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**INTERVIEW
KURT MASUR**
NEW YORK
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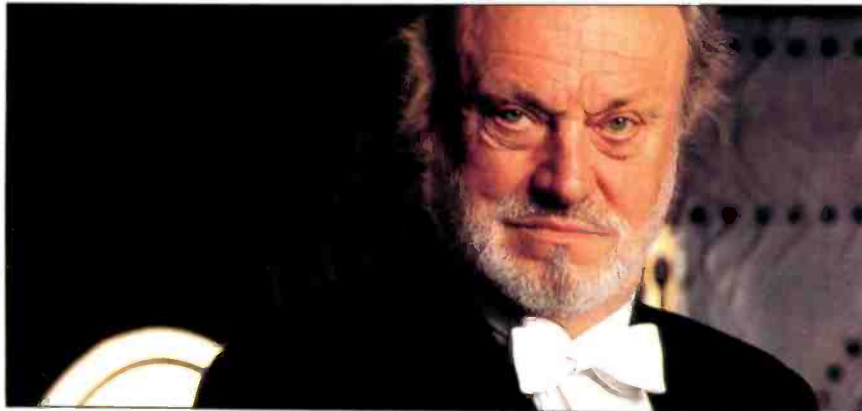
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The Cover Equipment: David Berning EA-2101 amp and TF-12 preamp
The Cover Photographer: ©1991, Bill Kouirinis Studio

Audio Publishing, Editorial, and Advertising Offices,
1633 Broadway, New York, N.Y. 10019

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MPA

The
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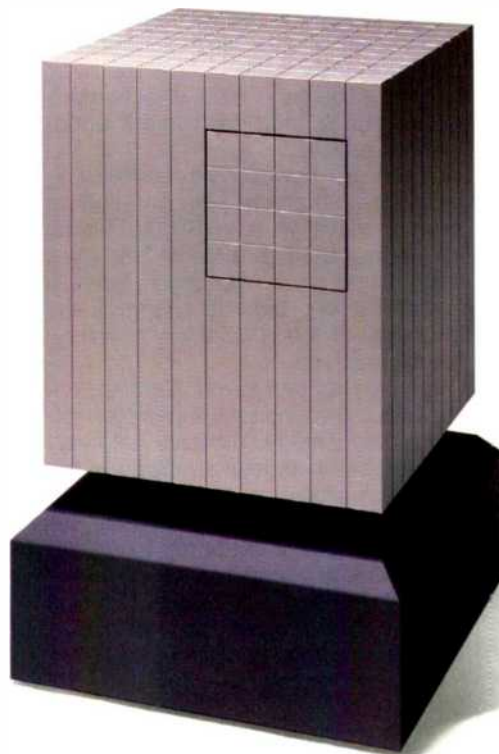
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AUDIO, December 1991, Volume 17, Number 12
AUDIO (ISSN 0004-752X, Dewey Decimal Number
621.381 or 778.5) is published monthly by Hachette
Magazines, Inc., a wholly owned subsidiary of
Hachette Publications, Inc., at 1633 Broadway,
New York, N.Y. 10019. Printed in U.S.A. at Dyersburg,
Tenn. Distributed by Warner Publisher Services Inc.
Second class postage paid at New York, N.Y. 10001
and additional mailing offices. Subscriptions in the
U.S. \$21.94 for one year, \$39.94 for two years, \$53.94
for three years; other countries, add \$6.00 per year.
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Subscription Service: Forms 3579 and all
subscription correspondence must be addressed to
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Don't Mention It

Dear Editor:

I suppose we don't need unsightly or confusing interconnects or power cords to use the Lirpa Labs Stealth DSP module (April).

Lirpa Labs was not mentioned in the Ad Index. The reality of this product is dubious at best, but if it is real, please place my name on the interested buyer's list. My system needs new and interesting components to keep it happy. To my meager knowledge, there are no other surrealism processors available.

Drain Bammage
Seattle, Wash.

Wise Investment

Dear Editor:

I recently inquired about a loose power switch on my Adcom GFT-555 tuner. An Adcom representative asked me if I thought I could replace the switch myself since there was no soldering involved. I assured him that I would be able to perform the task. He agreed to send me the needed part free of charge, and I was in receipt of the part in just two days.

It's nice to know that some companies, such as Adcom, take care of the people who have invested (wisely) in their products.

Ronald Bessell
South Euclid, Ohio

Rapture in Maryland

Dear Editor:

As a dedicated reader of your publication and an ardent music enthusiast, I always appreciate learning about and hearing equipment constructed with quality and care in which I may have a buying interest. In the past, both your readers and staff have provided me with this vital information, and now I'd like to return the service.

During a recent search for a second set of speakers, I "discovered" a small but talented local speaker manufacturer who builds both finished speaker systems and speaker kits for discriminating audiophiles who don't want to (or can't) spend their very last dollar on high-end speakers but still want to enjoy the best in sound reproduction. For the past 30 years, The Speaker Factory at 9141 Arbuckle Drive, Gaithersburg, Md., has been manufacturing systems

of impeccable sound-reproduction quality compared to highly advertised systems selling for three and four times as much. It's musical rapture you experience when you listen to the smooth response, clean bass, and extended highs produced by The Speaker Factory's array of systems.

I feel an obligation to other readers to let them know that The Speaker Factory exists. I am sure most readers will agree that not only is the talent which creates the sound important to us, but the accurate reproduction of that recorded sound is equally important, especially at reasonable cost.

Richard H. Bender
Gaithersburg, Md.

Fight the Power

Dear Editor:

The quality of recorded music is approaching that which is live. It's a pleasure playing with tapes of Pocket Songs and the Singing Machine, integrating my clarinet in its three registers. I play the gambit, from gutbucket blues, symphonic themes, and ethnic musics—all with authentic background music on tape. I take full blame if my clarinet squeaks. I also take home a salary above that which most band-leaders receive.

There is, however, a contributing factor that subtracts from my musical performances here in South Florida. The power is inconsistent, and as a result I find myself playing at times a halftone lower, thereby changing the character of the original key heard by the orchestrator.

If it can happen to me, it is happening to audio connoisseurs with state-of-the-art technology. They are not hearing musical instruments playing in the recording studio at 440 pitch reproduced as such on their expensive audio equipment. It is not fair for power companies to decrease by even a halftone. Everything, including highway lights, runs well at 440 pitched power. All they need do is use their access to technology so that we may have the best use of ours. If they flinch, a "battery" of a boycott would alter their mind-set, although audio connoisseurs among the employees of utility companies are not asked to support us.

Owen Engel
Lauderhill, Fla.

Museatex has always designed compact and elegant components with the convenience of remote control. The Melior Audio/Video Control Center inherits all of the convenience and critically acclaimed performance of our audio preamplifiers, and adds DC-coupled video switching to ensure perfect black-level retention for all video sources. Signal purity is maintained by completely isolating the video and audio signals through the use of special shielding, separate power supplies, and careful ground connections.

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TAPE GUIDE

HERMAN BURSTEIN

Disabling the Erase Head

Q. Tapes that I bulk-erase are quieter than those erased by my deck's erase head. Also, they don't have the low-level buzzing noise that I occasionally hear. Would a switch for the erase head's current allow me to turn it off and get a few more dB of signal-to-noise ratio when I use bulk-erased tapes? Is there a good reason why manufacturers don't include this feature?—William Shipman, Fredericksburg, Va.

A. Yes, disabling the erase head—by switching off the oscillator current going to it—can give you a somewhat quieter recording than if the erase head is active. However, if the heavy load presented by the erase head is removed from the bias oscillator, the amount of bias current going to the record head is likely to rise. Therefore, if you plan to erase only by means of a bulk eraser, it becomes necessary to readjust the bias current going to the record head.

On the other hand, you may want the option of using either the bulk eraser or the erase head. For example, if you want to erase only the tracks on side A of a cassette, you must use the erase head; a bulk eraser necessarily erases all tracks, from both sides. In this situation, you would require a substitute load and a switching arrangement that diverts the erase current to the substitute load when the erase head is cut out. The substitute load would have to present the same impedance to the oscillator as does the erase head.

Altogether, you face a technical problem of at least moderate difficulty, although far from an insuperable one. If I recall correctly, many years ago there was an open-reel deck which incorporated the feature you desire, using an actual erase head as the substitute load. However, this feature added significantly to cost and helps explain why we don't see it, particularly since there seems to be little demand for it in the market.

Effectiveness of Play Trim

Q. A few cassette decks include a Play Trim feature to correct for azimuth mismatch between the tape and the playback head. How effective is Play Trim? Is there a difference between two-head and three-head decks with respect to its effectiveness?—Anthony Hudaverdi, Santa Monica, Cal.

A. Play Trim can correct for modest treble losses due to azimuth mismatch and other factors; in the range from 10 to 20 kHz, it can provide about 3 to 6 dB of treble boost.

Losses due to imperfect treble equalization in recording are apt to be quite minor, relatively speaking. Losses due to excessive bias tend to be larger but not all that great unless the deck manufacturer or the user has not taken due care with respect to proper bias. So treble loss due to these two factors can be handled quite effectively by Play Trim in most cases, but losses due to azimuth misalignment can be quite profound even if the

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misalignment is quite small. To take an example, assume misalignment of only 10' (1/6 of a degree, which is too small to be discerned by eye). At 10 kHz, the resulting loss is 2.1 dB, which is within Play Trim's ability to correct. But at 20 kHz, the loss is 10.2 dB, which is well outside Play Trim's ability to correct completely.

I see no reason why Play Trim's effectiveness should be different between two-head and three-head decks. However, the chance of azimuth misalignment is greater for a three-head deck. Obviously, misalignment cannot occur if one records and plays with the same two-head deck. But with a three-head deck, owing to use or misadventure, the record and play heads can become misaligned with respect to each other.

Radio Interference in Tape Decks

Q. I have a problem with background noise on tapes recorded with my deck. Specifically, I am picking up

a radio station. This can't be bleeding from a tuner because I don't have one hooked up to my system. Do you have a solution to this? I have heard of a component from Adcom that is supposed to clean up a.c. power, but I don't know if this will help. —David Cooper, Rochester, N.Y.

A. Radio frequency interference (r.f.i.) can come into your deck in various ways. One is through the power cord of the deck or the input cables to the deck; another is through the power line. Perhaps the radio station is being picked up by the first stage of the deck's own record electronics, or the preamp stage of your amplifier may be doing so, particularly if you are using its phono stage, which has high gain and is therefore sensitive to extraneous signals. You can probably figure out where the interference is originating by disconnecting components that feed into the deck.

Dressing (rearranging the path of) power cords might help if r.f.i. is

picked up by one of them. Reversing a plug's position in the wall outlet is also worth trying. Dressing cables leading to the deck—or the cables between your signal source and amplifier—may help. If r.f.i. is entering the deck directly, reorient the deck and/or place it somewhere else.

An a.c.-line interference filter, available at audio dealers and elsewhere, may be useful. Line conditioners made by Adcom, Tice, and other companies are basically intended to suppress the effects of spikes, hash, surges, and other anomalies in the power line. Such devices are not cheap, and I think that the chance of one solving your problem is small. Therefore, if you do decide to try one, I suggest buying it on a trial basis. ▲

If you have a problem or question on tape recording, write to Mr. Herman Burstein at AUDIO, 1633 Broadway, New York, N.Y. 10019. All letters are answered. Please enclose a stamped, self-addressed envelope.

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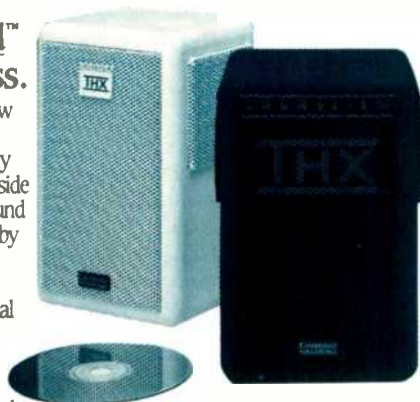


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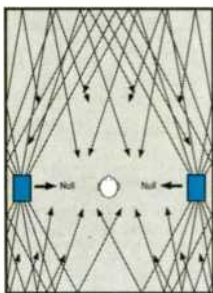
Unlike other speakers, the purpose of rear/side speakers in a Dolby Surround or DSP system is to "surround" the listener with uniform, *non-directional* ambient sounds. Conventional speakers are designed to create a precise, "stereo stage"—the opposite of what you want from a surround speaker. The Surround, however, is a dipole radiator. It contains a 4" low frequency driver facing "forward" out of the cabinet, and two 3" high frequency drivers—one on each *side* of the cabinet.

