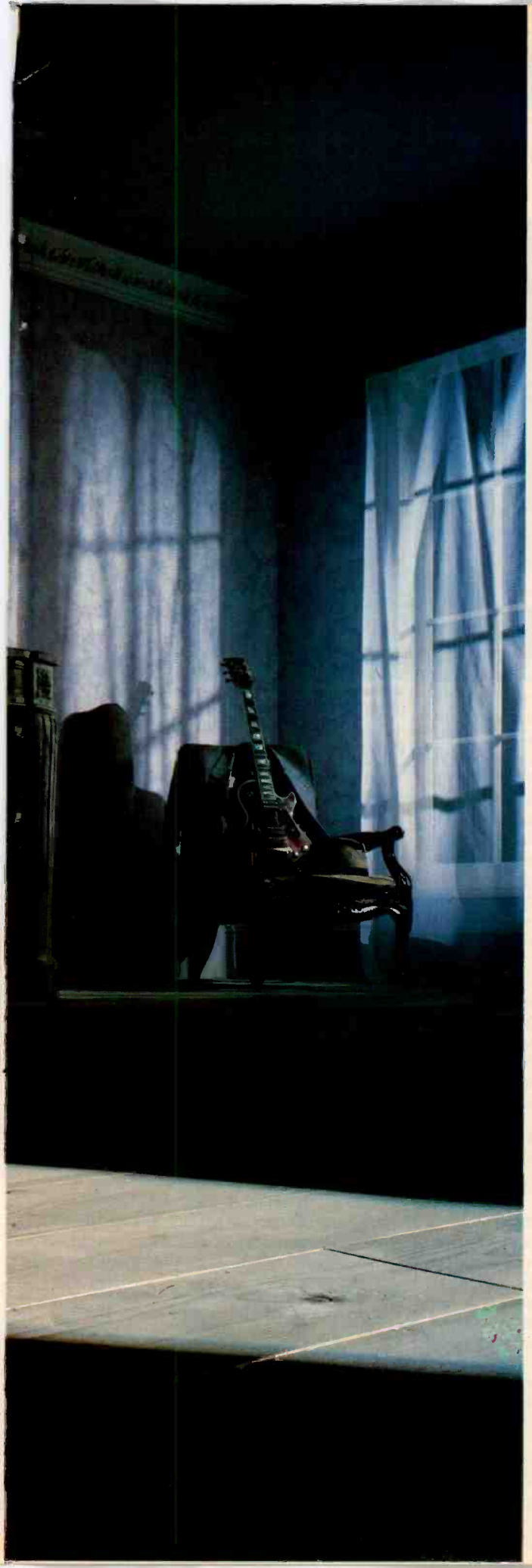

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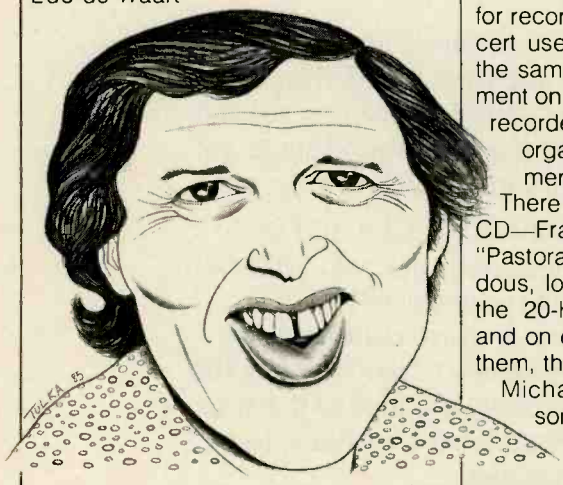
PEDAL POWER

Jongen: Symphonie Concertante for Organ and Orchestra; Franck: Fantaisie in A, Pastorale. The San Francisco Symphony Orchestra, Edo de Waart; Michael Murray, organ. **Telarc CD 80096.**

This month's blockbuster CD is Telarc's magnificent recording of Jongen's "Symphonie Concertante for Organ and Orchestra." There aren't many works for organ and orchestra; the one that comes immediately to mind is, of course, Saint-Saëns Symphony No. 3.

The "Symphonie Concertante" was championed by the late Virgil Fox, who included his organ transcription of the Jongen piece in a program I recorded (of Virgil playing the Ruffatti organ in Garden Grove, Cal.). The new Telarc CD, however, is the first release since an ancient Capitol LP of the Belgian National Orchestra.

Edo de Waart



The "Symphonie Concertante" is a tremendously dynamic and exciting piece. Right after the first few orchestral bars, the full organ enters at very high level, and you had better have an amplifier and speakers that can cope with the enormous output. Throughout the work, there are other great, dynamic passages for organ and orchestra, along with some very lovely, melodious sections.

The recording was made in the new Davies Symphony Hall in San Francisco. As a concert hall, it has not been too kindly received. Telarc engineer Jack Renner tells me he had some problems with this hall, but from the sound he got, I'd say he managed very well. It apparently is a hall more suited for recording (empty) than it is for concert use. The organ in Davies Hall is the same type of Italian Ruffatti instrument on which Virgil Fox played when I recorded him. It is a brilliantly voiced organ having great power and tremendous, 32-foot pedals.

There are two filler pieces on this CD—Franck's "Fantaisie in A" and "Pastorale." There are some stupendous, low-pedal fundamentals around the 20-Hz region in the "Fantaisie," and on equipment that can reproduce them, they are just thrilling.

Michael Murray, who has made some outstanding recordings for Telarc, is the organist, and he brings his usual mastery to the Jongen and Franck works. Edo de Waart is good with this kind of repertoire, but evidently didn't please some people with his handling of the more standard repertoire, and he has since departed the conductorship of the San Francisco Symphony Orchestra. Jack Renner has given us a superb recording, with a splendid balance between organ and orchestra. The balance works well in the hall ambience, giving us plenty of power and good definition.

In summation, an outstanding and exciting CD that will tax the capabilities of even the finest audio system.

Bert Whyte

Neville Marriner

Offenbach: Overtures. The Philharmonia Orchestra, Neville Marriner. **Philips 411 476-2.**

Here we have eight of Offenbach's most familiar overtures, in a blockbuster recording.

Neville Marriner elicits great playing from the Philharmonia Orchestra, and he lovingly polishes these orchestral gems into gleaming, burnished performances. The Offenbach music is infectious, ebullient, and brilliantly scored. One gets caught up in the excitement of "La belle Hélène," "La Périchole," and "La vie parisienne," and delights in the bombastic opening passage of "La Grande-Duchesse de Gérolstein."

The sound on this CD is simply stunning. The digital recording is very big and open, with all orchestral elements well-defined in a spacious perspective. Internal balances are such that a very cohesive sound is produced, offering great power and projection with unfettered dynamic expression. This is a multi-miked recording, but it is most impressive, a model of its kind.

Bert Whyte

Water Music of the Impressionists. Carol Rosenberger, piano. **Delos D/CD 3006.**

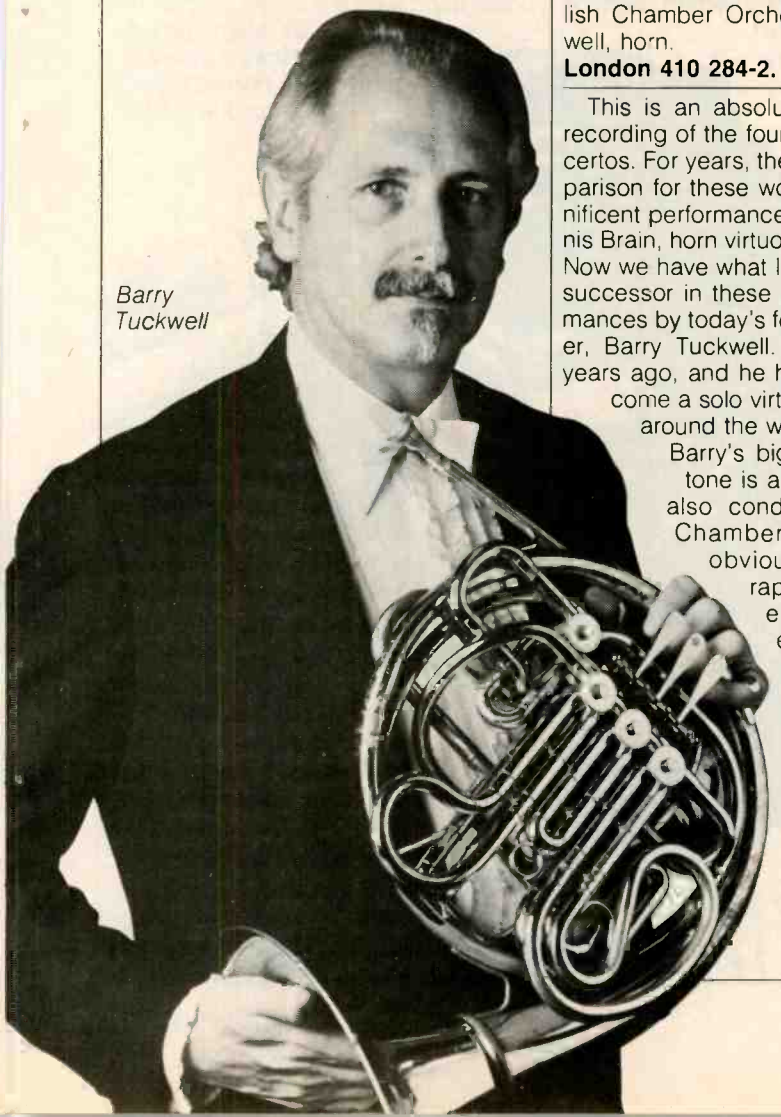
This justly famous recording, which garnered much praise in its original LP edition, is now successfully transferred to CD.

Illustration: Rick Tulka

Interestingly, my old friend Stan Ricker, record-cutter par excellence, was the engineer. Stan used just a pair of B & K 4133 omnidirectional instrumentation mikes, with power supply/preamps designed by another friend and former colleague at Crystal Clear Records, John Meyer.

The piano sound is very clean, sonorous, and highly detailed in a moderately reverberant recording hall. One odd quirk is that the higher registers of the magnificent Bösendorfer Imperial Concert Grand piano display a bit more hall ambience than the middle and lower registers.

Carol Rosenberger plays brilliantly, and expertly uses the extra half-octave bass response of the Bösendorfer to emphasize the sonorous tolling of the bells present in Debussy's "Sunken Cathedral." *Bert Whyte*



Barry Tuckwell

Relaxin': Joe Beck
Digital Music Products CD-444.
(Available from Digital Music Products, Rockefeller Center Station, P.O. Box 2317, New York, N.Y. 10185.)

Relaxin' is a pleasant, innocuous recording with Joe Beck on guitar, Jay Leonhart on acoustic bass, and the well-known Grady Tate on drums. This is another superbly recorded production from Tom Jung and, as usual, a good value with over 56 minutes of music.

As the title indicates, this is relaxin' music, easygoing arrangements of such favorites as "What's New?" "Secret Love," and "Georgia on My Mind." The sound is impeccably clean, and the music is just the thing to accompany cocktail chatter. *Bert Whyte*

Mozart: Concerti for Horn. The English Chamber Orchestra; Barry Tuckwell, horn.
London 410 284-2.

This is an absolutely delightful CD recording of the four Mozart horn concertos. For years, the standard of comparison for these works was the magnificent performances by the late Dennis Brain, horn virtuoso par excellence. Now we have what I consider a worthy successor in these superlative performances by today's foremost horn player, Barry Tuckwell. I recorded Barry years ago, and he has long since become a solo virtuoso, concertizing around the world.

Barry's big, smooth, mellow tone is a joy to the ear. He also conducts the English Chamber Orchestra and obviously has a good rapport with the players, who give him execution of very high order. The sound is superb—nice, clean strings are free of edginess, and Barry's horn is ideally balanced just forward of the orchestra. Wonderful music, great sound—this CD is a gem! *Bert Whyte*

Beethoven: Symphony No. 4. The Berlin Staatskapelle, Otmar Suitner.
Denon 38C37-7077.

This release is one of the best sounding to come along in some time. The notes are in Japanese, but I have been able to get a partial translation. The recording was apparently made with the new Brüel & Kjaer studio-quality, omnidirectional microphones, noted for their low self-noise level and their absolutely flat response across the frequency range.

Recording with omnis in a large, resonant hall is not without its problems, and many listeners will feel that this recording had just a little too much reverberant pickup. This is, of course, a matter of taste, and most listeners can adjust easily, especially when the recording has so much going for it otherwise.

There is not a harsh sound to be heard. The string ensemble is seamless from bottom to top, and the texture is absolutely gorgeous. There are CD critics who claim that digital processes create harshness in string sound; for them, this disc should be a revelation.

Otmar Suitner's performance is just a bit on the slow side, and I, for one, feel that Beethoven would have been better served by a somewhat smaller ensemble.

Highly recommended for its sonic values. *John M. Eargle*

Dream Street: Janet Jackson
A&M CD 4962 DIDX81.

I confess; I approached this one with an attitude on. I mean, I've *heard* La-Toya, but just because your last name is Jackson doesn't mean you're automatically a pop music genius. Well, good news, Janet's okay. She sounds a lot like Michael but with less heft to her voice and less of the incredible expressiveness he picked up during many years of public performance.

The drawbacks of being a late-blooming Jackson are many. The comparisons are inevitable; critics are bound to point out that you're getting attention based on someone else's hard work and success.

One of the huge compensatory advantages, however, is the ability to hire the best in the business to assist you,

Though Janet Jackson does not have an outstanding voice, she handles herself with real sophistication on *Dream Street*.

including members of your own illustrious family. Yep, Michael makes an appearance on this one, but you'll have a hard time hearing him in the mix. He, Tito, Jackie, and Dino Espinosa share backup vocals on "You Don't Stand Another Chance," the hot, funky opening number. Big brother Marlon produced this cut with associate producer John Barnes, and is it ever a winner! The production is sophisticated, with a big, fat drum intro out of clean silence, followed by a funky bass line that enters the phantom center over a background of light, dancing synthesizer accents. Unfortunately, the production is so overwhelming on this one that Janet's vocal, at center midground, isn't completely the star of the song.

Janet makes it to the upfront center spot on the following cut, however, sharing the vocal spotlight with Cliff Richard on "Two to the Power of Love." Perhaps it's Richard's influence, but here she sounds less like a female Michael and more like—dare I say it?—Olivia Newton-John. Anyhow, the synth work sparkles, the tune is quite pretty, and there's a real sense of open aural space. This one is produced by one of the slickest producing teams in the biz, Giorgio Moroder and Pete Bellotte. They lay claim to five cuts on this CD, including "Communication," replete with electronic communications sound effects, and the title tune, with its stereotypical lyrics about a poor girl's struggle to make it in Hollywood. The percussion work on "Dream Street" makes up for its banal lyrics; in fact, the percussion and synth work are outstanding throughout this CD.

Marlon is responsible for producing one other cut, "All My Love to You," which features a brief moment of total silence, a razor-sharp second of empty space cutting through multiple layers of music. Jesse Johnson produced two cuts, "Pretty Boy" (which borrows from Prince but lacks the juice) and "Fast Girls" (a fairly ordinary funk exercise).

This CD has outstanding dynamic range, an excellent sense of spatial presence, and flawless clarity. It is a fairly eclectic collection of songs, and though Janet doesn't have an outstanding voice, she handles herself with some real sophistication. Great production, great arrangements, great sound. *Paulette Weiss*

Mozart: Concertos Nos. 15 and 16. The English Chamber Orchestra, Murray Perahia.
CBS Masterworks MK 37824.

This is an excellent CD of these ingratiating, early Mozart piano concertos. Murray Perahia is the pianist, and his performance is exemplary, both as musician and conductor. He takes a properly light-handed approach to these works, and they are sprightly readings, embellished by his impeccable technique.

The sound is superb; surely this is one of the best sounding CDs I've heard from CBS Records. It is very clean, with precise, accurate transient attack on the piano. The string sound is blessedly free of edginess. The piano is balanced nicely, just forward of the orchestra, and the acoustic perspective affords a pleasing spaciousness along with finely etched detail. A delightful, tuneful recording in every respect. *Bert Whyte*

Saint-Saëns: Symphony No. 3, "Organ." The Baltimore Symphony Orchestra, Sergiu Comissiona; Frederick Minger, organ.
Vanguard K38Y-17.

This popular work is now available on Compact Disc in at least three different recordings.

The Vanguard recording was engineered by two friends of mine, John Newton and Jeff Zoraya, and by no less than two other engineers. I personally do not endorse this practice of engineering by committee. When I record, I fly solo—or I don't record at all. Perhaps this multiple engineering is responsible for the not-altogether satisfactory sound. I have been in the National Presbyterian Church in Washington, D.C., where this piece was recorded. It is not an easy venue, but it has a big Aeolian-Skinner organ, and I can't understand why the organ part of this symphony is as attenuated as it is. I know Newton and Zoraya know how to properly record an organ.

Janet Jackson

Carol Rosenberger is a formidable talent, and her performance of these Beethoven piano sonatas is powerful and intense.


Carol Rosenberger

Anyway, conductor Comissiona and the Baltimore Symphony furnish a spirited and well-paced performance, with an especially rousing finale. But this is where the organ should make a grandiose sound, and such is not the case. Too bad! *Bert Whyte*

Beethoven: Sonata No. 23 in F Minor for Piano, Op. 57 ("Appassionata"), Sonata No. 32 in C for Piano, Op. 111. Carol Rosenberger, piano.
Delos D/CD 3009.

This Delos recording of two of Beethoven's most popular piano sonatas was engineered by my old friend and master record-cutter, Stan Ricker.

Knowing that pianist Carol Rosenberger would be playing a Bösendorfer Imperial Concert Grand with its extra half-octave of bass (response down to 16 Hz!), Stan opted to use Brüel & Kjaer 4134 mikes, and special, low-noise preamps built by John Meyer. Stan fed just a stereo pair of the mikes into a Studer 169 console, and thence to the Soundstream digital recorder. Among the reasons for using these B & K mikes is their ultralow frequency response—almost flat at 2 Hz—and their ability to accept SPL of up to 160 dB!

I warn you, the piano transients on this CD are tremendous. To play the crushing, triple-fortissimo bass and midrange chords on this recording requires a brute speaker system and amplifier. My new B & W monitors driven by Krell KMA-200 (200-watt) Class-A amplifiers were equal to the task, and the sonority of the sound was simply awesome.

Stan has recorded the piano relatively close-up, but the nice, warm ambience of the hall he used affords a very natural piano sound. Carol Rosenberger is a formidable talent, and her performances of these works are powerful and intense, with lots of drama and expressiveness, yet with due regard for the lyrical qualities of these great Beethoven piano sonatas.

A splendid large-scale recording, meant to be played on a large-scale audio system. *Bert Whyte*

Debussy: La Mer; Nocturnes. The Philharmonia Orchestra, Michael Tilson Thomas.
CBS Masterworks MK 37832.

Michael Tilson Thomas turns in a really splendid performance of "La Mer," aided and abetted by some of the best sound I've ever heard from a CBS CD. Admittedly, this is the Philharmonia Orchestra, recorded in London with, once again, an EMI balance engineer at the console. It matters little—Thomas paints a very evocative picture of the sea, and his storm is almost of hurricane intensity. Oddly, his performance of "Nocturnes" is less persuasive, and one could also say that the sound quality is not as good as on "La Mer." In "La Mer" we have nice, clean, high strings. Even though we must presume that "Nocturnes" was recorded at the same session, here the high strings are edgy.

"La Mer" is really a sonic tour de force. The dynamic range is exceptionally wide and, on B & W 808 speakers, the sound has extraordinary impact. *Bert Whyte*


Varujan Kojian

Liszt: Symphony No. 2, "Dante." The Utah Symphony Orchestra, Varujan Kojian.
Varèse Sarabande Digital VCD-47207.

On this CD, the rarely performed *Dante Symphony* of Liszt is conducted by Varujan Kojian. His Utah Symphony Orchestra was recorded in the splendid acoustics of their new hall.

Bruce Leek, the engineer who did such a fine job on the *Star Wars* trilogy I reviewed some months ago, was also the engineer for this recording. Apparently, he used approximately the same mike setup as in the trilogy. While the sound is generally quite good, for some reason (possibly the scoring) it just doesn't have the exemplary qualities he achieved in the *Star Wars* recording. I had a feeling that the sound was a little compressed in places, and some internal balances just weren't right. Perhaps it is my reaction to the music. This is Liszt at his most fustian—probably the reason for this symphony's infrequent performance. *Bert Whyte*

Ravel, Chausson: Piano Trios. Beaux Arts Trio.
Philips 411 141-2.

Pianist Menahem Pressler, violinist Isidore Cohen, and cellist Bernard Greenhouse are the superb musicians who make up the famous Beaux Arts Trio.

This trio has been concertizing together for many years. In this digital recording of the Ravel and Chausson piano trios, their rapport is evident in the finely wrought performances. Their playing is elegant, refined, yet highly musical and expressive. The Philips

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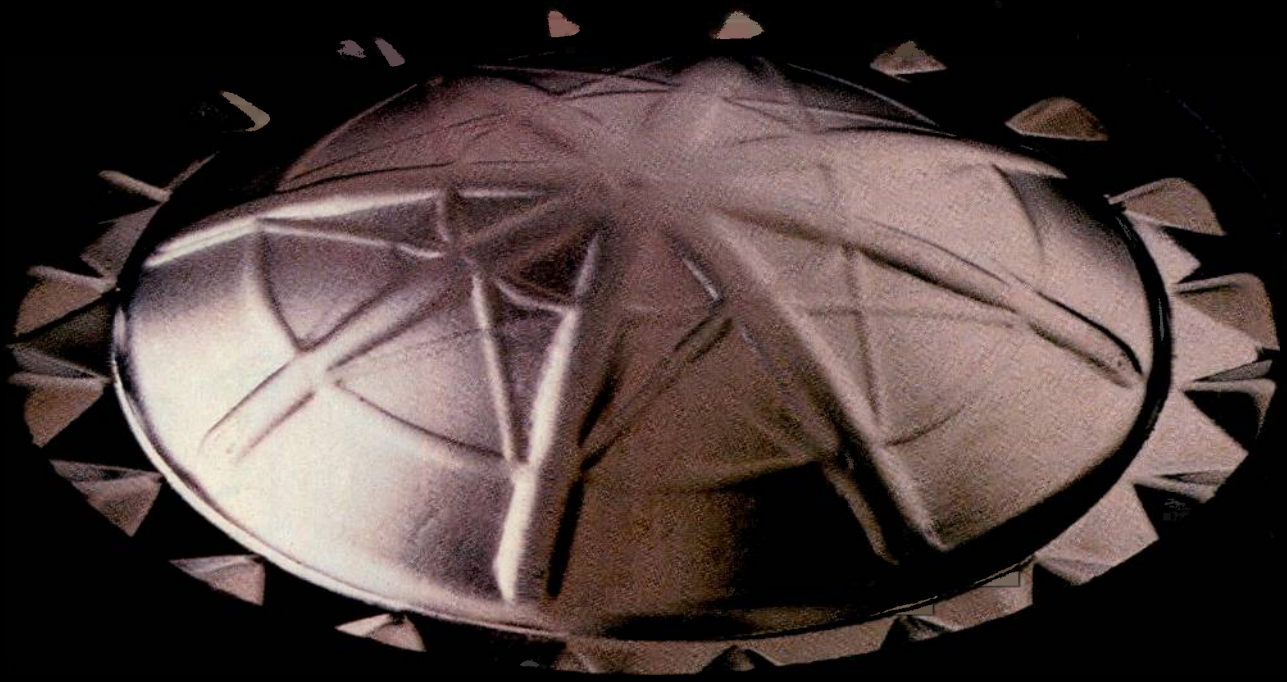

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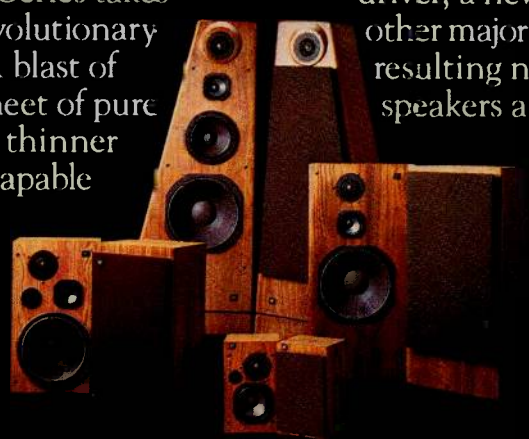

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Beaux Arts Trio

The Beaux Arts Trio's rapport is evident in this finely-wrought recording of the Ravel and Chausson piano trios.

engineers have given the trio an outstanding recording. The perspective is moderately close-up in a nice, warm (but not overly reverberant) ambience. Balances among piano, violin, and cello are near ideal. All is very clean and highly detailed, and the Beaux Arts Trio makes a ravishingly beautiful sound. The dynamic compass of the piano is tremendous; you'll need gobs of power to realistically reproduce its massive sonorities. This CD must be regarded as one of the best chamber music recordings I've heard in some time. *Bert Whyte*

Time Warp. The Cincinnati Pops Orchestra, Erich Kunzel.
Telarc CD-80106.

If ever there was a sonic blockbuster, this CD is it! Which is exactly the intention Telarc had when recording this collection of space movie music. Their purpose was to explore the outer reaches of dynamic range and create some special sonic effects of crushing sonority. Producer Bob Woods has stated that *Time Warp* has the "hottest levels" since their memorable "1812 Overture" recording!

Synthesizer artist Don Dorsey composed a special work, "Ascent," to open the recording, and it quite literally opens with a bang. (If your initial volume setting is too high, you may be sorry!) This segues into the ubiquitous introduction to "Also sprach Zarathustra." Then it is on to excerpts from *Star Trek*, *Battlestar Galactica*, *Superman*, *Star Wars*, and *Alien*. Next are "Blue Danube" and the "Gayne" adagio from *2001: A Space Odyssey*, then, another blast of "Zarathustra."

There are great brass fanfares here and brilliant cymbal clashes and huge fortissimo bass drum whumps of awesome impact. The *Battlestar Galactica* sequence opens with a crushing orchestral chord with tremendous bass drum strokes. When some people visited, I had cued the CD to this passage, setting the gain controls for a very hefty level. When I started the CD, the blast of sound damn near made my friends jump out of their skin! All of this sonic furor is utterly clean, and while the music isn't of great moment, it is exciting and great fun. *Bert Whyte*

Bartók: Music for Strings, Percussion and Celesta. The Tokyo Metropolitan Symphony Orchestra, Moshe Atzmon.
Denon 38C37-7122.

Bartók's angular writing is very apparent in his famous "Music for Strings, Percussion and Celesta," and less so in his "Roumanian Folk Dances." These two works are given a good, if not particularly exciting, performance by Moshe Atzmon conducting the Tokyo Metropolitan Symphony Orchestra.

The pieces were recorded using 11 Schoeps, four Shure and four AKG mikes in the acoustically attractive Narashino Bunka Hall. There is some spotlighting of instruments, but this is a well-balanced, very clean sound. Strings are fairly smooth, and the transient response on the percussion instruments is sharp and accurate. The recording is good enough to warrant more Bartók CDs from Denon.

Bert Whyte

Mahler: Das Lied von der Erde. The Berlin Philharmonic, Carlo Maria Giulini; Brigitte Fassbaender, contralto; Francisco Araiza, tenor.
Deutsche Grammophon 413 459-2 GH.

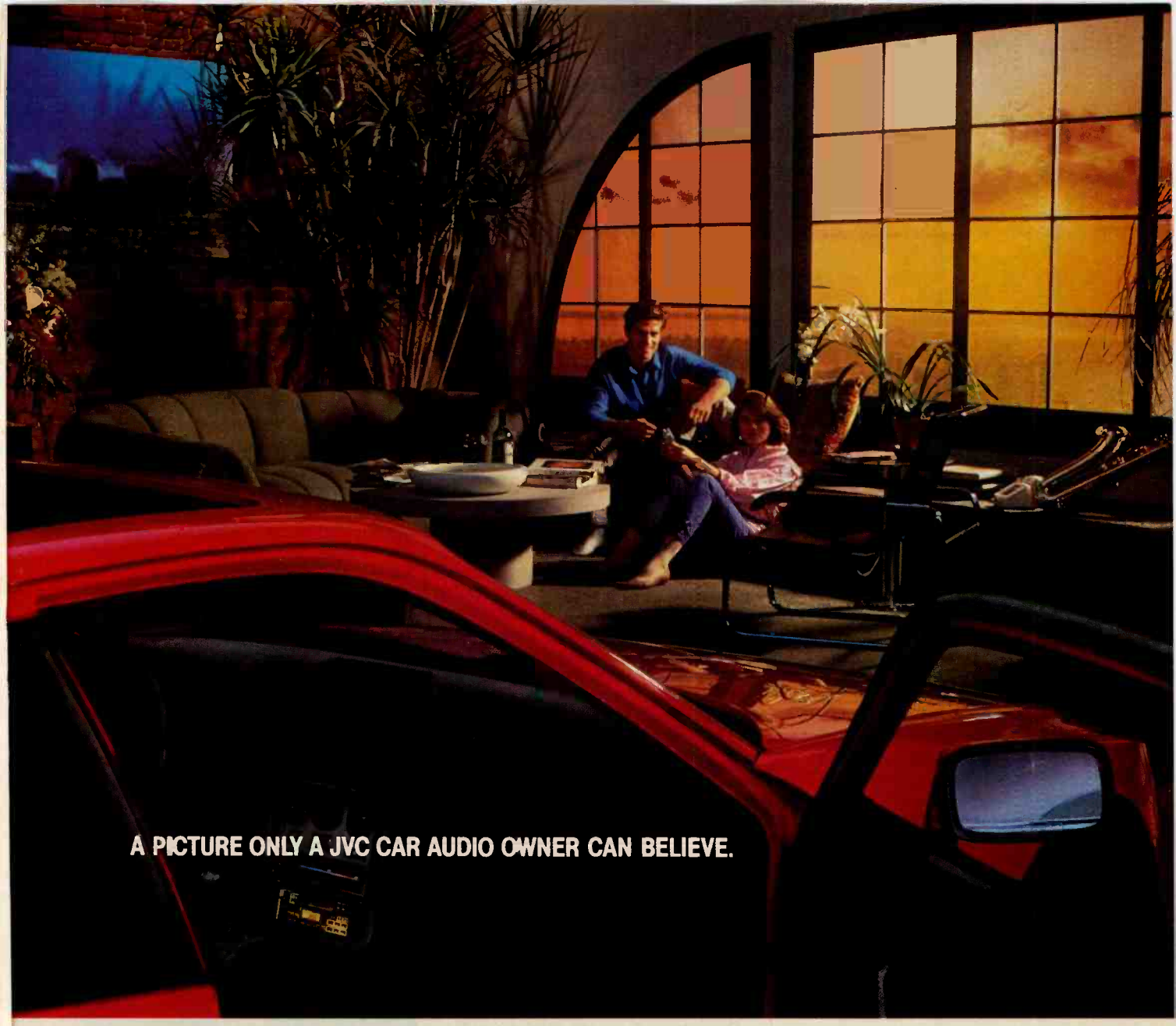
This DGG recording of Mahler's *Das Lied von der Erde* (Song of the Earth) has a number of flaws, but, in general, is so good that it overcomes the deficiencies.