When mounted on the side walls of your listening room, The Surround's two high frequency drivers direct sound towards the front and rear of the room. The sounds then reflect off the surfaces of the room, and finally reach the listener from *all* directions...almost as if the music was "coming out of nowhere."

The result is surround sound the way it was meant to be heard.

Price Breakthrough.

Like all our products, The Surround was designed by Audio Hall of Fame



VCR Mystery Mono

I take keyboard in hand to offer another possible solution to the "No Surround Sound" problem as related by Steve Metz in your column in the January issue.

It has been my experience that very few Hi-Fi VCRs (actually, none that I can think of) include multiplexed stereo as part of their modulated-r.f. output. They only feed stereo from their audio output jacks. Further, most salespeople and many technicians are unaware of this.

It has also been my experience that many people upgrading to a stereo video system have simply replaced their older, monophonic VCR and followed tradition by connecting the VCR as part of the r.f. signal loop (i.e., feeding the r.f. signal from the antenna or cable box to the VCR's r.f. input, then feeding the VCR's r.f. output to the TV receiver's r.f. input).

When you're not playing a tape, the VCR will usually just pass through whatever r.f. broadcast or cable signal it receives, and the TV (which I assume to be stereo-capable) then decodes any stereo signals and provides stereo audio to the sound system. During tape playback, however, the VCR's modulator creates an r.f. output signal (usually on VHF channels 3 or 4), with monophonic audio (sometimes obtained from the linear audio track). This signal is then presented to the TV receiver, which can then send only monophonic sound to the preamplifier/decoder.

The solution to this can take many forms, depending on the capabilities of the TV receiver. If the TV has separate A/V inputs and outputs, and input selection of either r.f. or line sources, then the video (either composite or "S") and left and right audio outputs of the VCR should be routed to the video and audio inputs of the TV. The TV's A/V outputs should then be routed to the sound system. To view the broadcast or cable signals, the TV receiver's input switch is set to "TV" (antenna/r.f. or whatever). To view a videotape, you switch the TV to the appropriate input (which might be labelled "Video," "Line," "VCR," "A/V," or the like). If your TV has no such inputs, you can feed your VCR's audio outputs directly to any unused line inputs on your audio system.

There are many other possibilities depending on the equipment being used. The key is to abandon the r.f. link in favor of the separate audio and video connections. This should produce a cleaner picture than using the VCR's r.f. modulator.—Clifford I. Knight, Plymouth, Mass.

Using Tape Loops

Q. My preamp has only one tape loop. I have a Hi-Fi VCR, a cassette recorder, and some signal processors. How can I set up this conglomeration?—Gordon R. Taylor, Bowling Green, Ohio

A. If all you had was one recorder and one signal processor, you could probably hook the processor to the tape loop and the recorder to that, because most processors now have tape loops of their own. You might even be able to daisy-chain another processor or two if each unit has a true bypass switch. Otherwise, you might pick up noise and other problems from such a connection.

In your case, you'll need some kind of external switchbox to which all your gear can be connected. An article in our June 1989 issue covered such switchers from Canton, DB Systems, Niles Audio, QED, Radio Shack, Rusbond/FMP, and Vanco. Sony also makes switchboxes, and dbx used to make a fancy unit that had indicator lights to show which components were in-circuit. Most switchboxes include tape-dubbing switches that allow you to feed the output of one tape deck to the input of another; these switches can also be used to feed a processed signal to a tape deck during recording or to process the tape deck's output during playback.

Output Tubes Glow

Q. I recently purchased a receiver, vintage 1968 or earlier, and I liked it so much that I also got a Fisher Model 800C receiver for its excellent AM section. The output tubes of both receivers glow a blue or purple color—some not at all, some only a little, and some quite a bit. Is this bad? Is it the fault of the receiver or the tubes themselves? All of the tubes test out fine. When should output tubes be replaced? How much power do I lose as they age?—William Luginbuhl, Bluffton, Ohio

A. Glowing output tubes can be the result of various factors. The tubes themselves could be gassy. There may be insufficient bias applied to the grids. This can be caused by problems with the bias itself or by leaky coupling capacitors feeding the grids. That could even make the grids positive with respect to cathode. If such an extreme condition exists, the tubes will be destroyed relatively quickly. The sound will be very distorted as well.

I don't have an answer as to when to replace output tubes. Much depends on how often the gear is used. Certainly if you notice that you can no longer obtain proper output without audible distortion, change the tubes. Deteriorating driver stages can also produce some of these same symptoms.

If you cannot bring the plate current to specification, even when the bias is set properly, the tubes are probably bad and should be replaced.

CD Deterioration

Q. I have read several articles regarding the deterioration of CDs over time. Is there any truth to these allegations, or is it a controversial question without a definite answer? If CDs do have a limited life and will not last forever, will there ever be a medium that will?—Joe Jarocki, Franklin Park, Ill.

A. So far as I know, there is no problem of CD deterioration; I have not had such problems, nor have I received even one letter from a reader indicating that they have.

As for what medium is truly permanent, nothing on earth is permanent. Magnetic tapes can be erased, or their plastics can lose plasticizer. Vinyl phonograph discs can wear out. Perhaps the DAT system offers at least some hope of being archival—not because the tapes can't be erased, but because the information can be copied from one generation to the next by digital means. This is a virtually lossless process as long as the copies are made before the master has had time to deteriorate. A

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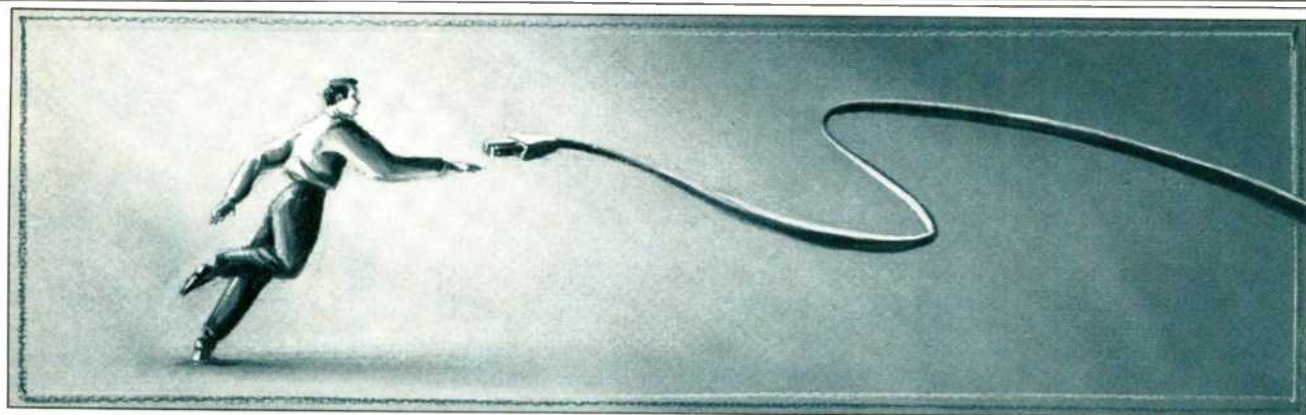
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POLITICAL PRODUCTS



Recession-weary dealers and manufacturers descended on Chicago's CES last June in disappointing numbers. While the government tells us that we are coming out of the recession, most of us feel otherwise. The recession may have bottomed out, but nobody really knows when a general upturn will become apparent or how strong it may be.

In the meantime, the parade of new products continues, and major companies continue to battle it out for technological supremacy in the areas of low-cost digital recording and interactive CD. We'll discuss both of these later.

First, let's recap high-end audio. You remember exhibitors' plight at last year's show: No space at the inn—in fact, nothing but prefab demo rooms in the lower level of the North Hall. Shortly before the show, a large number of high-end exhibitors bolted and set up their own displays at the Chicago Historical Museum, well north of the Loop. Fortunately, CES management took the necessary steps to reverse the trend, and this year the high-end exhibits were back at the Conrad Hilton Hotel, a site they had occupied in earlier years. However, the smallish rooms in the Hilton are not conducive to accurate sound reproduction, and the larger rooms, which work much better, are limited in number and cost a good bit.

A highlight of the Hilton was the Marantz USA exhibit. As you may know, Philips has acquired the Marantz trade name in the U.S. and is working hard to put that company back on the pedestal it occupied 30 years ago. That will take some doing, but they are making strides. In addition to standard models, Marantz was showing a DCC (Digital

Compact Cassette) recorder and a write-once CD recorder.

Marantz also presented a generalized audio computer that can perform several functions. It can automatically equalize the stereo system for a given listening position in the room and provide additional user-adjustable parametric equalization. It has multi-channel outputs for ambience generation and Dolby Surround for video presentation. It offers stereo width control and headphone signal processing for accurate "out of head" localization. Signal compression/expansion and scratch elimination for older LPs is also included. As if this weren't enough, the unit also operates as a versatile test set with sine-wave and noise output signals and a 27-band real-time analyzer. Operation of the unit is made relatively easy through dual video displays which let the user see two menus concurrently.

At McCormick Place, Sharp was showing its latest designs in LCD video projection. The convenience of these projectors lies in the simplicity of set-up—no converging is necessary. The unique design makes use of standard (non-phosphor) white-light sources which are split into three paths, one for each primary color. These three paths are independently modulated by LCD elements, then are recombined and projected via a single lens. The picture has no flicker, but the individual pixels (picture elements) are quite apparent and are annoying to many viewers.

For the first time, Sharp was showing an HDTV projector. Here the pixels are so small (over 3 million in the composite picture) that none of them could be seen as such. Colors were accurate,

and saturation was excellent. While this projector is a standard model in Japan, its only use in the U.S. would be in industrial HDTV applications.

Denon exhibited an interesting variation on standard CD technology, a 3-inch disc capable of 80 minutes of playing time, using no data compression at all. This is accomplished essentially by using a shorter laser wavelength and refined optics to give a pit size about one-half that of the standard CD's. This in turn results in four times the signal density on the disc, as shown in the photomicrograph. While this may never become a music format, it has tremendous potential for CD-ROM and related applications.

Hughes Aircraft is getting into the consumer electronics business! Its products will be a Sound Retrieval System (SRS) adaptor and a series of satellite stereo loudspeakers with subwoofers. While SRS was licensed for TV use by Sony and RCA/GE earlier, Hughes' adaptor is intended for use with normal home stereo electronics, where it will fit into the external processor loop. When SRS is engaged, the adaptor dynamically acts on the stereo difference channel (L - R), creating an increased stereo stage width, largely in the midrange. The listener must sit virtually on the plane of loudspeaker symmetry if the effect is to be heard best. However, in TV application, where the loudspeakers are generally closer together, the listener-location constraints are more relaxed. The control unit provides a good range of SRS settings, from subtle to quite pronounced. My feeling is that most listeners will probably settle into an operating point about midway on

Unexpected.

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MusicBank/Acoustic Isolation System

Not even the Nakamichi engineers who created the 1000 mb expected it to sound so good. Not that it was a *total* surprise. After all, Nakamichi's extensive research had already proven conclusively that vibration—all kinds of vibration, but especially the airborne variety—is bad news for CD reproduction. But when all of the sophisticated countermeasures collectively known as the Nakamichi *Acoustic Isolation™* system were harnessed to combat vibration in the 1000mb CD transport, even its creators were impressed. Then again, Nakamichi products bearing the "1000" model designation have always managed to drop a few jaws. Ask to hear it through the Nakamichi 1000p Digital Audio Processor fitted with the new DA-111p D/A converter upgrade. And expect the unexpected.

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(Corey Greenberg on the sound of the Kevlar Reference Screens at the 1991 SCES, *Stereophile*, Vol. 14 No. 8-August 1991)

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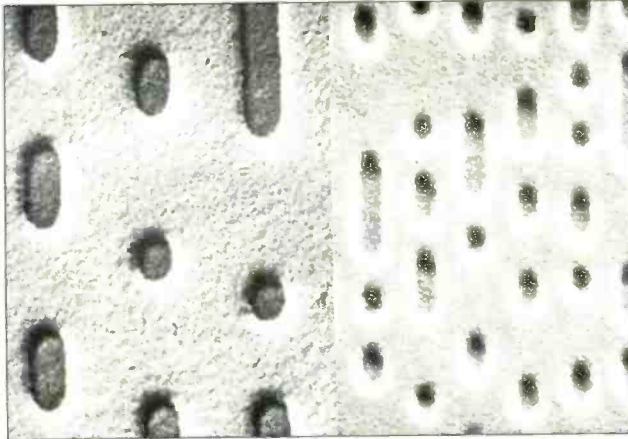
In Philips' dream of the future, analog cassettes would last into the next century; in Sony's, they would wind up in the closet.

this scale. Hughes' satellite loudspeakers are designed for uniform radiation into a 180° horizontal angle and are small enough to permit more flexible options than conventional bookshelf loudspeakers.