In the first song, "Das Trinklied," tenor Araiza seems too submerged in the orchestral sound. At the same time, his voice and the high strings sound both shrill and compressed. Oddly, after this problem-ridden opening, the sound blossoms, becoming more open and transparent, with Fassbaender making some lovely sounds. Her performance of "Der Abschied" (The Farewell) is simply beautiful and very heartfelt. The music accompanying her in this movement has wonderful sonic presence, is highly detailed, and has some supercharged sonorities. Giulini's conducting is masterful, and if you are not moved by the otherworldly beauty of this music, there is no hope for you. *Bert Whyte*


Carlo Maria Giulini


Brigitte Fassbaender


Francisco Araiza



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This CD of rarely heard works, performed by the Scarborough Chamber Players, is a real delight.

Works of Spohr, Villa-Lobos, Starer, Roussel, and Blank. The Scarborough Chamber Players.
Centaur CRC 2016. (Available from Centaur Records, P.O. Box 23764, Baton Rouge, La. 70893.)

This CD is a real delight, presenting an interesting collection of rarely heard works for soprano with chamber resources as simple as piano, flute, bassoon and clarinet. Selections include Spohr's "Six German Songs," Villa-Lobos' "Bachianas Brasilieras No. 6," Starer's "Songs of Youth and Age," Roussel's "Two Poems of Ronsard," and Blank's "Four Poems on Texts by Emily Dickinson."

Performances are excellent, and the recording approach is simple and direct. Texts are included in the notes.

John M. Eargle

Berlioz: Symphonie Fantastique. The Tokyo Metropolitan Symphony Orchestra, Jean Fouret.
Denon 38C37-7087.

This CD version of Berlioz's *Symphonie Fantastique*, with a minor league ensemble, The Tokyo Metropolitan Symphony Orchestra, conducted by the relatively obscure Jean Fouret, faces very tough competition from several other Compact Discs of this work, most especially from Telarc's superb recording by Lorin Maazel with the Cleveland Orchestra.

The playing of the Tokyo Metropolitan Symphony Orchestra is fairly good—nice ensemble work in the strings, and fine brass playing too. The dialog between the English Horn and oboe in the beginning of the third movement, "Scene in the Country," is particularly well done. Fouret gives a fairly straightforward performance, but it lacks momentum and drags a bit. He is slower than Maazel in the "March to the Gallows" and the "Witches' Sabbath," and doesn't generate as much excitement. Fouret conducts the work in 50 minutes flat, to Maazel's 48:34.

Sonic values are variable. The acoustics of the Sayama-shi Public Hall in Tokyo, where the work was recorded, are really good—warm, spacious, with a decay time around 1.9 to 2.2 seconds. Multi-miking was used, and while the sound is highly detailed, this technique negates some of the advantages of the fine acoustics. Up to mezzoforte level, first and second violins have a nice clean sound; above that level, they get quite shrill. There is a huge bass drum, very solid in impact, which I'm afraid is used a bit too enthusiastically in the last two movements. Dynamic range is quite wide and there are some other good points—but it falls short on both musical and sonic values as compared to the Telarc recording.

Bert Whyte

Mahler: Symphony No. 4. The Chicago Symphony Orchestra, James Levine; Judith Blegen, soprano.
RCA RCD1-0895.

As a confirmed Mahler junkie, I eagerly look forward to all Mahler recordings that appear on CD.

This glorious Fourth Symphony has much going for it, not the least of which is the great playing of the mighty Chicago Symphony Orchestra. Such stunning execution, coupled with such rich tonal resources! Levine's performance is quite good, if a bit mannered at times. However, he gives an exceptionally expressive and emotionally wrenching performance of the great third movement, "Ruhevoll."

The recording, dating from 1975, was made in Medinah Temple in Chicago. The engineer was Paul Goodman, a former colleague of mine at RCA Records. I can assure you that Paul is a fine, perceptive recording engineer. However, he is subject to the ideas and directions of producers—which in this recording means multi-miking with a vengeance. I'm fairly certain a 16-channel recorder (analog in those days, of course) was used.

Paul establishes a nice overall balance in the reverberant acoustics of Medinah Temple, and the sound certainly is clean, with lots of impact and sonority. Alas, throughout the recording, Paul's good sound is marred by ridiculous spotlighting that grotesquely bloats individual instruments, making them acoustically bigger than the whole orchestra. About a third of the way through the first movement, there is an entrance for solo first violin (the concertmaster) that is ludicrous—so spotlighted and so close-up it swamps the rest of the orchestra! The multi-miking allows the producers to dot every "i" and cross every "t" in the score, but it carries with it the perils of exaggerated perspective and a diminution of depth. Too bad! It is a shame Paul Goodman's basically nice sound must be so subverted.

Bert Whyte


James Levine

Elgar Overtures: In the South; Froissart; Cockaigne. Handel: Overture in D Minor. The Scottish National Orchestra, Sir Alexander Gibson.
Chandos CHAN 8309.

In this welcome release, Sir Alexander leads his orchestra through fine and characteristic readings of these delightful works of Elgar. The production team has opted for sound rich in room ambience and with just a modicum of spot miking. Generally the sound is excellent, but you may want to roll off the treble just a bit. The bottom end can be awesome. In "Cockaigne," the performance includes the

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Some of the instruments in this version of Handel's *Water Music* sound smooth and natural, but others have a surprising edge.

optional pipe organ part in the final measures. The 32-foot open diapason is quite in evidence, and there are some fundamentals which reach down into the 27-Hz range. If you have a subwoofer, you'll be delighted with all of this. *John M. Eargle*

Handel: Water Music. La Grande Écurie & la Chambre du Roy, Jean-Claude Malgoire.
CBS Masterworks MK 39066.

Here is another Baroque ensemble, La Grande Écurie & la Chambre du Roy, with a recording devoted entirely to Handel's *Water Music*.

This French group was recorded in Notre Dame in Paris. The liner notes state that a Sony digital recorder was used and that the mikes were Schoeps. Original instruments of the period are used, and while some of them sound quite smooth and natural, others have a surprising edginess and harshness, not necessarily attributable to the imagined sins of digital recording. The French horns are particularly annoying. Instead of the noble, mellow tone with which we are all familiar, these horns sound hoarse and guttural, with a blatty quality. The reverb period of the church must be about 3 S, so the mikes used probably had cardioid patterns. There is plenty of air around the instruments, but the sound still has too much brilliance and fatigues the listener's ear. *Bert Whyte*

Canteloube: Chants D'Auvergne, Vol. 2; Villa-Lobos: Bachianas Brasileiras No. 5. The English Chamber Orchestra, Jeffrey Tate; Kiri Te Kanawa, soprano.
London 411 730-2.

Some time ago, I reviewed, most favorably, a CBS CD of Canteloube's "Chants D'Auvergne" sung by Frederica von Stade. Now we have this new version on London, featuring the luscious, lovely voice of Dame Kiri Te Kanawa. Dame Kiri's voice and the expressiveness with which she uses it are altogether remarkable. Her voice is clear, clean, and limpid, a refulgent example of the magnificent sounds that can be produced by a great singer. Dame Kiri's performance of these lovely works is richly expressive,

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Kiri Te Kanawa's voice, and the expressiveness with which she uses it, are remarkable on this really lovely CD of Canteloube and Villa-Lobos.

Kiri Te Kanawa

lighter textured than Frederica von Stade's. Her French diction is better and the words more articulate.

This CD was splendidly engineered by John Dunkerley. Dame Kiri's voice is projected in front of the orchestra, but not too prominently. The orchestral accompaniment is exceptionally clean and well-balanced in a moderately spacious acoustic environment. (The jacket booklet doesn't say, but I presume the recording venue was Kingsway Hall in London.)

An attractive filler on this Compact Disc is Villa-Lobos' "Bachianas Brasileiras No. 5," a composition for soprano and cello, with well-known cellist Lynn Harrell furnishing a smoothly played, tuneful accompaniment.

If you are an aficionado of "Chants D'Auvergne," you'll probably want to own both this and the von Stade CD. Faced with a choice, I'd opt for this really lovely recording. *Bert Whyte*

Popular Masterworks of the Baroque: Tafelmusik
Reference Recordings RR-13 CD.

Tafelmusik is a Canadian Baroque orchestra which uses, as often as possible, original-period instruments. For example, musical director Jean Lamon's violin dates from 1610!

This was originally an analog recording made with the special, focused-gap magnetic tape recorder of the redoubtable Keith Johnson. It was recorded for Tam Henderson's Reference Recording label, and was very highly regarded on the original vinyl LP release. The CD transfer has been very well done, and while a moderate amount of tape hiss is evident (as in the LP), at least there is no impulse or surface noise to contend with.

The program offers Handel excerpts, including parts of "Water Music," the lovely Pachelbel canon and gigue with richly sonorous cello, J. S. Bach's "Air" from his orchestral suite No. 3, some Vivaldi and Telemann, and Henry Purcell's big, noble theme which was used by Benjamin Britten in his famous "Young Person's Guide to the Orchestra."

The sound is just lovely—some of the most musical and natural strings on record, with equally mellifluous oboe and bassoon. All of this is presented in a very warm acoustic ambience, with good stage width, exceptional depth, and precise and stable image localization. The sonics are very wide-range and smooth yet afford good, clean definition on all instruments. This is a very fine reference recording for string-tone quality. *Bert Whyte*

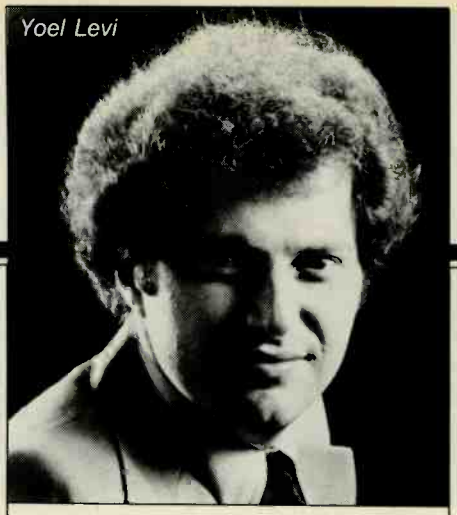
J. S. Bach: Toccata and Fugue. The historic organ of Saint-Maxim-en-Provence, Pierre Bardon.
disques Pierre Verany PV 710811.

This is another in the series of historic-organ recordings issued by a French label, Pierre Verany.

The organ is the centuries-old instrument in Saint-Maxim-en-Provence. The liner notes give an amusing account of the problems encountered in recording such an organ. It is stated rather blithely that after more than two centuries "the organ is a bit tired." The keys must be depressed with considerable force; sometimes they stick and must be pulled up. The stops are difficult to draw and return—valves stick open, the wind chests leak. The organ sounds best at night in the winter; accordingly, this recording was made with the unheated interior of the church freezing cold!

The reverb period of this old church is about 3.5 to 3.75 S, and the organist, Pierre Bardon, had to adjust his tem-

Yoel Levi has a lot going for him, including the talents of the great Cleveland Orchestra, which has performed Sibelius many times.


Yoel Levi

pos accordingly. The sound is clean enough and well balanced against the acoustics, but it is very bright and can be too aggressive, with little extra pedal foundation. The program, some of J. S. Bach's most popular organ works, is well played considering the difficulties of execution. Certainly this is not the type of organ recording for sound buffs, but it is of interest to those who collect the sounds of historic organs.

Bert Whyte

Sibelius: Symphony No. 2, Finlandia. The Cleveland Orchestra, Yoel Levi.
Telarc CD-80095.

The Sibelius Second Symphony is deservedly one of the most popular works in all of the symphonic literature. There is hardly a name conductor who hasn't recorded this work, so it might seem that a relative newcomer like Yoel Levi wouldn't have much of a chance to distinguish himself.

Nonetheless, Levi has a lot going for him. First is his innate talent, which he displayed so vividly in his exciting Telarc recording of Prokofiev's "Romeo and Juliet." Second, he is at the helm of the great Cleveland Orchestra, which has performed the Sibelius Second Symphony many, many times under the batons of such great conductors as Artur Rodzinski, George Szell and Lorin Maazel. Finally, and of great importance, is that Levi has the benefits of superb Telarc recording.

Jack Renner used Masonic Auditorium in Cleveland, a hall he knows intimately, for this recording. Employing his usual spaced-array of omnidirectional Schoeps microphones, Jack has achieved both the massive weight and sonority required for this work, as well as the highly detailed inner balances. A good example is the completely articulate and tonally accurate pizzicato strings in the opening bars of the second movement. The overall sound is very clean, with great presence, and is superbly balanced with the warm acoustics of the hall. The triumphant finale, with its massive brass fanfares, is a blaze of orchestral color. Dynamic range is very wide on this Compact Disc, and if you have the right equipment, the triple fortissimos will stun you with their power.

Levi turns in a performance that is certainly the equal of, and better than, some of his contemporaries. Tempos are a shade on the fast side, but he makes it work. His "Finlandia," the filler on this CD, is equally stirring and exciting. Great music, great sound—this is what a good CD is all about.

Bert Whyte

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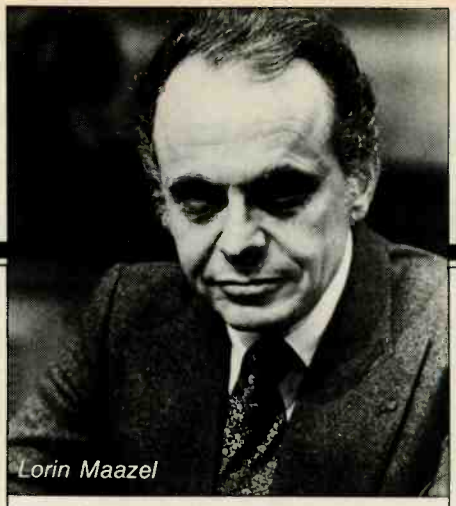
The performance of the *Symphonie Fantastique* led by Lorin Maazel may not be the most inspired, but neither is it dull.


Lorin Maazel

Berlioz: Symphonie Fantastique. The Cleveland Orchestra, Lorin Maazel. **Telarc CD-80076.**

Herewith, a recording that is a tour de force for overall balances, inner detail, acoustic perspective, and wide dynamic range.

The *Symphonie Fantastique* has always been a favorite vehicle to show off recording skills, and Telarc has gone to extreme lengths to impress us. For example, the bells, which contribute so highly to the orgiastic "Witches' Sabbath" final movement, are usually produced by tubular "orchestral bells" which are part of the normal percussion battery. Telarc ran remote lines from Severance Hall, the main recording locale, to McGaffin Carillon, a quarter of a mile away. The principal percussionist of the Cleveland Orchestra situated himself in the carillon tower and activated two large, separately miked bells on cue. Thus, the bells were recorded in real time with the rest of the music. In the recording, there is no doubt as to the authenticity of their clangor!

While the "March to the Gallows" and the "Witches' Sabbath" are mighty impressive in the sheer weight and tremendous impact of their sound, I am even more impressed by the sound and the expressive playing of the first, second and especially the third ("Scene in the Country") movements. Here the Cleveland Orchestra gives us playing of exquisite refinement and élan.

Some people have stated that they feel Lorin Maazel's performance of this work is dull. I would not say this is the most inspired reading I have ever heard, but dull it most certainly is not. In any case, between the superlative sound and the ravishing playing, this version makes a very strong statement for itself. *Bert Whyte*

Modern Jazz Performances of Songs from *My Fair Lady*: Shelly Manne and His Friends **Mobile Fidelity Sound Lab MFCD 809.**

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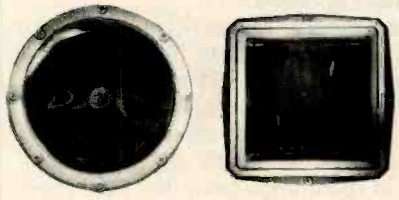

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These eight selections from *My Fair Lady* sound as fresh and vibrant today as they did when first recorded, in 1956.

musical by Alan Jay Lerner and Frederick Loewe. Second, it carries forth what was almost three decades ago considered "modern" jazz tradition—taking popular standards and reworking them with a measure of free-form improvisation. I'm happy to report that this little baguette has lost none of its glitter. The material sounds as fresh and vibrant today as it did when it was first recorded in 1956.

These eight selections from the brilliant Broadway hit are sparklingly interpreted by a trio consisting of Shelly Manne on drums, André Previn on piano, and Leroy Vinnegar on bass. Although drummer Manne is the nominal star of this session, Previn's piano takes command in these delightful, swinging interpretations. Whether producing cascades of glistening notes, as in the "Ascot Gavotte," or ruminating tenderly on the keys, as in the introduction to "On the Street Where You Live," Previn is utterly in control of his instrument. Manne and Vinnegar do a splendid job of maintaining the rhythm and mood of each selection, and throw in some intriguing solo work of their own. Some of these versions work against the originals in a way that cuts a new facet into the song, enriching it with unexpected dimensions. Two cases in point are the restrained, delicate treatment of the Broadway-rowdy "With a Little Bit of Luck" and the sassy-but-cool, jazzed-up sound of "Show Me," originally a rather strident list of demands issuing from the mouth of Julie Andrews.

Technically, this is not a showpiece CD, although Mobile Fidelity Sound Lab has done an extraordinary job of cleaning up this dusty little work of art. All instruments are rooted in position throughout the album, as was customary in recordings from the '50s. Previn's piano dominates the phantom center, while Manne and Vinnegar are aurally shunted off to the right and a bit too far back for perfect balance. There is a slight flatness to the sound that cannot be corrected by modern technical means, and some of the original tape hiss is apparent on these cuts between the lovely digital silences that separate each band. However, in comparison with an analog of the period, the sound is vastly improved. The original annoying (and plentiful) surface noise is eliminated (as are the scratches on my well-played LP), and a good deal of distortion has been corrected as well. Mobile Fidelity went back to the original master tapes of this 1956 recording session and reworked them for top-notch sonic accuracy, which was not present in the original analog release.

Give your ears a rest from oversynthesized and heavily orchestrated modern baubles. This bright, witty, intelligent acoustic gem asks the musical question, "Wouldn't It Be Loverly," and the answer is a firm, "Yes, it would." *Paulette Weiss*

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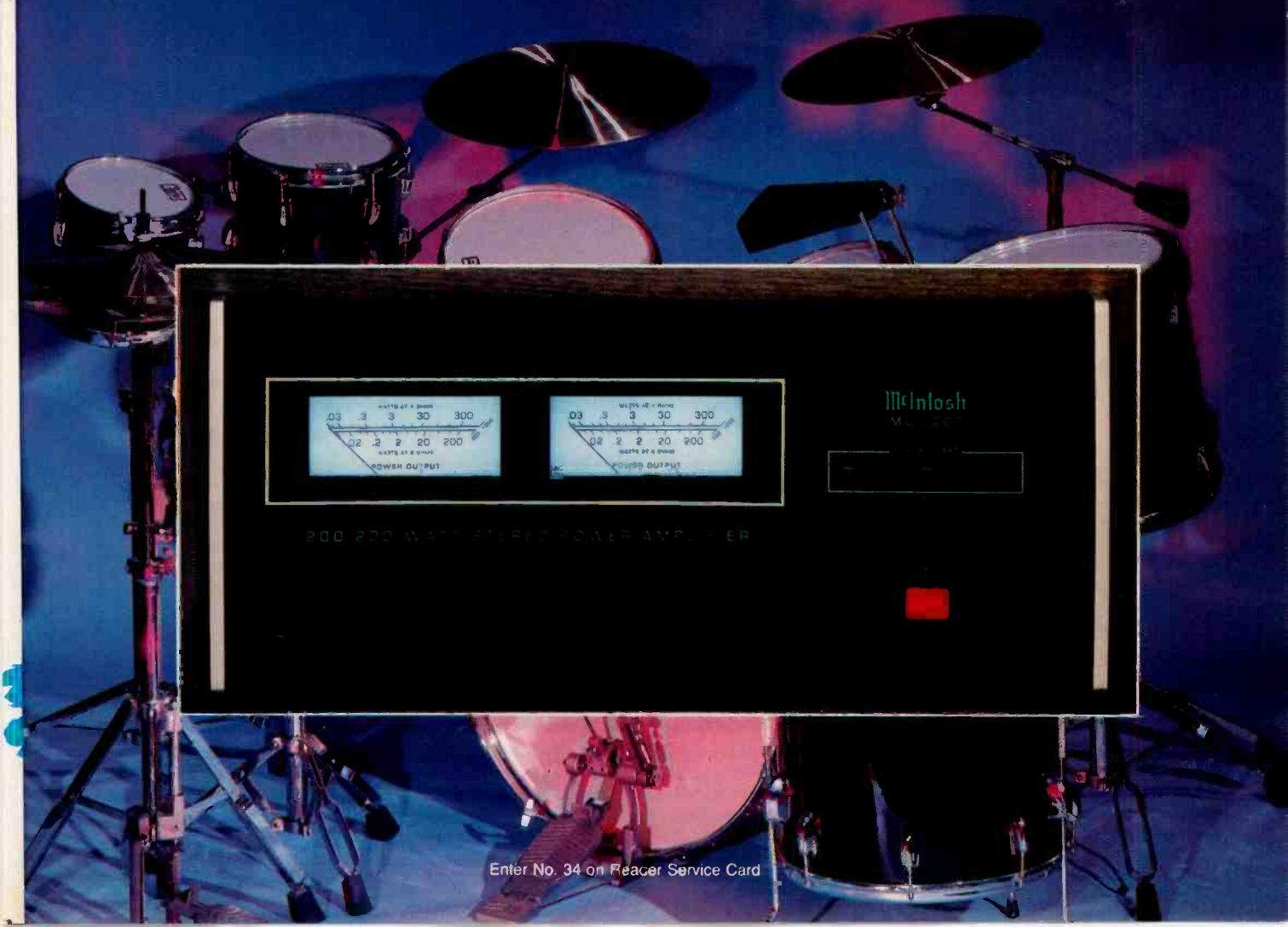

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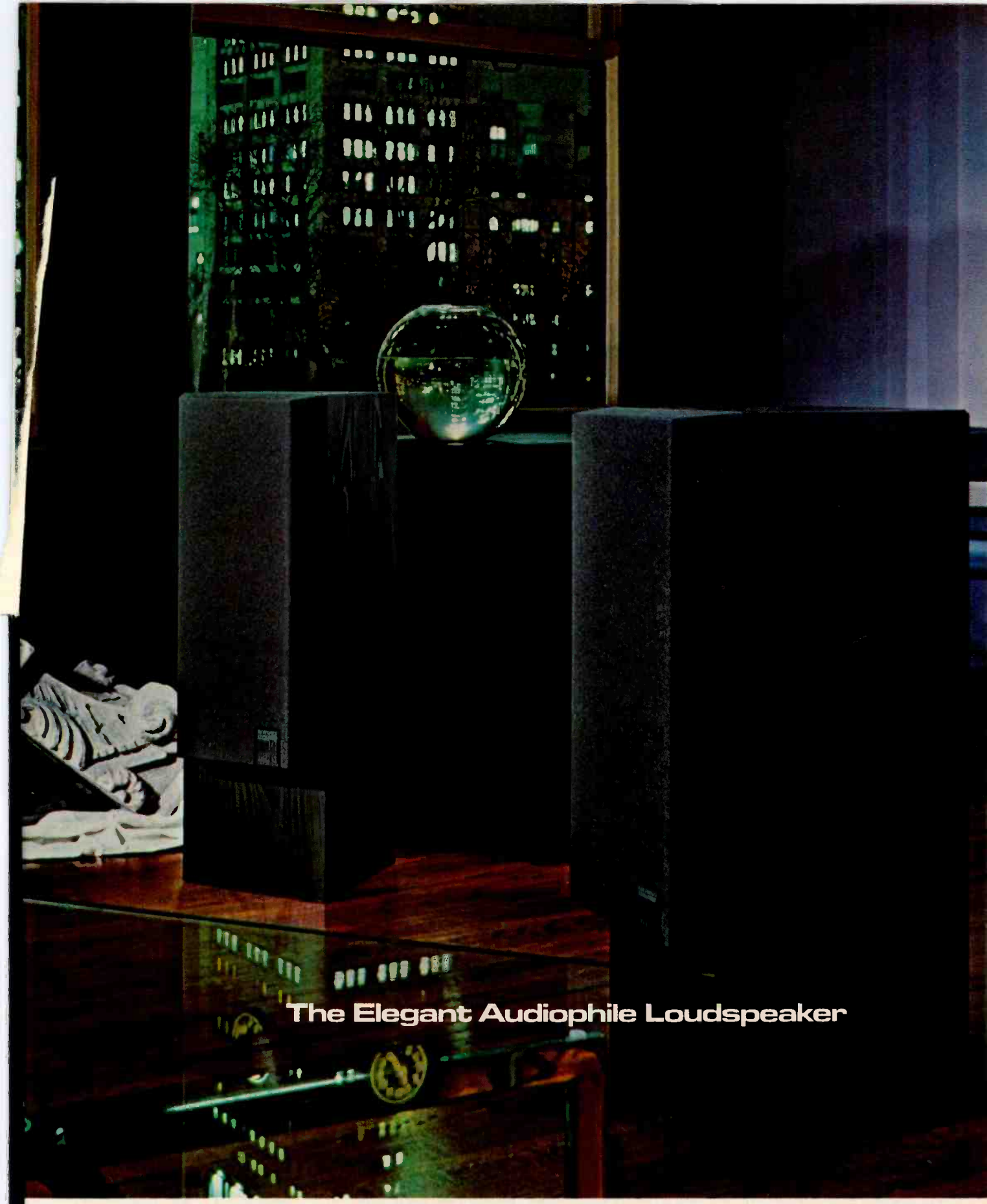

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MICHAEL TEARSON
JON & SALLY TIVEN

SPLIT LEVELS

Across a Crowded Room: Richard Thompson
Polydor 825 421-1 Y-1, $8.98.

Sound: B– Performance: A–

One Clear Moment: Linda Thompson
Warner Bros. 25164-1, $8.98.

Sound: B– Performance: B

For years now, critics like the Tivens and I have been falling all over ourselves raving about Richard and Linda Thompson and their wonderful records. They met during the recording of *Henry the Human Fly*, Richard's first solo album after leaving Fairport Convention, a group he helped found. They married and made a long series of superb records featuring Richard's uncompromising, somewhat autobiographical songwriting and his distinctive, nerve-tingling guitar playing, which owes a lot to traditional British folk music and the modality and sound of pipes.

At length the marriage fell apart, and each has tried to purge some of the pain through songwriting. Richard dealt with the split somewhat on *Hand of Kindness*, his previous album, but he really digs in here. Linda had never really written songs before—she was content to sing Richard's—but with the encouragement of friends she has opened up about her side of the split on her debut solo album.

Richard's album, *Across a Crowded Room,* is his most energetic ever. The playing is tart and bracing and sure. The songs contain a lot of bitterness, as suggested by titles like "She Twists the Knife Again," "Walking Through a Wasted Land," "Ghosts in the Wind," "I Ain't Gonna Drag My Feet No More," and "Love in a Faithless Land." Several, including "She Twists the Knife Again," "Ain't Gonna Drag," and "Fire in the Engine Room," are very fast-paced, while others, such as "When the Spell Is Broken," "Ghosts in the Wind," and "Love in a Faithless Country," are as morosely downbeat as anything he has ever written. Richard Thompson, a man who professes a love for gloom and doom in his music, has written some of the bleakest songs ever for this album.

The band includes two fellow Fairport alumni, guitarist Simon Nicol and drummer Dave Mattacks; bassist Bruce Lynch completes the roster. Fairport's original producer and manager Joe Boyd is producer here too, and he has overseen a subtle, difficult album to fruition. If Richard's new label, Polydor, exerted pressure to sweeten or commercialize his music, it was as fully resisted as it ever was when the Thompsons were a duo.

Across a Crowded Room is a harshly honest album that may well not find commercial success of the precious-metal variety, but it has some of the most real, most painful music I've heard in a long time.

By the way, Richard has remarried and personally is quite genial these days. The only gloom and doom in his life is in his music, and as I've noted, it has always been there.

Linda's album, *One Clear Moment*, has a lighter feel than Richard's, and it is more optimistic in tone, as you might gather from titles like "Can't Stop the Girl," "In Love with the Flame," "Best of Friends," and "Just Enough to Keep Me Hanging On." She has purposely used musicians she had not worked with while recording with Richard. Among the principals are guitarists Jerry Donahue and Albert Lee, and her close friend, keyboardist, and musical director Betsy Cook, who is married to the album's producer, Hugh Murphy.

Her album may be more straightahead than Richard's, but it is no less honest. Her voice still has the sharp edge it held on Richard's songs, but picking up the pieces of her life has allowed her more warmth than she has had on record in a long time. She is really at her best in the simplest settings, notably in the live recording of "Only a Boy." *One Clear Moment* isn't

Illustrations: Rick Tulka

nearly as scary an album as *Across a Crowded Room,* but it is nearly as good and probably equally doomed to obscurity despite the critical raves.

The two albums have similar recording quality, with Linda's being a bit smoother than Richard's, but the difference is merely a matter of style. Neither relies on tricks to put across the music. The songs are the most important elements, and that is the only way I can imagine these artists wanting it.

Michael Tearson

Whoopi Goldberg: Original Broadway Show Recording
Geffen GHS 24065, $8.98.

Sound: C+ Performance: Her own

Whoopi Goldberg is not for everybody. The one-woman show done by this black woman in her mid-30s is a series of monologs delivered by a variety of characters she becomes.

The most difficult one covers all of side one. This is the junkie/thief Fontaine. He (yes, *he*) is a profane S.O.B. who tells about how he survives and about some of his adventures, specifically his hustling of a plane ticket to Amsterdam, his encounter with airplane food ("I didn't see nothing I recognized"), his first trip to a legal hash shop where he's struck by the idea that the police can have it, too, and, at length, his visit to the house where Anne Frank was hidden in World War II. There, Frank's belief in the good in all people, despite the circumstances of her own life, somehow gets through to the bitter and cynical junkie.