Now for the corporate battles. When Philips introduced DCC last winter, the record industry pretty much felt it had a reasonable, viable replacement for the cassette. In fact, the backward compatibility of DCC meant that the changeover from analog to digital could be carefully planned to mesh with hardware growth. The approval of DCC by Matsushita and tape manufacturer BASF looks good, too.

Sony has now introduced the Mini Disc as its answer to the consumer's need for a recordable digital medium. The advantages of the Mini Disc are its convenience and ruggedness. It can hold 70-plus minutes of music and will come in two forms. Like the CD, it can be pressed and, as such, will simply be another carrier of recorded music. A recordable blank disc will be available for about the cost of a metal cassette, and this disc can be rerecorded any number of times. Like DCC, the Mini Disc makes use of data compression, so its performance will not be of the same quality level as the CD.

If Sony's dream comes true, the consumer of the future will have only CDs and Mini Discs. Cassettes would ultimately, like the LP, be relegated to the closet as the industry wound down the



A shorter laser wavelength and new optics give Denon's quad-density CD system (right) smaller pits than standard CD's (left).


manufacture of cassette recorders. (Sony's dream for DAT as a consumer medium has never materialized, despite the wide acceptance of DAT as a professional recording medium.)

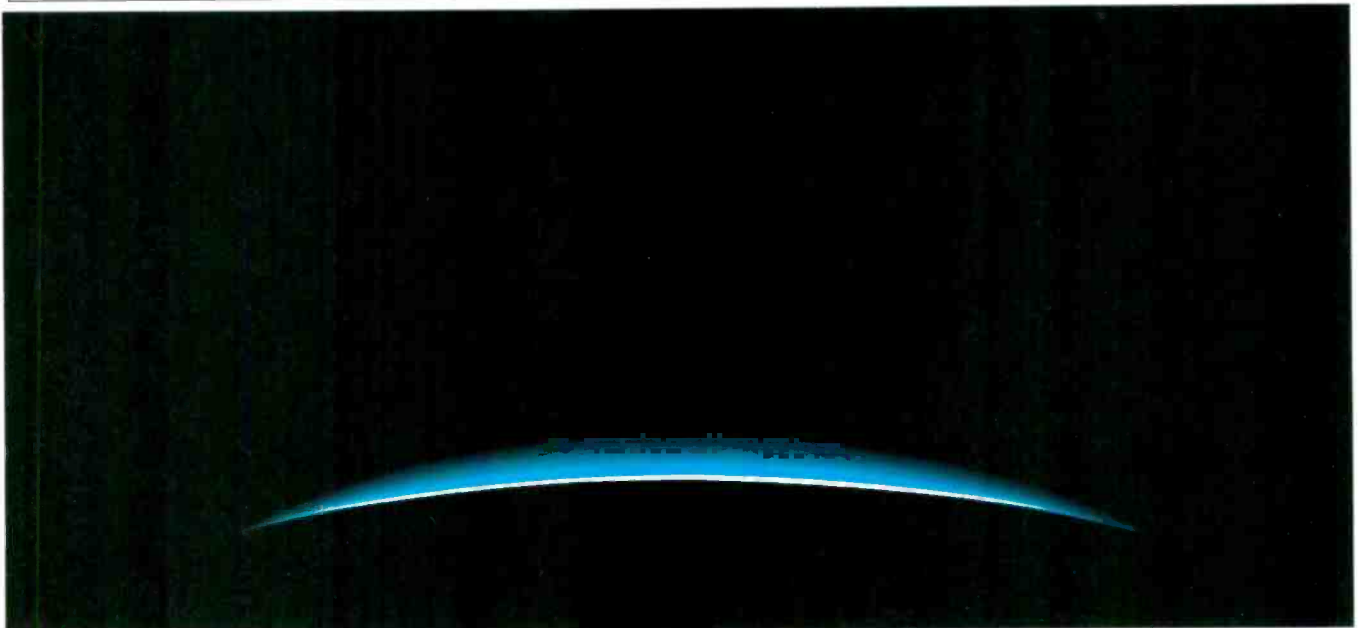
If Philips' dream is realized, the consumer of the future will have CDs, DCC, and a viable collection of analog cassettes with a continuing supply of new machines to play them on. The analog cassette would last well into the next century, in this scenario.

It's too early to call, but the outcome could hinge merely on the relative start-up costs of software and hardware manufacture for the two media.

The other battle now taking place is between proponents of CD-I and CDTV. CD-I stands for Compact Disc Interactive, while CDTV stands for Compact Disc Television. Both terms

refer to the use of specially coded CDs, in combination with a dedicated processor, TV monitor, and a handheld control unit, to provide the user with graphics and text data bases on a wide variety of subjects. The user "interacts" with the system by giving commands via the control unit. Subjects range from informational/instructive to various games.

CD-I is promoted by Philips, Magnavox, Sony, Matsushita, and Nintendo. CDTV is promoted by Commodore. CDTV has a slight edge in that it has already been shipped to the market, albeit on a limited basis. CDTV also has a strong proponent in Nolan Bushnell, the man who put Atari on the map in the early days of video games. And—you guessed it—the two systems are not compatible. 



BERT WHYTE

WHAT GOES SURROUND COMES SURROUND

Motion pictures encoded with Dolby Stereo sound were introduced in the mid-1970s and became commonplace by 1979. Presently, there are more than 3,000 such films, and more than 16,000 theaters throughout the world are equipped to show them. Dolby Stereo is the acknowledged format for modern motion picture sound and has been in place for 16 years. In a sense, it is the only game in town.

In 1990, direct theater presentation of movies accounted for more than \$5 billion worth of business in the United States. However, rentals of movies on videocassette that same year exceeded \$10 billion, and sales of videocassettes exceeded \$7 billion. A substantial percentage of the rentals were for movies that have Dolby Surround soundtracks. (Dolby Stereo is the term used in movie theater sound, and Dolby Surround applies to home video presentation.)

Although, obviously, not everyone who rents such videocassettes has a Dolby Surround decoder and surround speakers, a surprisingly large number of people do have Dolby Surround playback facilities. According to Dolby Labs, over 5 million decoders are currently in use, most of them in the growing number of home theater systems. My own system is fairly elaborate, but even the most basic Dolby Surround systems have left- and right-front speakers plus left- and right-rear or side speakers to reproduce surround information from videotapes or LaserDiscs. Users of Dolby Pro-Logic decoders are likely to add center-channel speakers, and many people add subwoofers as well.

Owners of home theater systems soon learn that not all Dolby Surround movies are created equal. Initially, the surround sound enthusiast is fascinated and overwhelmed by the motional dynamics of the special effects in blockbuster action films. However, many films have no motional surround effects at all. Only ambience information comes from the surround speakers behind the viewer; music, dialog, and sound effects come from the front channels alone.

As might be expected, some people who have a home theater system once owned a quadraphonic system. In fact,



Illustration: Philippe Lardy

many people are curious as to why Dolby Surround is flourishing, since it seems similar to the quadraphonic systems that were commercial failures. The usual answer is that there were too many competing quadraphonic systems—all incompatible. But beyond this was the misuse of the quadraphonic format. In pop music, which is normally subject to all kinds of sonic manipulations in the recording studio, it was a case of "anything goes." Having music from various instruments or groups of instruments cavort among the front and rear loudspeakers was not only acceptable, it was desirable. But the formalized, sacrosanct structures of classical music were torn asunder by arbitrary placement of discrete musical elements in the rear channels, contravening centuries of concert-hall listening—an unforgivable affront to musical sensibilities. Sadly, though the potential of quadraphonic sound was always evident to discriminating producers and engineers, it was never realized. Yes, a number of people, including yours truly, made discrete four-channel recordings with the rear channels properly used for hall ambience. But this was not enough to turn the tide against all of the quadraphonic catastrophes. In retrospect, in its purest form of discrete four-channel

ambience recording, we had the advantage of true stereophonic four channels.

The primary intent of Dolby Stereo recording is the production of motion picture soundtracks for subsequent replay in theaters equipped with Dolby cinema decoders. This imposes some special requirements. In particular, Dolby Laboratories requires that a theater's rear surround channels be limited to a top response of 7 kHz. Dolby Labs also requires that the surround signal be monophonic. This ensures that patrons sitting in the extreme left or right rear of the theater will hear the same effects. If the rear channels were stereo, there would be localization problems.

In home surround systems, the same provisos are usually observed, even though the theater's technical constraints are no longer present. There is no denying that it would be nice to have full-range, true stereo ambience in the rear channels of a Dolby Surround home system. But it must be remembered that almost every movie shown in home theaters was made for theatrical release. (However, it's not inconceivable that someday there might be enough home surround theaters to justify movies produced specifically for that market.)

It has not escaped the attention of the electronics and recording industries that a lot of surround sound systems are now in use. Might they be speculating that this could be a most opportune time to revive quadraphonic sound? After all, consumers who own surround systems are accustomed to sound emanating from rear speakers, and they already have those speakers and the amps to drive them. From what I can gather, the CD Standard (but probably not the Digital Compact Cassette or Mini Disc) includes provisions for four discrete channels of audio, though special discs and players would be required. If such technology were to become available, would the average consumer perceive and appreciate the difference between true stereo ambience and his present monophonic ambience system?

This scenario is not even on the horizon, but a few record companies have noted the popularity of the home theater concept and have issued CDs encoded with Dolby Surround. The main proponent of this system, RCA Victor/BMG, has released a number of CDs in this format. As might be expected, most Dolby Surround CDs are recordings of movie music. They are not derived from actual movie soundtracks but are either new or existing recordings of movie music, mixed or remixed with Dolby Surround encoding. Whether these recordings are new or remixed, the Dolby Surround encoding is

supervised by a consultant from Dolby Labs.

In April 1990, RCA Victor recorded Henry Mancini and the Mancini Pops Orchestra at the CTS studios in Wembley, England. The Dolby Surround mixes were done at Village Recorders in Los Angeles, by Grover Helsley, an engineer with extensive experience in mixing Dolby Stereo soundtracks. (*Editor's Note:* For reviews of this and the following RCA Victor CD projects, see the feature article by John Sunier in this issue.) RCA next turned to its catalog for a notable series of movie music, with Charles Gerhardt conducting the National Philharmonic Orchestra. These were recorded by Decca's legendary engineer Ken Wilkinson in the famed acoustics of Kingsway Hall in London. (Sadly, traffic has now made this venue unsuitable.) Rounding out the RCA Victor collection are a project derived from the voluminous recordings of Arthur Fiedler and the Boston Pops and another involving the music of Isao Tomita, who made fascinating use of synthesizers in four-channel recordings. (Five Tomita CDs have already been processed.) Another 25 or 30 surround CDs of various pop and classical music productions will be forthcoming, including Broadway musicals such as Stephen Sondheim's *Into the Woods*.

A surround CD from Telarc, *Spies: By Way of the World* (CD-83305), is a jazz recording encoded with Shure's

Stereosurround processing. This format is analogous to Dolby Surround and can be decoded through Dolby processors as well as Shure's HTS 5300. There is also a Stereosurround-encoded CD of Holst's *The Planets*, with Eduardo Mata conducting the Dallas Symphony Orchestra on ProArte (CDS 542).

I listened to RCA Victor's, Telarc's, and ProArte's surround CDs through my home theater system and through my main audio system. In the production of these Dolby Surround and Stereosurround CDs, the engineering was very wisely on the conservative side, using only the "difference," out-of-phase ambience information of the recording hall. There was no "stunting" in trying to put discrete instruments in the rear channels or in using any motion effects. In my opinion, the music is better served by this straightforward mixing.

How did these CDs sound? I had no doubt that the rear-channel ambience, even if monophonic, markedly improved the acoustic presentation of the music. It was definitely a worthwhile embellishment, affording a more spacious and natural perspective. These surround CDs couldn't match the heightened realism and the expansion of the acoustic space afforded by stereophonic ambience, but they are a plus for those with home theater systems and significantly increase listening pleasure. A

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CONSTRUCTIVE COMMENTARY

I was pleased to see that *Audio* has addressed the topic of sound transmission between dwellings with "Muffling the Neighbors" by F. Alton Everest (November 1990) and "Good Walls Make Good Neighbors" by Peter Jurew (December 1990).

When not preparing reviews and articles for *Audio*, I am in private practice as an acoustical consultant. Part of this work involves preparing acoustical studies for proposed residential developments; much of it relates to outdoor noise being transmitted indoors. Sometimes I am asked to review the drawings for a multi-unit apartment complex or hotel/motel and make suggestions so that the Sound Transmission Class (STC) values will conform to certain criteria.

Occasionally I receive calls from homeowners about excessive indoor noise. Many of these calls relate to outdoor noise such as traffic or commercial/industrial sources. Other calls are typically from more distraught homeowners who, like the people in the Jurew article, have moved into an apartment and discovered that they hear too much sound from their neighbors. It is difficult to help these individuals because the costs of acoustical testing and consulting, plus the construction to effect improvements, are more than they can afford. Now, at last, I can refer the people who call me to the two excellent *Audio* articles, with hope that they can solve the problems themselves.

A significant number of inquiries relate to what I call "unusual perception." In nearly 20 years of consulting, I have only defined two categories of unusual perception. In the first category, I have investigated two cases where the person was disturbed by tonal noise in the region from 60 to 80 Hz. I amplified the noise in the building and had them listen via headphones and tune in the disturbing noise through a tunable one-third octave filter. The measured SPL of the noise indicated that the clients' threshold of hearing at 60 to 80 Hz was only 20 to 30 dB below the normal value for a young person, and these clients were about 60 years old! (I couldn't hear the noise without amplification.) I am sure that these people would have been highly disturbed by the bass sound of contemporary music

coming through their walls! (The sources of sound in these cases were outdoors.)

The second category involves perception of sound from nonacoustical stimuli; I have investigated only one of these reports. A woman started hearing tonal-type noises in the region from 500 to 2,000 Hz (identified by comparing a tone from an audio oscillator) just after her community was wired for cable TV. The noise levels in her home were very low, as it was a country town with little traffic at night and no businesses open nearby. The perceived sound did not change when she wore ear protection, and her audiologist



said that she did not have tinnitus (ringing in the ears). My investigation ended without finding the source. Another woman indicated hearing high-pitched audio at times when a nearby military installation was testing a high-powered radar, but an investigation was impossible because the military operations were classified. It is difficult to conjecture about the possibilities of such a person hearing her neighbor's audio system via a nonacoustical path. It is interesting to note that, in today's audio systems, we are pumping high currents via 12-gauge wire into very low-impedance, and perhaps inefficient, speakers.

These examples indicate that perception variations among different people may greatly exceed the varia-

tions in the sound transmission paths. These variations could confound any efforts to retard the passage of sound.

The Everest article is comprehensive and accurate. I have just a few points to add. I think that it may be instructive to note some of the numerical criteria that we commonly work with in the acoustics of dwellings. First, and most important, is the actual noise level indoors: The Department of Housing and Urban Development (HUD) recommends a maximum day/night average sound level (Ldn) of 45 dBA. This is a bit complicated, but suffice it to say that if the level is 45 dBA from 7 a.m. to 10 p.m., and 35 dBA from 10 p.m. to 7 a.m., the Ldn will be 45 dBA. The FNMA specifies an STC of 45, minimum, for partitions between living units, and 50 from public spaces to living units. The FNMA minimum STC values for floors between individual living units and between living units and public spaces are 45 and 50, respectively. The Impact Isolation Class (IIC) values for floors between these spaces are also 45 and 50, respectively. California State regulations for multi-family dwellings require a minimum STC of 50 for party walls and floors. The California Office of Noise Control published a 500-page book of acoustical test reports on many wall and floor structures in 1981. (The book is, regrettably, out of print now). This remains the best reference to estimating wall/floor STC, and determining what to do to improve the STC. These, and many lab test reports on floors that are available from manufacturers of building materials, do include the STC rating plus the Transmission Loss (TL) values at standard third-octave frequencies.

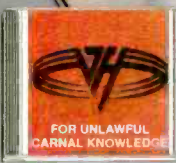
Contrary to what Everest indicates, both STC and IIC ratings are generally measured by acoustical laboratories for floor/ceilings and are stated in their reports. The STC rating relates to reduction of airborne noise, typically speech, and the IIC relates to reduction of footfall noise, which is structure-borne sound. The IIC is most easily improved by a thick carpet and pad, but this will not improve the floor's STC. However, there are many products available, along with tested designs for floor assemblies, which have high STC and IIC values. Some of these may be retrofitted to finished dwellings.

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Adding material to the existing wall, combined with the neighbor's cooperation, is usually more cost-effective.

The STC rating is centered about the performance of the partition in the 500-Hz region and is useful for predicting the attenuation of speech. When I am working with rock music as the source, I disregard STC in favor of the Transmission Loss value at 125 Hz. When the source is mechanical equipment, such as air conditioners, I use the TL value at 250 Hz for calculations. A workable rule of thumb, therefore, is to measure the A-weighted sound level (dBA) in the source room and subtract the appropriate TL value to estimate the (dBA) level in the receiving room. I note that the United States Gypsum Co. specifies a Mechanical Transmission Class (MTC) value for many partitions. This MTC number is centered on 250-Hz performance.

Although the Noise Criteria (NC) curves in the Everest article are all correct, they will be difficult for the reader to work with, as the reader is probably limited to measurements with a hand-held sound level meter, which measures A-weighted decibels. To work with the NC criteria, an octave-band analyzer is needed. That is why I gave the estimating procedure above.

Although I hate articles with math in them, there is one simple relation that may lend an understanding of Everest's graphs of sound transmission loss of walls. It is called the Mass Law, and expresses the obvious fact that sound attenuation increases with the mass of the wall:

$$TL = 20 (\log f) + 20 (\log W) - 33$$

where f is the frequency in Hz and W is the weight of the wall in pounds per square foot.


The audiophile may recognize that the slope of TL versus frequency is 6 dB per octave, the same as for an RC equalizer, rising with increasing frequency. If frequency or weight is doubled, TL increases by 6 dB. The formula is accurate for a monolithic wall such as concrete, but a well-designed stud wall should perform better than mass law at low frequencies. At high frequencies, the TL of real walls does not continue to rise, due to resonance phenomena and flanking paths.

Adding a complete extra wall, as reported by Jurew, can be very effective but is not usually recommended. A

complete partition is very heavy and should not be placed on an existing floor unless a structural engineer indicates that the building will support the added weight. Local building codes will probably forbid this construction without a permit. The materials listed by Jurew may weigh half a ton; I am worried that a reader may build a wall that will end up in the apartment below. Also, the footprint of the wall may significantly reduce the floor area of a small room. The wall's STC may be much greater than those of the flanking paths, such as doors, windows, ductwork, floors, etc., and in those cases the wall represents costly overkill. It is usually more cost-effective to add materials to the existing wall, such as furring strips, resilient channels, and drywall layers, with (uncompressed) insulation in the intervening air spaces. This kind of improvement, combined with the neighbor's cooperation in relocating speakers and possibly adding materials to his side, is an optimum solution.

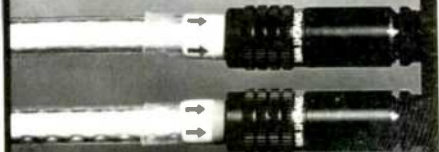
The references in the Everest article are excellent, but some may be too technical for the audiophile/home carpenter. I would like to add two books to his list that may be more understandable to the layperson. *Sound Control Construction*, originally available from the United States Gypsum Co., is now out of print but is helpful if you can find it in a library. *Quieting: A Practical Guide to Noise Control*, written by R. D. Berendt, E. L. R. Corliss, and M. S. Ojalvo, was published by the National Bureau of Standards in July 1976 and is now available from the National Technical Information Service in Springfield, Va. Call (703)487-4650 and ask for Handbook 119.

In addition, one should consult the Sweet's Catalog File, available in libraries, for data and design information in the catalogs of building material manufacturers. A favorite book with acoustical data is mentioned in section nine of Sweet's, *Fire Resistance Design Manual*, and is available for \$6.50 plus postage from the Gypsum Association, 810 First Street N.E., Suite 510, Washington, D.C. 20002 or by calling (202) 289-5440.

I trust that you will find the bulk of these comments constructive, no pun intended. 

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Take the human voice and the microphone, for instance. No, not the technological history of the mike—the effects of it. I've been reading a novel set in ancient Greece, well over 2,000 years back, where the formal outdoor theater and written-out play seem to have originated. No mikes! A marvelously skilled technique of vocal projection superbly aided by surrounding architectural reflection and a slanted bowl for the audience, allowing thousands to hear every word. An old story! My last on this concerned Saint Bernard preaching the Crusade from a French cliff-top to a hundred thousand or so in a valley below. They got the message, all of them, or so we are told.

What people don't know about mike technique today is hard to believe, considering all those video interviews we see every day with handheld mikes switching back and forth and a smooth and easy volume level. I've seen kids do it with play mikes. Adults make a mess of it, with hideous blasts and near silences. . . .

I am recently back from a camp-in that included a variety of events requiring microphone usage. There was, for instance, a big amateur stage show à la Hollywood and a character named Lola, all flounces and hairdo, who walked around on stage and up the aisles (indoor gym) with a wireless mike in hand—complete with big pop

screen—as she interviewed many in the audience. She waved that mike around as though it were a pearl-handled fan, the kind that folds up and then, flip, opens into some gent's happy face. Very Spanish. Great fun to watch. But the sound! Lola would sometimes remember, and whisk the mike up to her capacious mouth; a roar like 50 lions would emerge. But then away went the mike off to one side, coquettishly. A mumble was all we heard. The interviews, of course, were unintelligible, but Lola wasn't aware.

The Boss Man who ran the whole camp was no performer, just a high-level manager and organizer, but his mike technique was faultless. Every word of his frequent announcements was clear. Same mike, merely moved to the huge dining hall, where announcements were made at meals.

The most insidious effect, if I may say so, that mike technique has brought upon us is a disastrous loss of the normal connection between the human voice and its environment of the moment, any moment. Even with a mike. One of the curious effects that the mike novice discovers when he makes a public speech is that *he cannot hear his own sound*. Behind the "public address" mike, whether at a football stadium or an indoor banquet, a man (or a woman) simply loses touch with the acoustic surrounding. At first he simply does not know whether he is speaking (or singing) loudly or softly, whether he is inaudible or perhaps overloading the ears in the far-distant areas. It is a thing we must learn—and do. Some of us.

I hate to say so, but the art of singing minus the mike is in a somewhat sorry state these days, as compared to the

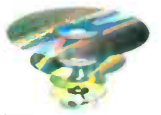
same in pre-mike times. It's the same story. In the old times, a singer learned not merely to *project* a loud sound, to fill up a big space beautifully, but also to harmonize that voice with each and every space, according to its requirements—to resonate, if you will, for the optimum *coupling* between the sound producer and the spatial receiver of that sound. Opera singers well into this century were as skilled as the old Greek actors in this sort of voice control. If singing in a small hall, the performer sang the same music but with less power—for the same effect. If singing *Lieder*, solo songs, in somebody's private music room, the performer expertly shrank his voice to its most minuscule beauty. Some singers still do! And if he had to fill an opera house five times as big as any house in the style and time of the opera he was singing, then he bellowed an enormous blast. Some singers can do *that* beautifully.

All, you see, without microphone. The entire range of classical music was designed *by the composers* to suit the acoustic requirements of their period and of the medium. Operas began small, no more than solo voices with continuo accompaniment, a few soft instruments. Operas grew larger and larger through no less than almost four mikeless centuries. Vocal technique increasingly went for sheer volume, very much at the expense of the precision that was the wonder of the 18th and early 19th centuries. Today, if the soundman has a larger hall to fill, he throws in more amp power, and maybe more speakers. In the past we used more vocal potency. Alas, we still do.

The mike has invaded musical comedy and the Broadway show, thus al-

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LX-200



LX-1000



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O What A Season! Capture The Moments With Olympus

AUDIO Magazine invites you to focus on OLYMPUS.

For a chance to win an OLYMPUS IS-1 35mm Zoom Lens Reflex camera or a Sony portable CD player, simply fill in the blanks, then send us this page or a copy with your name, complete address and telephone number to be received by January 1, 1992. All entries with the correct answers will automatically be entered in a random drawing. Answers can be found in this issue.

1. Capturing memories has never been easier than with _____.
2. For the serious photographer, there's the _____.
3. For point and shoot photographers, there's the _____ line.
4. Olympus quality even comes in _____.