On side two we meet Surfer Chick, who, talking perfect Valley Girl, tells about the abortion she gave herself with a coat hanger. She confesses that despite the permanent damage, it's not so bad because her whole life is still in front of her (she will not turn 14 for a month yet). Next, Crippled Lady goes on about how she revels in the horror she knows she inflicts on the "normals." Finally comes Little Girl, a seven-year-old who wears a big white shirt on her head as she patters on about her beautiful blond hair and how all she wants to be when she grows up is white and pretty.

Each character has a special brand of innocence and joy that belies the awfulness of their situation. Goldberg's special gift lies in making the audience care about these people, whom they would cross the street to shun in real life; she makes them lovable too.

Since it only has to deal with one woman and the audience, the recording is very simple. The feeling of live performance is the album's strength.

Nobody else is doing what Whoopi Goldberg is doing. I'm not sure anybody else could. Difficult as much of it may be to absorb, this is an extraordinary recording debut. *Michael Tearson*

Hard Line: The Blasters
Warner Bros./Slash 25093-1, $8.98.

Sound: B Performance: A

Hard Line, The Blasters' third album on Slash, is the most assured work they have done yet. Real confidence oozes from the very first moment, all the way through.

Hard Line is also the most diverse album they have done, and that is something that gives full berth and real meaning to the "American Music" label that the band puts on its sound. Their

Whoopi Goldberg

The Blasters

music is a celebration of a lot of different styles of real American sounds that gave birth to rock 'n' roll in the first place, as well as rhythm and blues and country music.

"Samson and Delilah" is a traditional song served up true, featuring the gospel voices of The Jubilee Train Singers. "Little Honey," with Richard Greene's fiddle and David Hidalgo's mandolin, is rough country music, while "Hey Girl" adds a little touch of accordion-driven zydeco/Cajun. The latter two songs feature the legendary Nashville veterans, The Jordanaires, who sang on a lot of Elvis Presley records and hundreds of others. They add a Presley touch, too, to the tough-rocking "Trouble Bound." "Dark Night" is based on a swamp-sound guitar lick, while "Common Man" and "Just Another Sunday" are just solid, no-fooling rock 'n' roll. No Blasters album would feel complete without a bona fide rock 'n' roll anthem, and "Rock and Roll Will Stand" does the job beautifully here. It features Gene Taylor's pumping piano and a Johnny B. Goode story line. They've even got a song aimed straight at FM radio, "Colored Lights," which John Cougar Mellencamp gave them to record.

Throughout, the band's performances are glorious and inspired. In Dave Alvin, the group has a dynamic, commanding lead guitarist and a brilliant, sensitive songwriter. In his brother Phil, Dave has found a great voice. The obvious closeness of the brothers is one big part of the band's glue. The rhythm section of Bill Bateman and John Bazz is one of the best rock 'n' roll has to offer, and Gene Taylor on piano is simply one of the most genuinely magical players anywhere. If there is any justice, considering the success that Bruce Springsteen and especially John Fogerty have found by wearing honesty on their sleeves, The Blasters will, finally, find their audience with *Hard Line*.

This new album marks the first time that The Blasters have employed outside help in their record production, and it has worked out swell. Jeff Eyrich produced all but two songs (Don Gehman handled the others), and Mellencamp was named executive producer for "Colored Lights" (actually, he's listed under his technical pseudonym of Little Bastard). *Hard Line* has a really lively feel. It bursts with vitality. It is hard not to feel good listening to it.

You've been warned. Skip The Blasters' *Hard Line* only at your own peril. It is one terrific album by one smashing good band. *Michael Tearson*

The Smiths

Meat Is Murder: The Smiths
Rough Trade/Sire 1-25269.

Sound: B Performance: B+

Aside from the title song's sweep into veggie didacticism, The Smiths' second LP reaffirms the imagery and melodic grace of last summer's British hit, "This Charming Man." It also shows a wider musical range than even the very fine first album, with the band using early-Brit skiffle riffs, crunching guitar bursts and even rainfall to get across their dangerously contemplative lyrics. Prime mover Morrissey may be a tad guilty of overconfidence here, but it's nice to see him and the rest of the quartet stretch their muscles.

The fact that this stylistic range comes largely from good ol' guitars is significant. Lots of bands have been calling for a return from the electronic Erewhon back to guitar-based rock 'n' roll. And though he's no Jimmy Page-level virtuoso, Smiths guitarist/co-songwriter Johnny Marr can flow from twangless instrumental breaks to jaunty, almost rockabilly riffs, to support lyrics of social-class horrors, existential outrage and helpless self-punishment.

Linked with Morrissey's expressive (if limited) voice, and collaborative self-production that pulls off interesting sonic effects cleanly, The Smiths have conjured a singular album. Now if they just had a single . . . . *Frank Lovece*

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On *Standing in the Line of Fire*, Gary U.S. Bonds settles into a very workable brand of feel-good rock 'n' roll that is easy to take and enjoy.

The Age of Consent: Bronksi Beat
MCA 5538.

Sound: B– Performance: B

Getting past Bronski Beat's militant-gay stance and on to the music isn't as difficult as it sounds. Though evocative of Frankie Goes to Hollywood, and just as eager to redefine old pop standards according to their own sensibilities, Bronski Beat, on their first American album, punch with an anguished rebelliousness that has eternities more in common with Gene Vincent than with Boy George.

Lead vocalist Jimmy Sommerville sings in an extraordinarily high register that amplifies the anguish. His vocal trills and shapings transform the dance-rock single, "Why," from potential self-pity to urgent self-examination. He turns "Screaming" into a litany from an insider, and the guns-and-butter musings of "No More War" into a hopeless plea. Jimmy moans, "No more war—please," and the impact by song's end is something far more tangible than anything Boy George creates with "War, war is stupid."

The four-person Uptown Horns that accompany the three-member band supply Sommerville with more accents than an average day at the U.N. Like the vocalist, they seem to believe in every note—and that ought to transcend psychosexual barriers the way the old jazz greats did the racial ones.

Frank Lovece

Standing in the Line of Fire: Gary U.S. Bonds and The American Men
Phoenix PRT-0072, $8.98. (Available from Phoenix Records and Tapes, 201 East 61st St., New York, N.Y. 10021.)

Sound: C+ Performance: B–

The Best of Gary "U.S." Bonds
MCA 905, $3.98.

Sound: OK Performance: Originals

Standing in the Line of Fire is a solid piece of working-man's rock from Gary U.S. Bonds. Musically, it is quite consistent with the two fine albums he made under the aegis of fellow New Jerseyites Bruce Springsteen and Steve Van Zandt, a style I'm starting to call Jersey Rock.

As his contribution, Van Zandt has written, produced and played on the title song, which has the most sparkle and push of anything on the album. Past that one, *Standing in the Line of Fire* settles into a very workable brand of feel-good rock 'n' roll that is very easy to take and enjoy. Nothing spectacular, but it is mature and satisfying nonetheless.


Gary U.S. Bonds

Bonds' hits from the early '60s, for the most part long out of print, reappear on the collection that is part of MCA's new $3.98-list-price series. There are 10 songs included. If titles like "New Orleans," "Having So Much Fun," "School Is Out" and, of course, "Quarter to Three" make your heart race a little, you'll really enjoy this one. It also sports fine liner notes and better-than-expected sound.

Michael Tearson

Porky's Revenge! Original Soundtrack: Dave Edmunds and Various Artists
Columbia JS 39983.

Sound: C+ Performance: B+

Guess what. This is a terrific album.

Whatever you think of the endless parade of gross comedies that have followed the surprise success of *Porky's* (and I find them reprehensibly bad movies), the soundtrack music for *Porky's Revenge!* is excellent, the best

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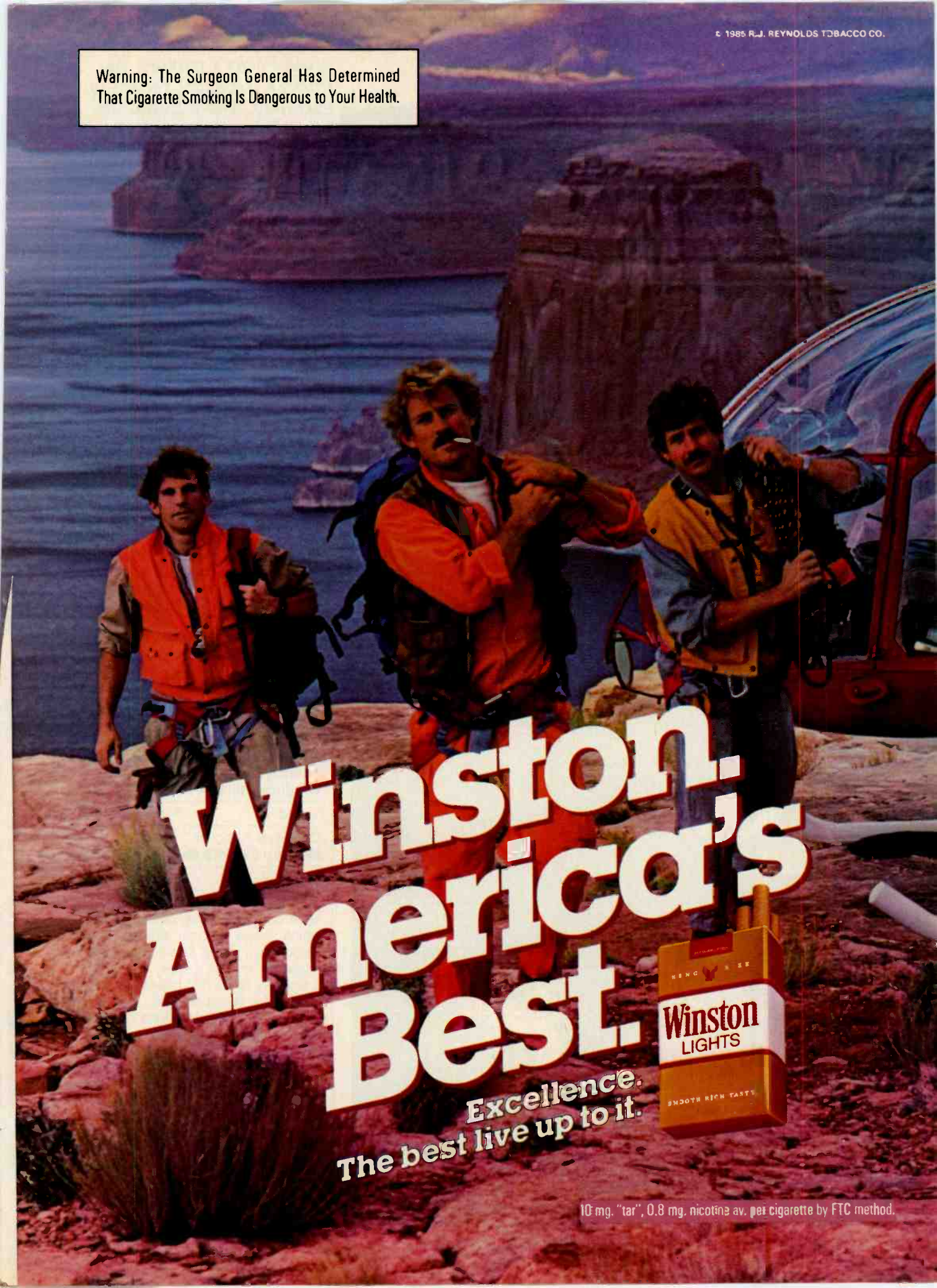

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Whatever you think of the gross *Porky's* movies, the *Porky's Revenge!* record is excellent, Dave Edmunds' best album in years.

album Dave Edmunds has been party to in ages.

Most of it is vintage rock 'n' roll, newly done gems recorded with verve and fun at heart. Edmunds sings "Do You Wanna Dance" and "Queen of the Hop" plus a new one he wrote for the movie, "High School Nights." He also contributes the instrumental title song. Clarence Clemons' big sax is here for the "Peter Gunn Theme," Jeff Beck sails through "Sleepwalk," Willie Nelson croons "Love Me Tender," and The Fabulous Thunderbirds do a swell job on Lloyd Price's "Stagger Lee." George Harrison sings a new Bob Dylan song, "I Don't Want to Do It." Then there's a Charlie Rich chestnut, "Philadelphia Baby," performed by The Crawling King Snakes: Robert Plant, Phil Collins, Paul Martinez, and Edmunds. Finally, there's "Blue Suede Shoes" done by the man who wrote it, Carl Perkins, backed by two erstwhile Stray Cats, Slim Jim Phantom and Lee Rocker.

The recording is very basic—nothing special, but nothing to get in the way of a real good time.

I plan to avoid the movie, but the music from *Porky's Revenge!* makes a wonderful party record.

Michael Tearson

Country: Various Artists
Windham Hill WH-1039, digital, $9.98.

Sound: B Performance: B+

Cal: Mark Knopfler
Mercury 822 769 M-1, $8.98.

Sound: B– Performance: B+

At the outset, let it be noted that I have not seen either of the films from which these albums present soundtrack music. Thus, I can only judge the music on its own merits.

Country is the first movie soundtrack issued by Windham Hill, and it employs many of the artists on their roster, notably George Winston (on piano), Darol Anger (on violin), Mike Marshall (on guitar and mandolin) and Mark Isham (on piano and brass). Charles Gross composed the score. Gross' overwhelming influence is Aaron Copland and the grand sweep of his music, something openly acknowledged in the album's thank-yous. The score is reverent and spacious, conveying

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Mark Knopfler's warm, undeniably Irish-sounding score for *Cal* talks directly to the dreams and longings of the human spirit.

open country and farmland and big skies and a slower pace of life than found in cities—all of which is surely appropriate for a film called *Country*.

The digital recording here is up to Windham Hill's usual standards of excellence. Clarity is superb, from Winston's soft, solo piano passages to dynamic, fully orchestrated pieces like the stirring "The Auction." This album is blessed with music that is uplifting and undeniably American in feeling.

By comparison, Mark Knopfler's score for *Cal* has an undeniably Irish sound. Knopfler has used musicians he knows well here. From his band, Dire Straits, comes the excellent rhythm section of John Illsley and Terry Williams. Guy Fletcher plays keyboards, the renowned Irish folk musician Paul Brady plays tin whistle and mandolin, and Liam O'Flynn contributes *uilleann* pipes.

Like the music for *Country*, Knopfler's *Cal* talks directly to the longings and dreams of the human spirit. Knopfler makes repeated use of a couple of very traditional-sounding themes, much as he had done in his first scoring assignment, for the film *Local Hero*.

The *Cal* soundtrack does not have the digital-clean sound that the *Country* track does, but it is nonetheless a very warm, very good-sounding record of lovely music. (Mark Knopfler fans should also watch for the forthcoming album of his soundtrack music for *Comfort and Joy*, a film written and directed by Bill Forsyth, who did the same for *Local Hero*.)