**Mail to: Olympus Sweepstakes
AUDIO Magazine
1633 Broadway
New York, NY 10019**

First Prize:

- * OLYMPUS IS-1 35mm Zoom Lens Reflex Camera (approximate retail value: \$800)

Second Prize:

- * Three second prize winners will receive Sony portable CD players (retail value: \$240)

No Purchase Necessary. Only one entry per person allowed. No entries will be returned. Winners will be selected from all entries received with the correct answers, in a random drawing to be held on or about January 15, 1992. Sponsors not responsible for late or lost mail. Sweepstakes open to residents of the U.S., 18 years or older, except employees of AUDIO Magazine, Olympus, their subsidiaries and affiliates, and members of their immediate families. Void in Puerto Rico or wherever prohibited. Prizes are non-transferable and no substitutions or cash redemptions allowed. Prizes must be claimed within 14 days of notification attempt or winner is subject to forfeiture, in which case a substitute winner will be selected. All taxes are the responsibility of the winner. Winners may be required to execute an affidavit of eligibility and release. Odds of winning depend upon the number of correct entries received. For a winners list, please send a self-addressed, stamped envelope by January 15, 1992 to: AUDIO Magazine, Olympus Sweepstakes Winners, 1633 Broadway, New York, NY 10019.

An insidious effect that mike technique has brought on us is loss of connection between the human voice and its environment.

tering what once was really a popular kind of classical music into a more contemporary but much more raucous and noisy format. Not loud voices! Loud amplification. A very big difference. On the other hand, big operas—those that come before a handful of really contemporary works—are still performed largely in the outward manner of the past, if in generally much larger places. No mikes. Pure vocal (and instrumental) volume, controlled at the source, not at the console or mixing panel. It's another world, and becomes a more difficult one every day. Shall we use mikes for old operas (and much else)? If we do, we make a drastic, fundamental change in the production of sound. Most singers trained for opera (i.e., loud) simply cannot sing into a close mike.

If a pop singer's mike goes dead, there is no sound at all beyond a few feet. Pop styles are *designed* nowadays for microphones, and the singers design their voices for the same. No power. Leave that to the electronics. But a "classical" singer still spends hours, days, years, developing the loudest, most forceful tones the teacher can get out of him with, hopefully respectable sonic quality.

What does an opera-trained singer do in a small listening space—I mean, live? My experience is that most sing just as loudly as in the opera house. Indeed, most of the music they perform is *designed* for such singing and simply cannot be sung at half volume any more than you can shout at half volume. Richard Wagner's operas are perhaps the ultimate in this respect. (And he also knew wonderfully well how to use *sotto voce*—half-voice—effects, almost whispered yet still in song, and was still able to fill a big house.) This Wagnerian tradition was built largely because of the heroic qualities of his characters, not ever just ordinary people. They were bigger than life; they must sing the same. Richard Strauss, Wagner's follower, used even bigger orchestral effects and voices on the same scale, but, progressively, his people became more realistic, intimate, human, and his writing for them the same.

Where Wagner's gods and supermen orated, at enormous length, Strauss gives his people real conver-

sations, up to speed, yet couched in music. *This* opera, you see, is heading toward the contemporary feeling *and the microphone*, though Strauss surely did not realize it nor, I expect, would have admitted it. Good Strauss singers are rare. They use no mikes, and yet their sound must have a close-up quality that belongs in our microphone age.

One of the curious eras in microphone technique came at the very beginning of the electronic age in recording. Audio engineers, after 1925 or so, were so fascinated with the things a microphone could do that they overdid, applying what amounted to pop technique to music inherently unsuitable for it. The great Kirsten Flagstad's first American recordings were that way. Listening, you hear the lady's tonals, loud and clear. Every sniff is audible, remarkably hi-fi. And the orchestra, supposedly all-enveloping and bathing the voice in its wonderful sound, is so far away and faint that its impact is about that of a radio ad background. How we do get mixed up!

It seems to me that TV, now expanded to video, has brought a whole new range of useful mike techniques to go with its pictures. That man in the furniture ad, for instance, who ambles slowly from the far background to head-and-shoulders position while making his pitch: Perfect audio balance and liveness, natural volume. No mike visible. In his hair? In a pocket? It is miking perfection, compared to Lola.

Indeed, there is here an ever widening difference between professional and amateur. The general public simply cannot do a good mike job, cassette machine or camcorder, with the knowledge and equipment it has. Whereas almost anybody can turn out good color pix, microphoning is a very pro skill. Like the art of the speaking voice in old Greece.

Thettalos, a Greek professional actor of mature fame, has been caught carrying spy messages, is defending himself before the King, who is ready to kill him on the spot. I give you one memorable sentence from this account: "In his resonant voice, which could have reached an audience of twenty thousand, now pitched perfectly to the room, he delivered his supplication." Thettalos was pardoned. He didn't need a mike. **A**

Oh

This holiday, the best things you can open are your eyes. Capturing memories has never been easier than

What Would

with Olympus. Take our compact zoom cameras. They're loaded with thoughtful technology such as red-eye

Christmas Be Like

reduction and power zooms to let you get close to the moment in a moment. For the serious photographer,

Without O? There'd

there's the IS-1, the world's first integrated system Zoom Lens Reflex camera. One camera with hundreds

Be No Snowflakes. No Eggnog.

of options and one incredibly sharp Olympus 35-135mm zoom lens. For point and shoot photographers,

Nothing To Open. There Would Be

you can choose the Infinity Jr. or the new auto-focus Infinity Stylus—the most advanced ultra-compact

Santa Claus, But He Wouldn't Be Jolly.

camera ever. Olympus quality even comes in compact 8mm video camcorders. There's a

whole range of cameras



at a whole range

of prices. So put Olympus under your tree this Christmas and never miss another ho, ho, ho.

And There'd Be No Olympus Cameras
To Wish For Because You've Been So Good.

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Signature Reference Series: The Very Best of the Best

The legendary sound of Polk loudspeakers has for years been exemplified by its flagship Signature Reference Series (SRS), the speakers that carry Matthew Polk's signature.

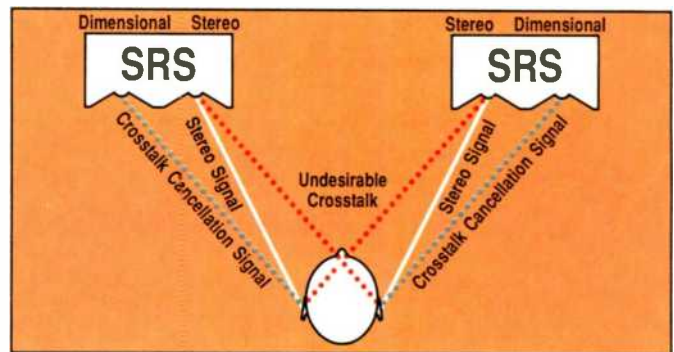
Polk now introduces its SRS 1.2TL, 2.3TL, and 3.1TL, each featuring the latest breakthroughs in loudspeaker technology. Following is a technical brief of why the SRS speakers sound so remarkably like a live performance. After reading this information, it is hoped that you listen carefully to the SRS loudspeakers at your Polk Audio dealer. While you will probably hear things you have never heard from a stereo system, you can be assured that everything you hear is true.

It All Begins With the Sonic Excitement of Polk's Stereo Dimensional Array (SDA)

Years ago Polk Audio recognized the importance of more absolute separation of information reaching each ear. Of course, the fundamental

With conventional speaker systems, each ear hears both speakers, and the separation is minimized. The resulting soundstage is reduced to the small space between the speakers. A large symphony orchestra is reduced to only a few feet wide and a few inches deep.

Polk's "True Stereo" SDA technology delivers left signal information to your left ear and right signal information to your right ear. Each ear only hears its proper signal, thereby maintaining full stereo separation. The resulting soundstage is dramatic.



Each Polk SDA incorporates a special extra set of drivers which radiate a difference signal that cancels the undesirable signal going from the wrong speaker to the wrong ear (interaural crosstalk distortion). The result is True Stereo reproduction.

...everything you hear is true.

concept of stereo reproduction is that there are two separate channels of information, each intended for one ear only (i.e. "true stereo").

To more accurately reproduce sound as it was originally created, it is vital that the integrity of this separation of information be maintained.

Experts have called the Polk SRS Series featuring the revolutionary Stereo Dimensional Array (SDA) technology "mindboggling...astounding...flabbergasting...a new dimension in sound." Others have discovered new life in their favorite musical selections. It is "True Stereo" by Polk.

Yes, Everything You Hear is True

Listen to what the critics say: "Mindboggling..astounding...flabbergasting." Listen to what other Polk owners say: "I've never heard anything like it...it's whole new world."

But no number of written accolades will prepare you for the experience of listening to the SRS loudspeakers at your Polk Audio dealer.

We invite you to your local Polk Audio dealer for a demonstration of this technology. Because everything you hear is true.

You will hear the next generation of loudspeakers.

polkaudio

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For More Information



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ZERO BOREDOM.

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PIONEER
The Art of Entertainment



CLD-M90 5-CD/LaserDisc Player

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A woman with short blonde hair, wearing a black top, sits on a dark sofa with a red and black patterned blanket draped over her. She is looking towards a large white screen. A man with dark hair, wearing a grey hoodie, sits on the other side of the sofa, also looking at the screen. The screen displays the text "HOLLYWOOD AT HOME" in large, bold, red capital letters. The room is dimly lit, with a small table to the left of the sofa holding a decorative object. A potted plant is in the foreground, and a larger arrangement of plants is to the right. The ceiling has recessed lighting.

HOLLYWOOD AT HOME

AUDIO's Guide To The New Home Theater Experience

What you see is what you hear.



Surround Sound decoders and acoustic environment simulators are supposed to give you a heightened sense of reality when you're listening to music or watching a movie. Unfortunately, most of their effects circuitry robs the original performance of fidelity.

That's why Denon created the AVC-3020 Surround Amplifier and the AVR-810 and AVR-610 Surround Receivers. Their special Dolby® Pro-Logic™ Surround Sound processor outperforms all previous analog or digital decoding circuitry in terms of delivering true *high fidelity*. You'll hear greater dynamic range, more channel separation, lower distortion and precise low level steering—the ability to place sounds exactly where the director intended them.

Remember, without high fidelity, there can be no "reality." And what's the point of a Surround Sound system, if it doesn't sound real?

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Denon America, Inc., 222 New Road Parsippany, New Jersey 07054 (201)575-7810

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DENON
The first name in digital audio.

Home Theater is now an integral part of the '90s' audio/video landscape. The much awaited—and discussed—marriage of audio and video is now a reality. For potential consumers, however, a crucial ingredient to this high-tech link-up is communication. One person's definition of Home Theater is another's fantasy, particularly when visions of Hollywood screening rooms at home fill the air. The reality—and essence—of Home Theater is simply "Big Picture, Big Sound." While some enthusiasts will spend a fortune for a cutting edge system, according to industry experts, it's not really necessary to do so. You can build a system one component at a time, as your budget permits, all the while working toward the goal of bringing a thrilling movie theater experience right in the middle of your livingroom.

While enthusiasts can argue which specific components are the best for a Home Theater, they

all agree that it takes five ingredients to really get the job done. They are a big-screen TV (27-inch screen and above), an A/V receiver with Dolby Surround, a laser disc player, a Hi-Fi VCR and at

least four quality speakers for the front and rear channels. Within this basic quintet are literally hundreds of options with a variety of special features and a wide range of prices. In fact, manufacturers are constantly improving overall quality and conveniences. And, fortunately, prices have *dropped* in the key Home Theater categories.

This special section will provide an overview of Home

Theater '92. We'll take a close look at the components that can easily turn your sofa into front-row center seating for your own screening of "Fantasia" or "Terminator 2." The prices are right and more importantly, the experience is a knockout.



©WALT DISNEY



MITSUBISHI HOME THEATER SYSTEM

Televisions—The Cutting Edge

A television is not only your eyes on the world, a big-screen TV is an integral part of the "Hollywood At Home" experience. And today's big-screen sets offer finer images, more advanced features and higher-quality audio circuitry than ever before.

There are three types of television sets currently available—direct view, rear and front projection—giving enthusiasts an extremely wide variety of



MITSUBISHI VS-50VX2

screen and feature options for their growing Home Theaters. Direct view sets can reach a screen size of 35 inches and deliver powerful picture performance while projection TVs can reach 15 feet! A critical measurement of TV quality is resolution, the amount of picture detail in a single scanning line; it is measured in lines. Better sets will have specifications of over 500 lines, which will be more than enough for laser discs, the best prerecorded software at this time.



ProScan PS31151

Top direct view sets, like the Mitsubishi CK-3535R (\$2,899), use cathode ray tubes (CRTs) with High Contrast coating, digital comb filters, a dot pitch of .85mm and Invar shadow masks to produce 700 lines of resolution. The image really sparkles. The tabletop monitor/receiver has a 181-channel tuner, 15 watts of audio power as well as picture-in-picture so you can watch two programs at once. The CK-3535R and select Mitsubishi sets also feature the ViewPoint on-screen operating system. According to Bill Loewenthal, the company's Product Marketing Manager, ViewPoint is an "integral part of our 'systems' approach to Home Theater. This lets people buy our components as their budgets permit and the equipment will



PIONEER PRO-95

always be compatible. They can start with a 27-inch set or larger, add a Hi-Fi VCR then advance to Dolby Pro Logic and larger projection TVs. And since the components all use a common operating system, it makes sophisticated equipment very easy to use."

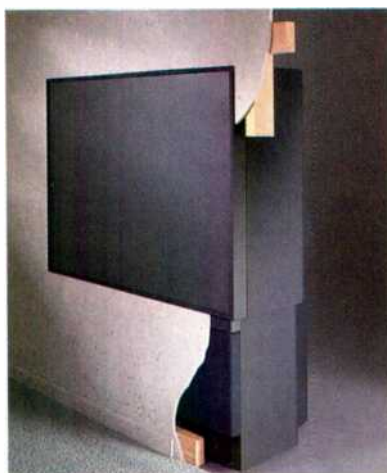
Other manufacturers also use cutting edge technologies to wring every possible ounce of picture quality from a video signal. Sony's KV-29XBR85 (\$2,099) uses ASC Active Signal Correction circuitry to increase sharpness and



SONY KV-29XBR85

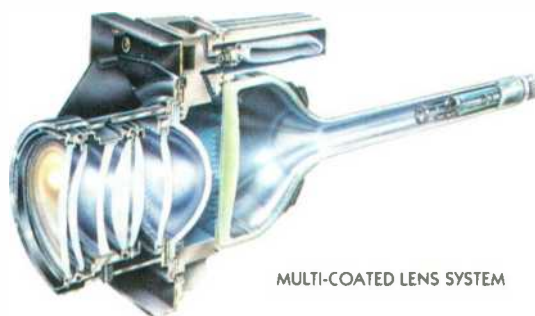
brightness. The 29-inch set is rated at 550 lines, has two tuners for Advanced Digital Picture-in-Picture convenience and SRS circuitry for enhanced sound performance. The 31-inch ProScan PS31151 (\$1,899) uses a digital comb filter and a wide band video amplifier to produce 650 lines. It has a built-in Dolby Surround decoder as well.

Those enthusiasts who really want "The Biggest Picture" for their Home Theaters can choose between screen sizes of 40 inches and 15 feet. And the quality of rear and front projection TVs has taken quantum leaps over the past few years. Not only has picture performance improved, cabinet size of rear projection sets has decreased, allowing them to fit in many more dens and family rooms. Leaders in this "trimming down" movement are Mitsubishi, Hitachi and Pioneer. Mitsubishi (see diagram) and Philips offer sets that can easily be built into walls.



MITSUBISHI SETS CAN EASILY BE BUILT INTO WALLS.

Critical viewing measurements for rear projection TVs are horizontal resolution, brightness and viewing angle. Unlike direct view TVs, rear projection sets use three CRTs (red, green, blue), hybrid lenses and a mirror reflector system to form the image you see on the screen. The design of the CRTs and lenses are vitally important for picture performance (see diagram). They directly impact on resolution, brightness (measured in footlamberts) and viewing angle (measured in degrees). Examples of top shelf rear projection sets include the Mitsubishi 50-inch VS-5017S (\$3,699), Hitachi's 60-inch 60SX1K (\$4,400), the 50-inch Pioneer Elite Pro-95 (\$4,800) and the 52-inch Philips 52LP50 (\$3,299).



MULTI-COATED LENS SYSTEM

Front projection TVs provide the biggest picture of all, up to 15 feet with 10 the most commonly found. This type of set consists of two separate pieces: a projector (using three CRTs) and a screen. Like rear projection sets, resolution, brightness and viewing angle are especially important specifications.

Several front projection TVs are now using LCD (Liquid Crystal Display) technology to produce an image, rather than CRTs. Sharp was the first to offer one and now has the third generation XV-120ZU (\$4,000). Philips will also have an LCD projector available early in 1992.

No matter which type of television fits your interpretation of Home Theater—and budget—quality and performance have now reached the cutting edge of video technology.

Some on-screen
TV and VCR menu
systems utilize
all upper case letters
that are hard
to read, mysterious
instructions, or
strange, meaningless
abbreviations that
you have to be psychic
to understand.

Our new ViewPoint™ System prefers English.

SET-UP

TIME SET
▶ CH PROG
ERASE AD TV CATV
PICT PREF
AIR/CABLE
CHANNEL CAPTION

USE (▲▼) & RETURN
(EXIT) TO QUIT

Look at competitive on-screen displays and you may see something like this.*

When Mitsubishi created the concept of Home Theater, we figured it didn't make sense for people to sit down in front of the most incredible sights and sounds television could offer, only to focus most of their attention on making the thing work.

We wanted our technical expertise to enhance the experience, not to complicate it. To work for good, not evil.

This year, we're introducing one of the most remarkable examples of our philosophy to date.

An advanced on-screen operating system called ViewPoint which, using our latest interface technology, lets you control your Home Theater System without distracting from the enjoyment you bought it for.

The System is so elegantly

simple, two buttons are all you need to operate it.

The on-screen information is displayed in upper and lower case letters for better readability, and communicates in a familiar language: English.

That means fewer abbreviations to decipher. Functions like "Time Set" and "Ch Prog" become "Set the clock" and "Memorize channels."

For more complex operations, a logical question-and-answer format guides you through.

Our unique point-and-click interface allows you to simply point to the on-screen item you need. While a P.I.P. window lets you monitor the TV picture as you use any of the menu features.

ViewPoint is available with many of our big screen TV's, our

◆ First Time Set-Up

Your choices are:

- Set the clock
- ▶ Memorize channels
- Add/delete channels
- Use Home Theater: off
- Rename the inputs
- Name the channels

Use ADJUST to select.
Then press ENTER.

Press MENU to return
to TV Main Menu.



The same instructions in the easy-to-understand language of Mitsubishi's ViewPoint System.

31" and 35" direct-view TV's, and three of our VCR models.

And because all Mitsubishi components are designed to integrate fully—not just from component to component, but from year to year, as far back as 1986—ViewPoint is also compatible with our previous menu systems.

So whether you're looking for a complete system, adding to an existing one, or building one a few components at a time, everything works together not only esthetically and electronically, but functionally as well.

Which is exactly what you should expect from a great Home Theater system.

At least, that's our viewpoint.



MITSUBISHI

TECHNICALLY, ANYTHING IS POSSIBLE™

*call (800) 527-8888, extension 245. *This is a composite model of on-screen displays on the market. Actual features and readability may vary.*

Enter No. 31 on Reader Service Card

Sound Sensations

Whether it's "Hasta La Vista, Baby" from "Terminator 2" or the wonderfully restored soundtrack of "Fantasia," listening to a movie is almost as important as the visuals. In order to fully re-create the movie theater experience at home (minus the popcorn, of course) a Dolby Surround or Pro Logic audio system is a must. And one of the most cost effective ways to reach this goal is the A/V receiver.

Top quality A/V receivers feature enough dynamic power to drive the most complex speakers, extensive audio/video switching capability and have either a Dolby Surround or Pro Logic decoder for true Hollywood-At-Home sound. Almost every blockbuster movie has a Dolby Stereo soundtrack which contains four channels of audio information—front left/right, center dialog and rear surround. Components with Dolby Surround decoding will deliver three of the channels, front left/right and surround, which provides the bone-crunching ambient sound effects moviegoers enjoy so much. It takes four speakers for this version. Dolby Pro Logic goes a big step further and decodes all four channels, including the important center dialog information (requiring a total of five speakers). Just how important is the center channel? For many experts, it takes precedence over any other. It anchors the dialog in the middle of the screen, just like in a movie theater, and accurately localizes the effects channels.

At one time components with Dolby Pro Logic were out of the reach of most consumers. Today it's a completely different story. Companies like Onkyo, Denon, Pioneer, Kenwood and many others now offer high-powered, high-quality Dolby Pro Logic receivers. A good example is Onkyo's TX-SV70PRO (\$850). The Pro Logic receiver is rated at 90 watts per channel into 8 ohms in the stereo mode. When punched into surround, power ratings are 85 watts-per-channel across the three



ONKYO TX-SV70PRO

front speakers and 30 for the rear surround channel. Unlike many other manufacturers Onkyo uses discrete power sources for all Pro Logic channels to improve the overall sound experience. The TX-SV70PRO also has extensive on-screen displays and a full-featured remote to easily access all of its sophisticated functions. It even has multi-room capability to bring high-quality audio to other parts of the house (by adding optional infrared repeaters).

Denon has taken the advanced single IC Dolby Pro Logic circuitry once only found on its AVC-3020 A/V Surround Amplifier and incorporated it into the new AVR-610 (\$600). The new chip delivers improved channel separation, reduced distortion, wider dynamic range and increased signal-to-noise ratios. The result is a dramatic at-home movie experience. By using discrete components, the AVR-610 pumps out 75 watts-per-channel each for the three front speakers and 20 watts each for the rear surround speakers. Along with Pro Logic, the AVR-610 has Hall and Studio modes for non-Dolby encoded material that provide either the big



DENON AVR-610

sound quality of a hall or the intimate feeling of a studio. There are also three video inputs and three audio inputs to handle growing systems.



KENWOOD KA-V9500

Kenwood's KR-V9030 (\$979) is part of the new breed of A/V receivers that not only have Pro Logic but Digital Signal Processing (DSP) as well. DSP simulates different sound fields and acoustically turns any room into an auditorium or concert hall. The KR-V9030 has six DSP options and is rated at 75 watts-per-channel across the three front speakers, 15 rear. Pioneer was the first company to offer a receiver with DSP, the VSX-D1S, and has added the VSX-9900S (\$1,100) to its line. It is rated at 125 watts for the front left and right, 40 center and 40 for the rear. This receiver has six video and five audio inputs, 30 AM/FM presets, a programmable Smart remote and a split screen video enhancer.

Other new A/V Pro Logic receivers of note include Mitsubishi's M-R8010 (\$1,399), JVC's RX-1050VTN with CompuLink (\$1,500), Yamaha's RX-V1050 with



PIONEER VSX-9900S



YAMAHA DSP-A1000

DSP (\$1,199), the Luxman RV-371 (\$1,400), Technics SA-GX710 (\$629), Sansui's RZ-9500AV (\$769) and the Fisher RS646 (\$499).

Along with the recent accessibility of Pro Logic, enthusiasts are now able to enjoy THX movie theater components for their Home Theaters. This sophisticated system, is an enhancement of Dolby Pro Logic and requires special amplifiers, decoders and speakers. Technics was the first to offer a complete system and recently high-end manufacturers such as Cambridge SoundWorks, Fosgate, Lexicon, NAD, Triad and Snell have become THX licensees.



TECHNICS THX amplifier

While THX is considered by many to be the "ultimate" Home Theater sound system, there are many other high-quality Pro Logic components available. Some of the most highly regarded are Yamaha's DSP-A1000 (\$1,500) integrated A/V amplifier, Kenwood's KA-V9500 amp (\$1,499), Sony's TA-E1000ESD preamp with Pro Logic and Carver's CT-17 A/V preamp/tuner with Pro Logic and Sonic Holography (\$799).

What good is Dolby Pro Logic if you're powerless to enjoy it?

In the desire to turn everyone's living room into a movie theater, more and more manufacturers are featuring Dolby Pro Logic Surround Sound in their components.

But, **featuring** Dolby Pro Logic and **delivering** Dolby Pro Logic aren't necessarily the same thing. Onkyo understands this difference, unlike those manufacturers interested only in their products having the latest "hot button" regardless of how well they incorporate it.

The promise of the Dolby system lies in its ability to create an extraordinary sensory experience. One you shouldn't be powerless to enjoy because your receiver or amplifier can't handle the demands of dialogue, soundtrack and special effects all at the same time.

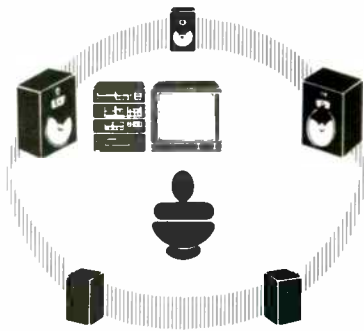


That's why Onkyo Dolby Pro Logic components are built with a strong amplifier foundation. Every model features Low Impedance Drive power supplies, consisting of heavy duty transformers (40% larger than many of our competitors), oversized capacitors and discrete output circuits.