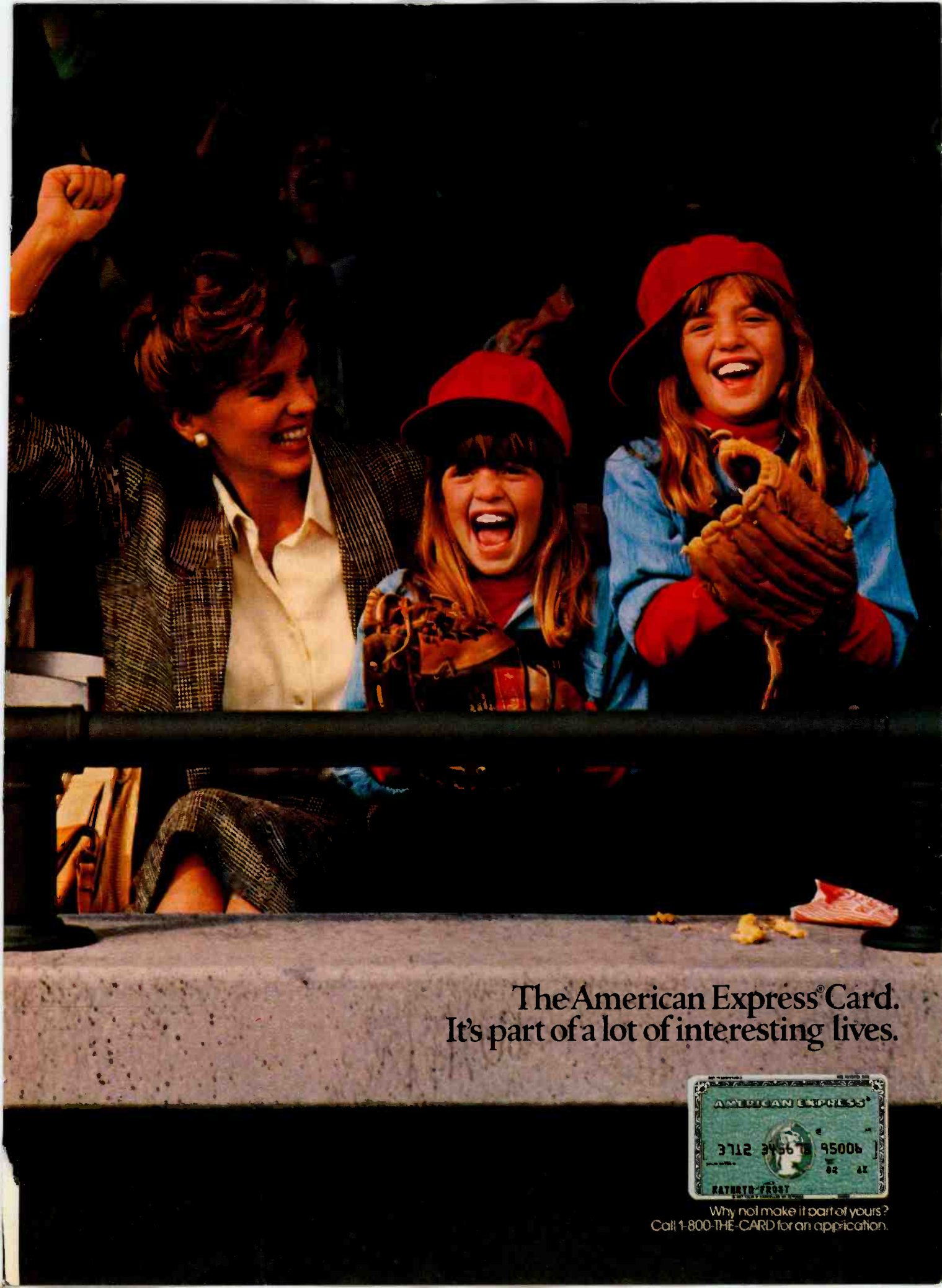
Each album has soundtrack music that can stand on its own, apart from the film for which it was written. As is customary for the genre, both feature recurring themes and leitmotifs as well as music that can conjure up visual images. And each has given me real pleasure in getting to know them.

Michael Tearson

The Collection: Ultravox
Chrysalis FV 41490, $8.98.

Sound: B+ Performance: A–

Ultravox's synthpop extravaganzas have charmed most of Europe, but somehow American success has eluded them. It has been said that people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Those who have avoided Ultravox because of their long, dirgelike opuses can, on *The Collection*, have just the hits.

who buy dance music aren't really into meaning, which could be part of the problem: Ultravox is lyrically adventurous. Having blazed the trails which Duran Duran later capitalized on, it would seem that they would be a natural for the young music audience—then again, John Cougar Mellencamp sells more records than a lot of the people who opened the door for *him*. Originality and creativity have a small part in making a career in the music business, and one of Ultravox's big problems is that they lack an appealing image. Midge Ure's attempt to be the Clark Gable of New Music fell on its backside, but at last he's shaved that ridiculous mustache (at least for the cover of this record).

So why a greatest-hits album from a group that's had no real hits? Midge is getting a little bit of publicity for writing and performing "Feed the World (Do They Know It's Christmas?)," and with that bit of high profiling, who knows, maybe some starving British pop stars will get fed. This British quartet's U.K. singles do sound better laid end-to-end with one another, and, even though there's only a smidgen of previously unreleased material here, the record stands as a strong work. Those who have avoided Ultravox because of their long, dirgelike opuses can now have nothing but the hits, and perhaps their record label can muster up some promo and make "Reap the Wild Wind" the hit it deserved to be years ago. We're waiting for the Ure solo LP ourselves. *Jon & Sally Tiven*

Open the Door: Pentangle
Varrick/Rounder VR-017, $8.98.

Sound: B+ Performance: B–

After nearly a decade, Pentangle has regrouped right where it left off. In its original form, Pentangle brought together traditional English folk music and jazz with a strong dose of Charles Mingus, a heady mix they still use.

The group includes legendary guitarist Bert Jansch, vocalist Jacqui McShee, Danny Thompson on upright bass, drummer/percussionist Terry Cox, and guitarist/violinist Mike Piggott, who admirably replaces John Renbourn. Piggott actually brings a new dimension to the band with the

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Mick Jagger's solo debut re-creates The Stones' sound without the jagged edges, by smoothing the roughness and mechanizing the swing.

addition of his violin. Their playing is intricate, delicate, and immaculate. One very difficult thing they do magnificently is to play very softly much of the time. Often, Cox very softly solos on chimes or bells, and he is beautifully recorded at it. In addition, they perform at comfortable, leisurely tempi, needing neither volume nor velocity to artificially pump up excitement. They don't so much play with fire as with great warmth.

Selections range from the traditional, tragic ballad "Yarrow" to Milton Nascimento's "Mother Earth," plus a whole clutch of new Pentangle originals.

Album production is very tasteful. Producers John and Rick Chelew had the good sense to employ engineer Jerry Boys, who recorded many of the Pentangle, Bert Jansch, and John Renbourn records of the '60s and '70s. He is an engineer who understands the music he records here. The mix is very smart and the sound is top-notch, a fitting accompaniment to smart, assured performances, all of which makes *Open the Door* a very satisfying record. *Michael Tearson*

Mick Jagger

She's the Boss: Mick Jagger
Columbia FC 39940.

Sound: B+ Performance: B+

Mick Jagger is nobody's dummy. His Royal Rubberlips has temporarily left his mates behind to make a collection of singles, singles, and more singles to put Mick back on the map. The last few Stones albums have not sold all that well, perhaps due to a strained relationship with their label (Atlantic). This first solo album is Jagger's move to reclaim what's rightfully his. With a record as good as this one, and with CBS putting all its weight behind it, *She's the Boss* could easily sell as well as the last albums by Hall & Oates or The Cars. Or Michael Jackson? Well, we'll just have to wait and see; it's certainly a possibility.

But this album is more a show of well-honed professionalism and homogenization than of Mick Jagger entering new territory. The several producers and multitude of players have more or less re-created The Stones' sound, without the jagged edges, by smoothing out the roughness and mechanizing the swing. Perhaps this is something more appealing, or perhaps the public *does* like the imperfections that make Rolling Stones records a little more human.

The players are among the best in the world—Jeff Beck, Eddie Martinez, and Nile Rodgers on guitars, Michael Shrieve on drums, Carmine Rojas playing bass. You won't find any better instrumentalists. As far as producers go, Nile Rodgers' and Bill Laswell's hit-making ability and credibility are indisputable.

But Jagger's solo album is the test of whether he can make a *Thriller*, whether Jagger can sell not 1 or 2 million but 8 or 10 million records—and no matter that he's solo rather than with his mates. The big question is whether his potential audience for a record so obviously aimed at the mass market is as big as Michael Jackson's. One can only wish Jagger the best, because with or without him, Keith Richards will always make the kind of raw rock 'n' roll records that satisfy in a way homogenized rock cannot. It's as if Jagger wants more production and perfection in Stones records, while Keith wants more inspired performances; now the public will have its say.

For a debut solo album by Jagger, it's at least as good as it should be. There are no great revelations—but then again, to us *Thriller* was simply a nice progression from *Off the Wall*.

Jon & Sally Tiven

EDWARD TATNALL CANBY

MATCHED SET

Prokofiev: Cinderella Suite. The Saint Louis Symphony Orchestra, Leonard Slatkin.
RCA ARC1 5321, digital, $12.98.

Prokofiev: Symphony No. 5, Op. 100. The Saint Louis Symphony Orchestra, Leonard Slatkin.
RCA ARC1 5035, digital, $12.98.

Photo: The Bettmann Archive

These very compatible twin recordings somehow remind me of our ubiquitous automotive twin offerings—Horizon/Omni and the like. Here you have Prokofiev in his last and finest period, the end of the WW II years, in two different musical "lines," symphony and grand ballet. The two works share many musical components, even similar tunes, and are played, recorded and produced by the same forces. Yet in practice the works are basically different—like Plymouth and Dodge.

In the ballet format, Prokofiev is showy, episodic, tuneful and danceable, his music superbly good for any active background listening from living room to car to "personal cassette" with phones. In symphonic form the same sort of music is more highly organized into a continuing structure as you listen. It is more massive, more demanding—not at all background, though, like most "classical" works, it can be put nicely to that use. And so you take your choice of these, or stock up on both of them for different occasions.

I am astonished at the suave precision of the present Saint Louis Symphony under Leonard Slatkin. This difficult music is played as though the musicians had it mostly memorized and knew its every quirk after long experience. Especially the strings, which are the foundation of Prokofiev's neo-Romantic sort of writing in this late period, and particularly the violins, which often play in hard-to-tune octaves or are spaced two octaves up in extremely high registers. Brahms was fond of that technique too (and is often played out of tune), but Prokofiev's music is more agile and gossamer, hence even more difficult. I have never heard the music as accurately and painlessly rendered! It can squeal and screech unmercifully, and often does in less meticulous playing.

Slatkin is a cool, precise leader but never mechanical, nor is the music unshaped. I feel he lacks a bit in the perception of the magical moods of this wry, expressive sound. Other versions are emotionally more telling, though often (unfortunately) at the expense of the aforementioned squeals and screeches, which happen in Prokofiev when things get too emotional. In the long run, it's better Slatkin's way.

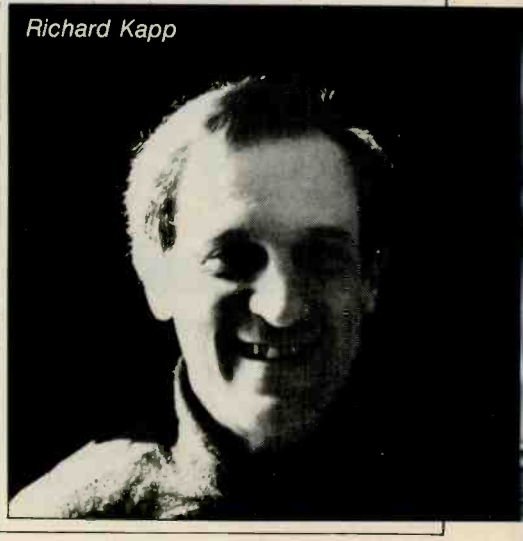
The recorded symphonic sound is very much in the RCA and RCA Victor tradition—warm, mellow, smooth, a bit on the distant side. The RCA engineers have preserved this characteristic sound for decades right into the audiophile and digital age and, here, into the orchestra's relatively new home, Powell Hall, first of the old vaudeville and movie palaces to be converted to "classical." Very fine.

Spectacular hi-fi shows up in both these works when Prokofiev wheels out his big guns, notably in the symphony, where big drums and crashing cymbals combine near the middle of side two. That should keep our "fi" lovers happy, whatever the playing format. I would not call the LP surfaces ideal, but they are unobtrusive. There is a bit of once-per-turn thumping in a gentle way, some faintly crackly rustling near side end, a steady level of background sound throughout. But note that much of this is undoubtedly hall sound and will appear in both cassette and CD formats. That sort of noise should *not* be ruled out. It has spatial components and helps our ears to create their illusions of reality. Silence, remember, is devoid of meaning.

Bach Jubilee. Philharmonia Virtuosi of New York, Richard Kapp.
CBS M 39357.

Well, well, all hail Bach's 300th birthday. By this time, Bach (not to mention Handel and Scarlatti, the other members of the 1685 anniversary troika) may be coming out of your ears after

Richard Kapp



entering from every side, until you are ready to scream for, er, Mozart. Or Salieri. But this disc is a balm for tired ears, very easy listening.

It's been a long time since we've had all-instrumental Bach transcriptions—maybe since Stokowski ceased converting Bach into prime Tchaikovsky. He did a good job in his way, introducing at least the basics of Bach to a large multitude of those who would never have listened otherwise. Now we are remarkably more sophisticated, and I include every hi-fi man and woman I know. We *like* Baroque music; it's even in the supermarkets, or was until Mozart/Salieri took over. No longer must Bach be violently doctored into some kind of schmaltz for the general public. But we still distrust Bach's voices, solo or chorus.

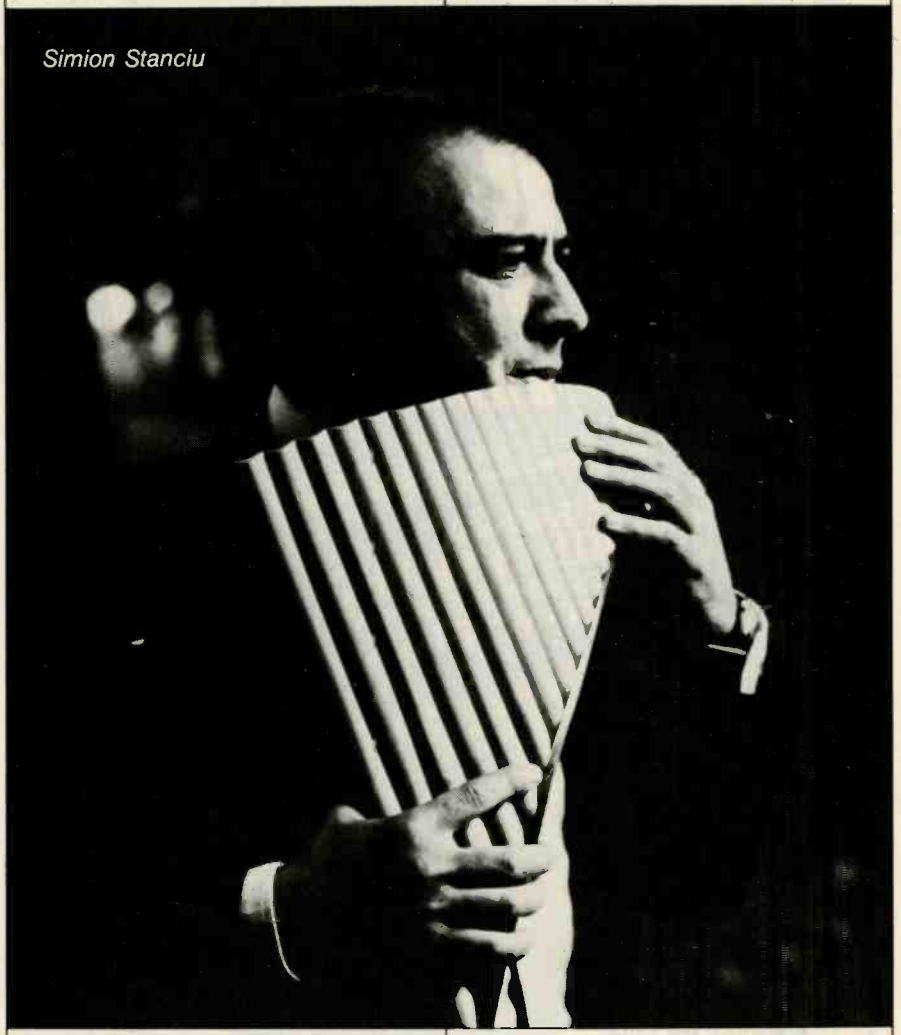
So—no voices in this recording. In the places where they belong, instruments take over. Many of the pieces were never intended for voices, being for Bach orchestra or for organ. But the ex-vocal pieces make for pleasing contrast.