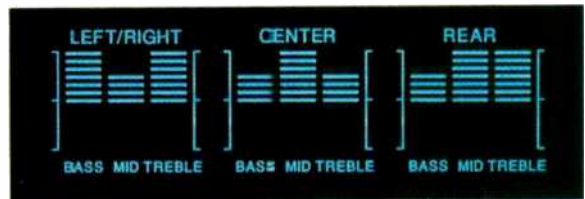


And because we've taken no sonic shortcuts, our A/V components are rated into low impedance loads down to 2 or 3 ohms. These measurements, called Dynamic Power Ratings on a spec sheet, reflect the power reserves an amplifier must have to handle peak power demands. Onkyo A/V components give you the best of both worlds—power to spare for movies, the performance of separates for music.

At Onkyo, we don't believe in shortchanging the critical center channel either. Many of our Pro Logic A/V components have 5 separate amplifier sections, one for each channel, with the power matched between the left & right front and center channels. In this way, the relationship between the dialogue, effects, and music is in the exact proportion the director intended. If they're not, sounds that are supposed to come towards you and envelop you lose their impact, and whispered dialogue becomes overwhelmed.



Onkyo's home theater philosophy also takes into account the physical configuration of your home. An adjustable rear channel digital delay lets you tailor the surround effect to the size and shape of any room. For even more flexibility, our A-SV810PRO features an 8 Mode Digital Soundfield Processor, plus the ability to individually equalize the bass/mid/treble frequencies for each channel.



So, before you invest in any A/V receiver or amp, check to see how it stacks up in terms of Dynamic Power, center channel wattage, and the ability to shape the sound to your needs. Remember, a great Dolby Pro Logic experience requires more than just a logo on a faceplate.

It demands a company as dedicated as Onkyo to bring it to life.



Onkyo's achievements in Dolby Pro Logic have been recognized by the industry through Audio Video International's awarding their 1991 HiFi Grand Prix Awards as "Product Of The Year" to our TX-SV70PRO Pro Logic Surround Sound Receiver, A-SV810PRO Pro Logic Surround Sound Integrated Amplifier and ES-600PRO Pro Logic Surround Sound Processor.



ONKYO®

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The Laser's Edge

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PHILIPS CDV600

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SONY MDP-605

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One of the newest VCR trends goes beyond Hi-Fi sound and attempts to solve one of the most baffling tasks confronting Americans—how to program an unattended VCR to tape a TV show. Manufacturers took a big step forward in solving the mystery several years ago with on-screen displays. They have refined them further, making them easier to use. A good example is Mitsubishi's ViewPoint operating system, which is found on their top models such as the HS-U82 (\$999). ViewPoint instructions are clearly written, making even the most advanced functions easy to use. RCA has taken another approach and incorporated VCR Plus codes into three of their new VCRs (VR680HF at \$579 is the least expensive). The

codes are found in major newspapers, entered into the remote and programming's done. Also of note is Panasonic's simple-to-use LCD Program Director found on their better Hi-Fi models such as the PV-S4167 (\$799).



mitsubishi HS-U82

HARDWARE HINTS

Other '92 VCR pointers: new models with center loading slots are available from Sharp and Fisher. The companies state this "mid mount" design cuts down on vibration and adds to image stability particularly for big-screen TVs (Sharp VC-H85U,



PANASONIC PV-S4167

\$569 and Fisher's FVH-4903, \$499). Prices of Super VHS VCRs are now more attractive. This higher-quality version of VHS offers little prerecorded software but make excellent tapes of off-air broadcasts and "work prints" for owners of high-band camcorders.



RCA VR696 HF

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THE BOSE LIFESTYLE MUSIC SYSTEM

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THE
AUDIO
INTERVIEW



New York's New Maestro



Kurt Masur

Concertgoers' expectations today are vastly different from those of their parents 20 years ago, says the new music director of the New York Philharmonic—and high-quality sound and video recordings have a lot to do with it.

"Back then, the average concertgoer was content to see the conductor and the first row of violins, with the rest of the orchestra incognito. But that was before technology told him that a lot of interesting things were going on back there," Kurt Masur explains, leaning back in his chair in a lounge backstage at the Gewandhaus concert hall in Leipzig, where he's been conducting since 1970. In September of this year, Masur, a genial bear of a man, began his service as music director of not just one, but two of the world's great orchestras—the Philharmonic in New York and the 210-year-old Gewandhaus Orchestra in Leipzig, in what was East Germany.

Masur, who has nearly 100 recordings to his credit, mostly with the Leipzig Orchestra, believes that low-cost, readily available recordings have made today's audiences familiar with a much wider range of music than ever before. And he believes that the steady development of recording technology—high fidelity in the late 1940s, stereo in the 1950s, and the digital recording of the 1980s—has enabled listeners to hear things in the music that earlier generations may have missed, such as the musicality of a contrabass that in analog days was reproduced as little more than bass percussion, or a solo flute that was once lost in an orchestral climax.

— Robert Angus —

"People are used to hearing those details at home, and when they come to the concert hall, they want to see the musicians and the instruments that make those sounds," Masur says, warming to his subject. "It's something like the beginning of the movies. The first films were silent. Then a piano player was added, changing the division between sight and sound. Movie producers found that music could help create a mood, or highlight the action, or advance the story. That changed the expectation of the audience, and by the end of the silent era you found serious composers writing music to accompany silent films, a practice that expanded with the coming of sound. Audiences were getting more sophisticated with each improvement. Now you have theaters where the sound completely envelops the moviegoer and puts the audience into the action.

"Audiences are better educated, generally, than those of 20 years ago, perhaps because people are forced to have a high degree of technical knowledge in their jobs or professions, and they don't check that at the door when they leave the office. When they come to a concert, they want to understand what is happening and how, to take part in the technical aspects of music making. Today's audiences are no longer content to close their eyes and let the music wash over them."

The trick, Masur admits, is to enable his listeners to do that without making changes in the music and how the audience hears it. Shortly after he assumed the conductorship of the Leipzig orchestra, plans were announced for a Gewandhaus to replace the "new" one built in 1884 and bombed into oblivion 60 years later, toward the end of World War II. Since the War, the Gewandhaus Orchestra had performed in the Congress Hall a quarter of a mile away. That hall, built for meetings and exhibitions, never seemed quite right, acoustically, as a concert auditorium.

From the beginning, the authorities invited Maestro Masur and the members of the orchestra to participate actively in planning for the new building. The result, the third Gewandhaus, opened to critical acclaim in 1981. Its eggshell construction, a sort of late 20th-century version of a Roman amphitheater, allows most listeners to look down on the orchestra from the terraced balconies that surround it. Ris-

*Developments
in recording technology
enable listeners to hear things
in the music that earlier
generations might
have missed.*

ers at the back of the stage make it possible for the brass, percussion, and string bass sections to be seen by listeners on the main floor as well. Masur takes immense pride in the eggshell design, a sort of building within a building that isolates the chamber from the noise of streetcars and other traffic passing by outside, all too evident in the lobbies that grace the front of the building. It is, he notes, perfectly suited to the making of recordings; virtually all of the orchestra's sessions have been held there over the past 10 years.

Musician input didn't stop in the planning stage. The architect created a 1:20 scale model of what the new auditorium would look like, complete with seats and other fixtures, in which it was possible to make acoustic tests. Orchestra members suggested raising the roof to increase reverberation time to 2.1 seconds. They also pressed for "sound-neutral" seats—comfortable

units that have the same acoustical properties whether or not someone is sitting in them. The proportion of sound-reflective to sound-absorbent materials used in the seats varies depending on their locations throughout the Gewandhaus. "We learned lessons from Avery Fisher Hall," an orchestra spokesperson added.

Explaining his egg metaphor, Masur says, "We have only to adjust the sound for the middle of the egg. If it is right there, then it is right throughout the hall." The acoustics are so good, in fact, that the late Leonard Bernstein reportedly complained that he could hear players at the back of the orchestra turning the pages of their music as they played, and it was distracting him.

Kurt Masur was born on July 18, 1927 in Brieg, Silesia, now part of Poland. His first musical training was at the keyboard. Attending the Collegium Musicum of Leipzig, he studied cello, percussion, and conducting. After graduation he was appointed orchestra coach at the Halle County Theatre, followed by positions as *Kapellmeister* at the opera theaters in Erfurt and Leipzig. In 1955, he became a conductor of the Dresden Philharmonic and in 1958 returned to opera as the general director of music at the Mecklenburg State Theatre. Two years later, he was named senior director of music at the Komische Oper in East Berlin, a post that brought him to the attention of international audiences when the Komische Oper toured parts of Western Europe, Japan, and elsewhere.

In 1967, Masur moved to the Dresden Philharmonic as chief conductor, a post he held until 1972. His United States debut came with the Cleveland Orchestra in 1974, the same year he first toured America with the Gewandhaus Orchestra. In 1987, he took the Gewandhaus Orchestra on an extensive tour that included the United Kingdom, the United States, Japan, and China.

On October 9, 1989, Leipzigers assembled in the city's two main churches—the Thomaskirche, where Bach played the organ, and the Nikolaikirche—for a candlelight vigil protesting the Communist government. During the evening, more than 200,000 people spilled out of the churches and marched to the Augustusplatz, across the street from the Gewandhaus. Standing in its magnificent glass foyer, Masur had a dramatic view of history

being made outside. He opened the doors of the concert hall to the marchers and, together with religious leaders, a prominent theater director, and even three secretaries of the Communist Party, served as a moral focus for the peaceful revolution.

"In a way," he said, "I was only carrying on those principles that I try to uphold when I conduct: Beethoven's hope in the 'Choral' Symphony was exactly for that which was happening all over Eastern Europe." Mentioned frequently as a candidate for president of the free transitional government, he declined the honor and today refuses to discuss politics when interviewed.

Other topics that are off limits include the relative merits of the Gewandhaus, which Masur helped to create, and Avery Fisher Hall, where he has been busy making improvements in the acoustics. He does acknowledge that he "will try to make some small corrections" to make the concert experience more attractive to the Lincoln Center audience.

"In most halls, musicians must adjust to the acoustical properties of the hall," Masur observes. "They don't



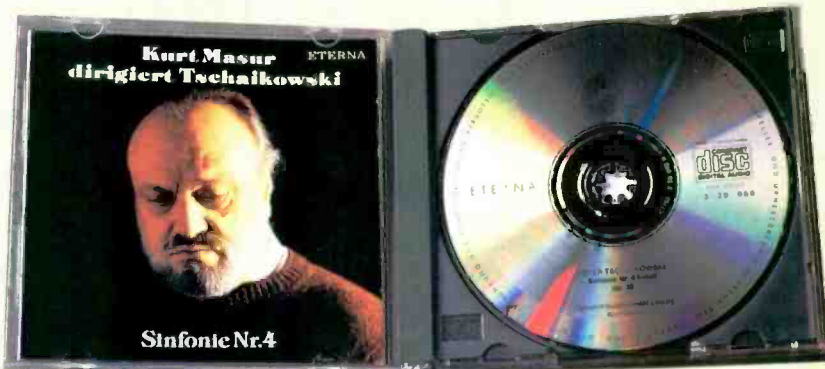
have to do that in the Gewandhaus. Because the sound is so even and because every member of the orchestra can hear what every other member of the orchestra is doing, there is a comfortable feeling about playing in it. Because they can hear so well, they can play without a conductor." He concedes that's not the case at Avery Fisher. "There, you can't hear all of the other musicians. Because the acoustic situation is not so natural, the orches-

From the beginning, Masur and orchestra members actively participated in the planning of the Gewandhaus.



Tchaikovsky: Symphony No. 4.
Leipzig Gewandhaus Orchestra;
Kurt Masur, conductor.
Eterna 3 29, 068, CD; 42:33.

The recent appointments of Kurt Masur to the New York Philharmonic, Wolfgang Sawallisch to the Philadelphia Orchestra, and Daniel Barenboim to the Chicago Symphony bode well for music making in those cities. These are conductors whose careers have been shaped more by musical opportunities than commercial ones. They bring a "middle European" style of playing that favors traditional orchestral balances, unforced dynamics, and, above all, delineation of musical structure. While the orchestra personnel will certainly appreciate this, it remains to be seen whether the ticket-buying public is ready for so great a change from what has gone before. One wonders, too, how record companies may regard the disappearance of fast-track superstars from these three podiums. Gunther Breest, head of Sony Classical, stated in an interview with Martin Bernheimer for the *Los Angeles Times* ("A Tokyo, New York, Hamburg Connection," April 22, 1990) that he considered



Masur "not good enough" for his label. This judgment might better read "not fast enough" or "not loud enough," considering Masur's predecessor at the helm of the Philharmonic. We may not know for several years whether the trend is a permanent one.