It's an excellent record by any standard. Excellent as jubilant background music with a big, Baroque beat. Excellent, too, in the sensible, intelligent playing, right in tempo, right in the easy ornamentation, very right in the solo organ of Edward Brewer, even right in most of the instruments that sub for the voices that aren't there. No heavyweight atmosphere at all—in fact, the thing is a bit kooky; one piece is described by the conductor as "rambunctious." How's that for Bach? Best of all, in addition to the fine organ there is a pair of really excellent trumpets, by any Bach standards. I predict *Bach Jubilee* will be your favorite fun record in no time at all.

Syrinx Plays Bach, Mozart and Quantz. L'Orchestre de Chambre de Lausanne, Armin Jordan; Syrinx (Simion Stanciu), Pipes of Pan.
Erato 75187 (RCA import), digital, $10.98.

Out of sheer curiosity, I pulled this album from a pile of recent Erato releases. Pipes of Pan? *Mozart*? What goes on here?

The only panpipes I'd ever heard were for kids, a few flimsy, hollow tubes bound together side to side, which would give out a breathy sort of tune if you puffed hard enough over their open tops. A beer or soda bottle will do the same, sort of like a horse trying to neigh. *Whooooh*. Not exactly a sound for Mozart, let alone that amiable flute composer for Frederick the Great, Johann Joachim Quantz.


Simion Stanciu

Never underestimate man's ingenuity! Especially over a stretch of millennia, since the first Pipes of Pan entered old Greek mythology. Pan, the man with goat's hindquarters who chased nymphs in the forest, scared one of them, Syrinx, into a pond, where he turned her into a reed and cut out appropriate pieces to make a pipe. Obviously the panpipe was well-known even then. It is perhaps the Original Musical Instrument. Give it numberless centuries of, shall I say, R&D, and you find it in Romania as a folk instrument. Romania isn't far from Greece, so the connection must have been direct. Now—the thing goes classical, thanks to Simion Stanciu, the Romanian player who calls himself Syrinx. Maybe it should be Syrinx II?

What he plays is not to be believed. He starts with the little, high-speed Bach "Badinerie," a test for any flutist, not to mention flautist; it is tossed off here with superb ease and no shortness of breath. Then comes the Quantz flute concerto, followed by the familiar Mozart "Flute Concerto in G," the real test. It is quite lovely.

You can see the instrument in the album jacket's photos, some 22 graded pipes with open tops, set into a sort of metal tray at the bottom and bound

Simion Stanciu plays the panpipes with astonishing speed and lightness. I am baffled; I do not understand how he does it.

together side by side. No finger holes, no keys, not even a mouthpiece. Absolutely elemental and primitive. And yet the sounds it produces are rich, virtuoso, moving faster than the modern flute itself, variable in tone color over a wide range, very human and expressive—remarkable! It suggests a whole batch of other instruments at various moments, often a high-pitched recorder, with the same cuddly, gentle low tones and startlingly loud high notes, but just as often a woody, clanky xylophone sound—or little bells, perhaps metal tubes. It can play tones that are pure and flat, or juicy sounds rich with vibrato, soaring from soft to loud and back—anything that a flute can do, and more.

But what is most astonishing is the speed and lightness with which it is played. I am baffled. I do not understand how it can be done. Not only very fast scales, easy to do with the pipes right next to each other, but also broken chords, arpeggios at high speed, elaborate and very musical ornaments, trills—anything. All, as far as I can see, by sidewise motion of head and supporting hands.

Moreover, though the "natural scale" of the instrument is G, and hence the choice of two concerti in that key, there seems to be all the chromatic notes in between, as well. If so, how do you play a fast scale, skipping many of the pipes, sounding others? Beats me. Whatever it is, the technique is easily equal to anything this fairly difficult music demands from the modern flute player.

A good deal of the music must be moved higher, up an octave, to fit into the instrument's limits—no great harm done and the sense gets through unimpeded, more clearly than in most flute versions. A willing little Swiss orchestra goes along for a lively backing. I have only one complaint—the inserted cadenzas are awful. Too bad. One of them seems to have been edited in and sounds out of tune. Fortunately, they are short.

Mahler: Symphony No. 4. The Wiener Philharmoniker, Lorin Maazel; Kathleen Battle, soprano.
CBS IM 39072, digital.

Most of our music on records these days is international, combining technicians and performers from the most diverse areas of the globe. CBS, in particular, is so determinedly international in its releases that sometimes it is hard to figure out who may have set the recording procedures or chosen the music. But there are determined musical nationalists still around, too, notably the Viennese. After all, Mahler belongs to that city, more or less. As do plenty of other composers.

The collaboration here just doesn't work. Yes—there is a typically Viennese way of playing, right from the

In Mahler's Fourth Symphony, with Lorin Maazel conducting, the Viennese mix is all mixed up. The music drags and seems shapeless.

beginning, a sort of pleasantly loose, frowzy, yet aristocratic sound, expressive but not too accurate. Under the right circumstances, this playing is deceptive—it can be superbly good, frowzy or no (just as a steely, mechanical perfection can be deadly dull).

Here, under Lorin Maazel, late out of the Cleveland's steely perfection (not usually dull, however!), the Viennese mix is all mixed up. The music drags and seems shapeless, the instruments are at odds, as though playing without understanding—Mahler, one of their very own! Everybody is trying hard but nobody seems to know quite what is going on. The musicians seem to be baffled by whatever Maazel is trying to do. They sound unrehearsed, fuzzy. Again, the Vienna Philharmonic—in *Mahler!*

I've watched Maazel rehearse and was struck by a certain cold efficiency, not the sort of thing to soften Viennese hearts. But Vienna can be obstinate. Perhaps it is just that Maazel conducts a bit differently. And so the musicians flounder, perhaps a wee bit deliberately? Could be.

But curious—more confusion enters with the soprano solo. Kathleen Battle is unexpectedly far off in the distance, as though offstage or behind the orchestra, or maybe someone forgot to open up her mike? This could be the latest in "all-natural" recording technique, undoing decades of close-up solo sound a few inches from the (home) listening ear, but it only adds to the disarray in this case. The quieter tones of the song are almost inaudible, so far away that the continuity is easily lost. Disturbing side-wall reflections make it even harder to pinpoint where she is on the stereo stage. A disembodied soprano ghost, an apparition! Not good.

All in all, this rates as a surprisingly ineffective performance for a first-line aggregation. How much more of an impact and purpose there is, for instance, in the ancient Bruno Walter recording, still available in a modern Odyssey LP transfer. There are others, including a different recording by Maazel himself, in case you want to make comparisons. The Walter is, of course, the classic version; the alternate by Maazel is with the Berlin Radio Orchestra on Nonesuch.

Mozart: Violin Concerto No. 4 in D, K.218; Adagio, K.261; Rondos, K.373 and 269. The Saint Paul Chamber Orchestra, Pinchas Zukerman.
CBS 37839.

Sometimes a top celebrity like Pinchas Zukerman—the very epitome of the young, musical VIP, into every medium you ever heard of including all the talk shows—is able to reach a state of total equanimity that is impervious to the pressures of such a life. You reach the top—what else? Relax, relax (but keep right on going). Strange! That's what we hear on this very pleasing

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Pinchas Zukerman's performance of the Mozart violin concerto is relaxed and friendly, and its sense is beautifully conveyed.

Pinchas Zukerman

Mozart record. I was won over in moments—I haven't enjoyed the little violin concerto as much in years. It is indeed entirely relaxed and friendly, yet not one of its points is missed; the sense is beautifully conveyed in human terms. This was no hack recording job, though other, more ambitious artists might have considered it so.

Of course, there are as many ways of playing Mozart as there are recordings of this music, which takes up side one of the disc. The oldest versions are of the "miniaturist" school, jewel-like and artfully tiny, denying Mozart his right to be a real human being. Throughout the 19th century he suffered this fate alongside the Romantic behemoths. Then, in the early 20th century, came the precious-but-perfect school, ever so chaste and exact—very, very beautiful for the ultra-connoisseur though not many others could take it. Now we have Pinchas, and at last the brave little composer comes down to earth as a man for all of us. About time! I do like it. I particularly like the remarkably slow, unhurried tempi throughout, giving all the time needed for every Mozartean twist. I like the informality, the casual expertise—the music really does ask for it. Superb, and it's for everybody, not in the least esoteric. That's what this performance says.

Side two is played similarly, but there are three, unconnected, single movements instead of another complete concerto. They are most unfortunately juxtaposed in the sound—they contrast in their keys, and we jump and flounder in dismay as each new piece seems for a moment all out of tune. I do not know who put the three pieces together (all alternative movements to the concerti), but somebody should have realized that it doesn't work, however nice it seems on paper. So side two is downgraded. Still, side one is marvelous.

Don't fail to note that Zukerman is the conductor as well as the soloist. Thus, not only the relaxed playing but the restfully slow tempi and the whole conception of the music in both solo and orchestra are his. I suspect the Saint Paul Chamber Orchestra learned a lot about Mozart during these CBS sessions.

Afterthought: I was not too happy with the rather close miking of the solo violin, which seems placed only a few feet from you. But this is standard for all big-time, virtuoso soloists and probably is what most listeners expect as a matter of course. The bigger the name, the closer the miking. No wonder first-time concert-goers are shocked by the tiny "live" sound of solo performers, unmiked, far away on the concert stage! At least in the music of Mozart, who played for small audiences, a half-way technique is ideal, not close but not distant either.

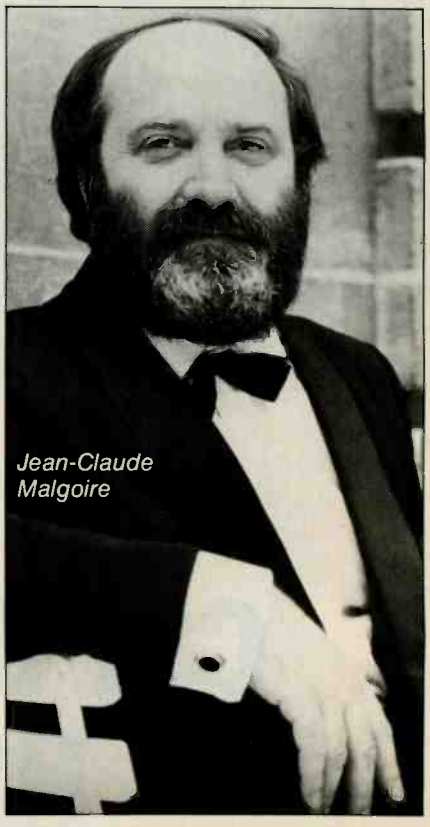
Carl Maria von Weber: Music for Winds. Wind Ensemble, Jean-Claude Malgoire.
CBS M 39011.

Beware of the musicologists when they start collecting *all* the works of this or that composer. Or a music publisher who decides to print every last piece of a certain kind—say, wind music. This record is the result of just such an endeavor.

Carl Maria von Weber's operas are famous—everybody knows the tunes in the overtures—as are numerous of his unforgettable concerted works, notably with clarinet. One of the best! But except for the short final bands on each side, this turns out to be the dullest music you will *ever* hope to hear. Most of it is very early—but that wouldn't necessarily mean it is unlistenable. All I can say is that the young Weber was a hack or a moron, or worse. There are five waltzes, more like the little country dances of Mozart and Beethoven. But if those dances are insignificant, these pieces are far more so. They're vapid. The same for a short "Concertino" for oboe and winds—such a far cry from the later Weber works using this title! Pap. Nothing more! Astonishing how dull some big composers can be at times, for one reason or another. May they rest in peace—and silence. I mean the dull works.

But suddenly, the last little waltz on side one perks up, with familiar tunes from the opera "Oberon," Weber's last work. Yet the waltz was supposedly written 40 years sooner! Instead, perhaps he wrote a mature potboiler at the time of the opera. By that age, at least he could write very listenable pap, as you will notice if you misguidedly buy this disc—there are several minutes' worth. And at the tail end of side two is an adagio and rondo that suddenly, wonder of wonders, sounds like the real Carl Maria von Weber. Lovely—but short.

The French winds are traditionally sharp and edgy in sound, and they occasionally indulge in their traditional privilege of playing out of tune. Especially the solo oboe, which happens to be played by the director. All in all, an unhappy introduction to the seamy side of this fine composer.



Jean-Claude Malgoire

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UNION AND REUNION

Together for the First Time/The Great Reunion: Louis Armstrong and Duke Ellington. Trummy Young, trombone; Barney Bigard, clarinet; Mort Herbert, bass; Danny Barcelona, drums.
Mobile Fidelity Sound Lab MFSL 2-155, two-record set.

These two LPs, originally produced by Bob Thiele for Roulette Records in 1961, have been completely remastered and pressed in state-of-the-art virgin vinyl by Mobile Fidelity Sound Lab via Victor Company of Japan. This is no small matter, for records released in this country have for years used inferior pressings—and the sound quality has suffered. But not here.

It is to Thiele's credit that he got the two greatest jazz artists America has produced into a recording studio at a time when their powers of invention were at their peaks. Louis Armstrong and Duke Ellington each knew and respected the other's achievements, and of course their paths had crossed through the years, but no attempt had been made to bring them together until Thiele managed it in 1961.

There is masterful playing by everyone on the album, making the kind of music every young musician and jazz fan ought to be listening to. These musicians were concerned not only with "swinging" and playing beautiful music, but with producing a sound, and this is what they did. Armstrong and his all-star band, with the one-and-only Duke Ellington leading from the piano, interpret Ellington's compositions from "Mood Indigo," "The Mooche," "Black and Tan Fantasy," "In My Solitude" and "Cottontail," through "Do Nothin' Till You Hear from Me" and "Just Squeeze Me," to more relatively recent numbers like "Azalea" and a blues piece titled "The Beautiful American." It is obvious everyone concerned had a ball. What they have given us is a legacy which is only now being properly understood.

My only complaint is that it would have made sense to have Stanley Dance update the original liner notes, because all the participants except drummer Barcelona have passed on, making this reissue all the more valuable. Otherwise it is highly recommended. *Frank Driggs*

White Winds: Andreas Vollenweider **Columbia/FM FM 39963.**

Sound: B+ Performance: B

Andreas Vollenweider, a Swiss electro-harpist, is the reigning guru of the New Age music movement, which seeks out harmony and spiritual fulfillment in a relaxing, nonaggressive sound. Because of the novel, plaintive voice of his electric harp and his penchant for lyrical, sweet melodies, Vollenweider is the first New Age musician to cross over into something resembling the mainstream.

Until now, sweet has been the operative word for Vollenweider's music. His first two records, *Behind the Garden* and *Caverna Magica*, were lush affairs, full of quivering electronic atmospheres, happy-go-lucky vocal touches and Vollenweider's ever-present harp. He showed a sensitive feel on those albums, playing on his instrument's strengths to produce a plucked, romantic lyricism. However, all too often his pervasively naive innocence got drowned in a rush of saccharine. He played an adult's idea of children's music, and the first thing I'd do after listening to one of these records would be to brush my teeth. But on *White Winds*, excessive sweetness is an aberration. Only "Flight Feet and Root Hands" is a throwback to the earlier albums; its light-funk rhythm and cloying harp line sound like outtakes from *Sesame Street*.

White Winds indicates a new, more mature direction for Vollenweider. The sweet airiness is modulated by a darker moodiness. After two LPs he's dis-

Louis Armstrong, Bob Thiele and Duke Ellington

Andreas Vollenweider

covered that a little discord can be good, that, in fact, complete harmony can be an utter bore. The crescendo of cries on "The Stone" would not have appeared on an earlier Vollenweider recording. And it brings a mildly cathartic release of tension that's resolved in the gentle melodies of "Phases of the Three Moons." It's this sort of tension-release-resolve movement that makes *White Winds* Vollenweider's most engaging record yet.

White Winds is a transglobal recording that succeeds as a coherent synthesis, rather than being an unnatural graft. Vollenweider and his musicians use an array of stringed, percussive, and wind instruments that would make an ethnomusicologist cry in envy. Panpipes, water drums, anklongs, lutes, bass clarinets, tablas, and a host of other musical exotica supplement the sound of Vollenweider's custom-made, electronically enhanced harp. With immaculate engineering by Eric Merz (whose sound manipulations justifiably place him in the musicians' credits), Vollenweider orchestrates a translucent maze of twists and turns where otherworldly tableaus appear around each corner.

Vollenweider walks in a verdant forest for the mind. Plucked koto lines stalk ominously; breathy panpipes caress you like moist breezes, and the polyrhythmic counterpoint of a gamelan-like orchestra dazzles you. When his harp emerges like the sun from behind storm clouds, it is mesmerizing in the symmetry of its digital delays.

Where previous Vollenweider records played on the lighter, more accessible brightness of his musical melange, *White Winds* shows a darker, introspective side that balances a joy of life with a bit of pathos and apprehension of the unknown. His music is richer, because he now seems to draw from the knowledge of life as well as fantasy. With *White Winds* Andreas Vollenweider has come of age.

John Diliberto

The Third Decade: The Art Ensemble of Chicago
ECM 25014-1E.

Sound: B Performance: A+

The Art Ensemble of Chicago (AEC) is that rare commodity, an institution that continues to evolve and change. The AEC swept out of the Windy City 20 years ago with what was then considered to be an iconoclastic brew of free jazz, African rhythms, and political polemic. They called it "Great Black Music—Ancient to the Future." Twenty years later they're still true to their original vision and just as iconoclastic, but also wiser and more concise with age.

Rarely has The Art Ensemble's music been captured so perfectly on vinyl. Unlike so many jazz recordings that at best capture a good performance, *The Third Decade* is an audio journey, tailored for the intimacy and space of your stereo system. It's a jazz recording that knows it's a record.

Even in their wildest, most revolutionary days, The AEC was a history

lesson of jazz and black music. That hasn't changed on *The Third Decade*, an album containing six wildly different pieces, yet generating coherency that can only come from a unified, collective consciousness.

The opening track, "Prayer for Jimbo Kwesi," sets the tone with a solemn, droning synthesizer line. Yes, I said synthesizer. The members of The Art Ensemble are purists of substance, not form, and Joseph Jarman's debut of his new synthesizer is carefully integrated into the organic firmament of The AEC soundscape. From the swelling shroud of synthesizer and bells emerges a simple melodic lament. It's voiced on the synthesizer first, then handed to one flute, and then another in a detailed tone poem that turns from somberness to quiet affirmation.

From poignant reflection to exuberant celebration, The Art Ensemble launches into "Funky AECO," bringing "hip-hop" music into the avant-garde. Percussionist Don Moye and bassist Malachi Favors set a dirty-blues, four-on-the-floor vamp. Lester Bowie's raucous trumpet solo laces through horn choruses that collide with the honks,

In the time since John Diliberto last contributed to our Jazz & Blues department (which makes its reappearance here after too long an absence), he has been the recipient of two major radio awards. His 26-part documentary series, *Totally Wired: Artists in Electronic Sound*, took first prize in the music category of the Major Armstrong Awards, which are administered by the Armstrong Memorial Research Foundation at Columbia University's Engineering School. The series, broadcast on more than 50 public radio stations, also received a Community Radio Award from the National Federation of Community Broadcasters.

Totally Wired, which Diliberto coproduced with Kimberly Haas in Philadelphia, documented the art of electronic music through interviews with more than 40 leading figures in electronic sound. The pair are now working on a 13-part follow-up, *Totally Wired Mark II*, which will feature Laurie Anderson, Giorgio Moroder, Robert Fripp and many others.

Junior Mance's new album, *Truckin' and Trackin'*, seems to be an attempt to get a toe in the commercial market. I wish him well.

squawks, and whooshes of bike horns and synthesizer.

"Scratch" music has never sounded as spontaneously joyous as on "Funky AECO" nor as symphonic as its classical counterpart, "The Bell Piece." "The Bell Piece" echoes Edgar Varèse's "Ionizations," except Varèse didn't have a scurrying, Roscoe E. Mitchell soprano sax run and Bowie's answering trumpet guffaw over the sirens and percussion of "Ionizations."

If "Funky AECO" is a party, then "Walking in the Moonlight," written by Mitchell's father, is for when everyone has gone home but there's still dancing in your head. Mitchell closes his eyes and blows a dark, tenor soliloquy.

The rhythm team of Moye/Favors is a key ingredient to The Ensemble's unity. The elaborate polyrhythms are driven with a relentless, muscular assurance, yet it's full of detail and warmth. On "Zero" they go back to the roots of swing and a fiery three-part horn chorus that frames Jarman's sophisticated, urbane alto solo.

Finally, the title track: It's a summation, a celebration, and a launching pad for the future. A lengthy, ritual percussion dance gives way to the sirens of the city. Those are real sirens, wailing and screaming and transmuting into the horns of The AEC. The Art Ensemble of Chicago can still call on reserves of anger, pain, and energy in a torrent of vital, free soloing.

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In High Profile: Dick Katz
Bee Hive 7016. (Available from Bee Hive Jazz Records, 1130 Colfax St., Evanston, Ill. 60201.)

Pianist Dick Katz has had a long and varied career in jazz but has had comparatively few chances to record as a combo leader. This is a shame, because he always finds a method by which to make music that has lasting value. This new release on Bee Hive, Katz's first as a leader in 15 years, is no exception.

Katz brought together drummer Al Harewood, whom he refers to as "Mr. Time," and the fine young bassist Marc Johnson, who worked in Bill Evans' last trio. Then he added the polished and swinging solo talents of trombonist Jimmy Knepper and flutist Frank Wess, who plays with a big, warm sound.

This record gets into a groove right away and maintains it throughout. That alone is sufficient to earn my recommendation. Katz has selected compositions by Oscar Pettiford, George Gershwin, John Coltrane, Thelonious Monk and J. J. Johnson to display his own eclectic piano playing, which ranges from understated to driving and even moves into stride style on Monk's "Friday the 13th" in most satisfactory fashion.

Knepper may be called a modern player (whatever that is), but he has deep roots, and Wess has covered all bases on flute for more years than any of us might care to remember.

This is a fine, fine recording and a credit to all concerned. *Frank Driggs*

Truckin' and Trackin': Junior Mance with David "Fathead" Newman
Bee Hive 7015. (Available from Bee Hive Jazz Records, 1130 Colfax St., Evanston, Ill. 60201.)

This is an attractive looking album, the first this well-liked, veteran pianist has recorded in the U.S. for some time, since Junior Mance, by his own admission, prefers to stay an acoustic jazz artist. The package includes a nicely printed, four-page, photo profile of Junior Mance's career, a worthwhile promotional effort on both the artist's and the label's behalf, and one which I heartily applaud.

Having said this, I wish I could say I liked the music more. Mance has certainly paid his dues in a career that goes back almost 40 years, and in David "Fathead" Newman he has a worthy foil for the type of blues playing that has become almost *de rigueur* in some segments of the population. My problem with it is that I was weaned on the blues as played by such long-forgotten and hallowed names from the past as Jimmy Yancey, Cripple Clarence Lofton, Roosevelt Sykes, Pete Johnson, Meade Lux Lewis, Memphis Slim, and Leroy Carr. Consequently I've always found it difficult to accept any other kind of blues playing. Kansas City artists such as Count Basie, Jay McShann and Mary Lou Williams, or Texans like Lloyd Glenn and Charles Brown, all managed to make me *believe* what they played. This does not. I can't argue with anyone wanting to play this way, or having arrived at this style after many years in the business, but I myself can't work up any enthusiasm for it.

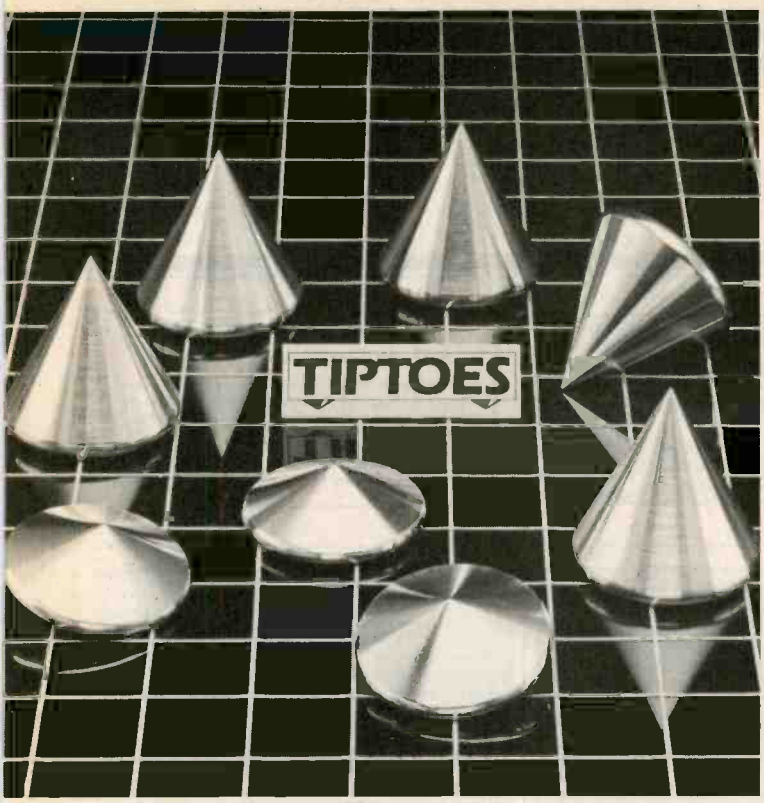
Some 20 years ago, Junior Mance did an album for Riverside, playing a lot of blues that paid more homage to the true masters of this particular part of jazz—and it came off. *Truckin' and Trackin'* seems to be somewhat of an attempt to get a toe in the commercial market. I wish him well. *Frank Driggs*

Fugitive: Mark Wenner and Switchblade
Whitewall Records, $8. (Available from Whitewall Records, c/o Nighthawks, P.O. Box 757, McLean, Va. 22101.)

Sound: C Performance: B

Mark Wenner is best known as the amazing harmonica player of Nighthawks. *Fugitive* is his side project, an album of spirited, rocking rhythm and blues, country, and rockabilly reflecting Wenner's own eclectic tastes. Highlights include his own nasty arrangement of "Sixteen Tons" with a rocking rhumba beat, Merle Haggard's "Lonesome Fugitive," Little Richard's "Rip It Up" and a stomping version of "Wash My Hands in Muddy Water." The recording is faithful to the rough-and-tumble attitude that characterizes Wenner's work.

The album is a fitting companion to Nighthawk's catalog of no-nonsense rhythm and blues, the kind of stuff that makes even a gray, snowy day feel sunny. *Michael Tearson*



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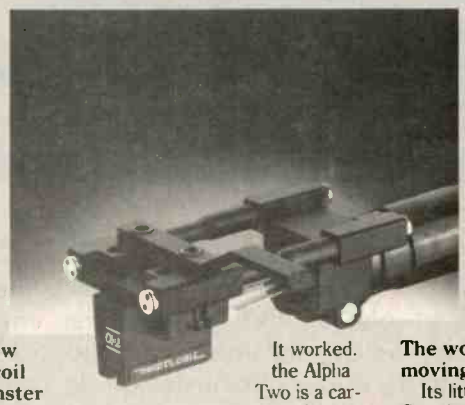

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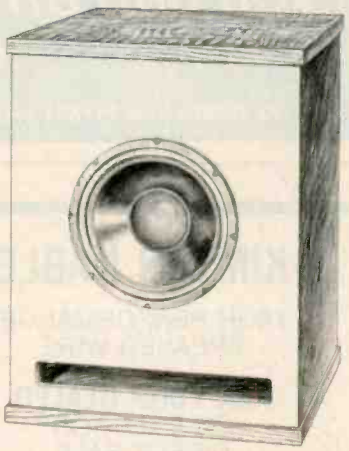

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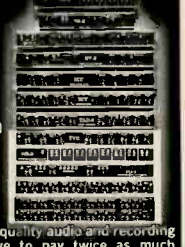

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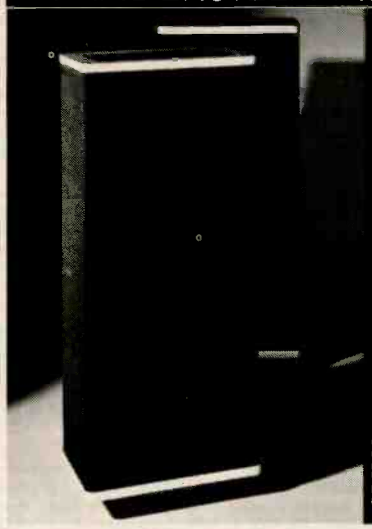

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a tragedy: condolences to Mr. Harry Pearson

On February 27, 1985, here on Long Island, the home of Harry Pearson, editor of *The Absolute Sound*, was destroyed by fire. We understand that Mr. Pearson had a huge collection of records, which he treasured, all of which were lost in the fire. Arson is suspected as the fire's cause.

We are very glad to hear that there will be no interruption in publication of *The Absolute Sound*.

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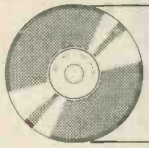

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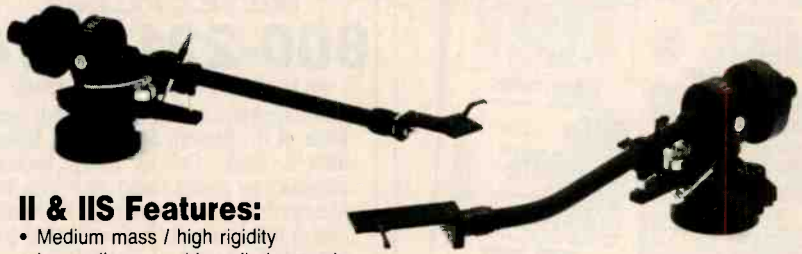

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