Masur's recording of the Tchaikovsky Fourth reflects the values stated above. The music is rationally paced throughout; the opening fanfare is appropriately dramatic—not the apocalyptic affair many conductors make of it. Likewise, the last movement has drive and urgency with no trace of

frenzy. The essential lyricism of the writing is given its due, and sectional contrasts are never overdrawn.

The recording may seem a little distant over low-resolution stereo systems and, in my opinion, could have benefited from slightly more contribution from accent microphones. However, over a high-end system, there is nothing problematic at all. There is a sense of correct hall ambience, and the "Row M" perspective may be appreciated by listeners sated with the excesses that plague too much current recording. *John Eargle*

tra's players don't feel so comfortable." One possible solution to the problem is to rearrange the seating; Masur says he's working on it.

"The Gewandhaus—by the way, the name means 'the hall of the clothes merchants'—started out as a guild house some 250 years ago, and eventually the merchants hired musicians to play concerts. The Gewandhaus Orchestra thus was the only one in Europe founded by rich citizens rather than maintained by a single patron."

Masur is perfectly willing to talk about his plans for the New York Philharmonic. Is the idea of conducting a nearly 150-year-old orchestra whose permanent conductors have included Leopold Damrosch, Leopold's son Walter, Gustav Mahler, Arturo Toscanini, and his good friend, the late Leonard Bernstein, intimidating? Not for a man whose present orchestra can trace its history back to November 25, 1781 and whose spot on the podium has been occupied by Felix Mendelssohn, Johannes Brahms, Bruno Walter, and Václav Neumann. One of Masur's goals is to take the orchestra out of Avery Fisher Hall to play to audiences not used to listening to classical music; children in the New York metropolitan area, for example. "If we reach them early enough with music, we can enrich their lives," he says, his eyes gleaming. "It's very important that very young people learn to sing, to like music. Then later they can learn to like different kinds. If every orchestra were to take part in an outreach program in its community, if the record companies would cooperate, we eventually could reach everybody. In the summertime, we can reach a lot of people outdoors. They can't enjoy the same musical experience as in a concert hall, but many of those listeners otherwise would never venture into Avery Fisher Hall."

Kurt Masur talks about the possibility of putting smaller musical ensembles in helicopters "and travelling to where the people are" when the weather is nice, or performing chamber works in shopping malls. A generation weaned on rock isn't necessarily lost to classical music, he believes. In Leipzig, for example, someone surveyed patrons of the city's discos to discover that 25% also appreciated organ music. "As they get older, they like being surrounded by sound and pushed in new directions. Whether it's disco or the classics, they're now looking for quali-

*Masur and
the musicians of the
Gewandhaus Orchestra offered
suggestions that contributed
to the final design of
their concert hall.*

ty," characteristics Masur finds in American young people as well. "The freshest audiences are on the West Coast—perhaps because they haven't heard it all before. They're looking for new experiences and are willing to try new music."


In Europe, Masur has earned a reputation as a champion of music of the Romantic period, particularly of composers like Mendelssohn, Schumann, Brahms, and Bruch, all of whom had strong connections to the Gewandhaus. Does this mean that Philharmonic programs will shy away from more adventurous or more contemporary fare? "I firmly believe that today's music students have a great deal to learn from Mendelssohn and Schumann. Both of them are very much underestimated, in my opinion. Schumann, for example, really knew how strings should sound. Mendelssohn created the role of the conductor as we know it

today. Before him, the orchestra played by itself. Both men fought for the musical life of Leipzig.

"Nonetheless, there are some outstanding American composers whose work deserves to be better known. I'd like to bring unknown pieces worth being heard to the audiences in New York, along with some of the better known but neglected works of the 19th century. I'd like to arrange exchange programs which would let young conductors from America perform in Leipzig, and young German conductors appear with the Philharmonic. Because I'll be resident with both orchestras for the next five years, I believe that I have a chance to build bridges that will benefit not only the musicians but also their audiences."

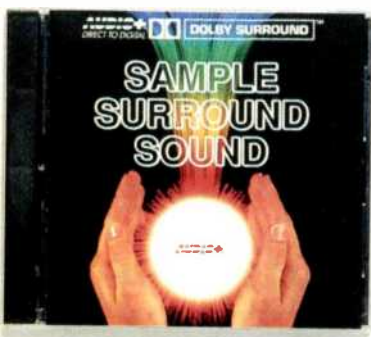
Besides exploring music that is new and unfamiliar to them, Masur finds today's young listeners delving into the musical past. "Throughout the 1960s, the 1970s, and the 1980s, people bought only what was new, looking for recordings with the highest technical standards. Now they're finding that contemporary conductors are not the last word on musical interpretation. They're rediscovering Toscanini and Bruno Walter, largely with the help of recordings which may lack the ultimate in sound quality but have a great deal to say musically."

The post of music director of the New York Philharmonic is the sort of thing that young conductors only dream about and older conductors contemplate killing for. Masur got the job almost without his knowledge. The Orchestra's search committee, which included a number of its musicians, voted to ask the Maestro from Leipzig to take the job, without checking to see if he was available. When a delegation visited Masur in Salzburg to tell him, "He was nearly knocked off his chair," his friend Peter Gurtler remembers. "He really didn't want to leave Leipzig, and he accepted only on the condition that he could continue as music director at the Gewandhaus."

When the time came to leave for New York, members of the Gewandhaus ensemble presented Kurt Masur with a framed poster containing the opinion of one of his predecessors about the Philharmonic. "A miserable orchestra," Mahler called it. Masur, joining in the joke, assured his colleagues that times have changed—but he won't say what happened to the poster. 

SURROUND SOUND

LEONARD FELDMAN



A few enterprising record companies have taken the initiative to produce Compact Discs encoded with Dolby Surround. Unlike the earliest quadraphonic albums of the 1970s, these recordings were made by producers who have generally used intelligence and discretion in assigning sound to the surround channels. After listening to a number of these recordings for several weeks, I found that the use of surround sound techniques on some (not all) of them increased my involvement in the music.

One disc, from Telarc, uses Shure's Stereosurround format; five other titles were recorded digitally by Intersound, Inc. under the ProArte Audio + label. The surround sound preamplifier I used to listen to these CDs was Sony's TA-E1000ESD; its digital signal processing allowed me to adjust parameters for the various musical selections. With this preamp, I could have used as many as six speakers (including a subwoofer), since it was designed to be the central component for a home theater system. For audio-only listening, however, I settled for a simpler setup. Front speakers were a pair of KEF 105-II units driven by a Carver 1.5t amplifier. Rear speakers were a pair of Bose Powered Roommate IIs mounted high above my head and some 2 feet behind my listening position. Ideally, I would have preferred to have a center-channel speaker and a subwoofer, but since my seating position remained fixed during the tests, I wasn't bothered by "drifting" instrumental or vocal sounds. The following comments detail my reactions to the Dolby Surround-encoded CDs.

Fireworks for Orchestra (ProArte CDS 527) is a sampler disc that serves as a good introduction to Dolby Surround Sound. The trouble is that its wide variety of short selections (11 in all, for a total playing time of just over 70 minutes) was not equally effective with a fixed setting of surround sound parameters; I had to vary rear levels and surround-channel delay times for many

of the selections. For the Hallelujah Chorus from Handel's *Messiah* (track 9) and the choral section of the last movement of Beethoven's Ninth Symphony (track 8), I turned up rear-channel levels so that I could obtain a feeling of being totally surrounded by the chorus. The result was spine-tingling. It was as if I were standing (or sitting) amid the choristers, and both of these familiar works never sounded better. On the other hand, when I played Copland's "Fanfare for the Common Man" (track 1), I had to turn down rear-channel levels considerably and return the surround-channel time delay to its standard 15 mS. Had I not made these adjustments, the brass and percussion instruments would have sounded as if they were in a cavernous cathedral or castle, which would have been most inappropriate for this brief selection. I played "The Sorcerer's Apprentice" (track 10) with standard settings, and the presence of surround sound contributed to the excitement this piece generates as it reaches its climax. Of course, I couldn't help seeing Mickey Mouse as the hapless apprentice in my mind's eye—such is the influence of the Disney classic, *Fantasia*.

Sample Surround Sound (ProArte CDX 013), another sampler, has several tracks of aircraft fly-bys—one of them mixed with cannon fire. If you like such effects, you'll want to turn up the rear-channel levels to match those in the front. Be sure to pull that rear level down again before you listen to track 12, a pop selection entitled "You're Nothing Without Me." If you don't, you may find yourself objecting to the "mix" and hear sonic exaggerations. Two of the selections that benefited most from Dolby Surround encoding were "Raiders of the Lost Ark March" (track 7) and "Music of the Night" from *Phantom of the Opera* (track 8). Only a moderate amount of sound energy was directed to the surround speakers in these selections—just enough to lend the music a richness and texture that it did not have in two-channel stereo. (If you are conscious of separate and distinct sounds

WITHOUT PICTURES

coming from the rear speakers during either of these selections, you've probably turned up the rear levels too much or you're sitting too close to the surround speakers.)

Opening Night (ProArte CDS 528) contains theater music particularly suited to Dolby Surround. All of the selections here seem to have been mixed with essentially the same channel assignments. Closing my eyes, I was reminded of the sound I experience when attending a Broadway musical. Ambience in a typical New York theater is somewhat less pronounced than in a larger concert hall, and this disc's recording engineers captured that precise and more moderate sense of ambience perfectly—from the opening bars of Leonard Bernstein's overture to *Candide* to Marvin Hamlisch's hit songs from *A Chorus Line*. The only track that suffers from a bit too much ambience is the fourth, which contains several selections from *The Sound of Music* by Richard Rodgers. Although it is appropriate to hear echoes on songs in the Swiss Alps, the effects were a bit exaggerated for my taste—especially in the familiar "Do-Re-Mi" song. On the other hand, the selections from the Broadway hit *42nd Street* seemed to position me in about the fifth row orchestra of the theater.

Hitchcock—Master of Mayhem (ProArte CDS 524) includes passages composed for the soundtracks of some of Alfred Hitchcock's best-loved films, such as *Psycho*, *Rear Window*, *Vertigo*, and *North by Northwest*. It made me wonder how much more effective these and other Hitchcock films would have been if their soundtracks had been able to take advantage of the Dolby Stereo process. Happily, the work of Hollywood composers such as Bernard Herrmann and Franz Waxman is given a new and more exciting life; the music is even more exciting than when it was tied to the films. However, although the orchestrations and arrangements created for this disc are impressive, the visual element is missed when using the CD alone. I couldn't help

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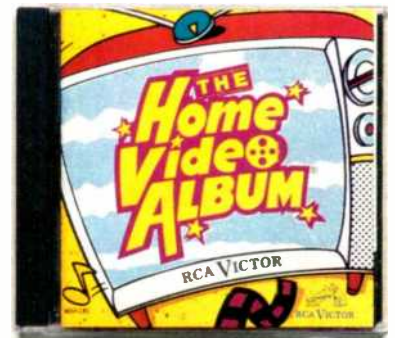
The failure of the early 1970s quadraphonic formats convinced most audio buffs and the general public that reproduction of recorded music would be limited to two channels. Yet in recent years, alternatives to standard stereo have come on the scene in a big way as part of the home theater revolution. Now, surround sound has come back to audio, with the excitement of movie theater sound beginning to be issued on standard music-only CDs. The same Dolby Surround decoder used for processing the playback of video can also be used to its fullest effect on these special discs. The most extensive of the offerings is RCA Victor's Dolby Surround Series. Most of the titles so far are soundtrack music, a genre that has a niche of its own, distinct from classical, pop, and jazz.

The Home Video Album (60354-2-RC), the first disc in the Dolby Surround Series, was originally used as a promotion by home video dealers—some of whom even included the popcorn. It is a sampler of themes from various classic films and also includes six different musical fanfares for the big movie studios, some overture and intermission music, and even two pieces for silent films. The soundtrack music was culled from a number of symphonic recordings Victor issued in the '70s and from old tapes of Arthur Fiedler performances of movie themes. A 10-minute suite of Dimitri Tiomkin's music for *The Thing* is full of scary surround effects. The studio fanfares, in particular, are fun to hear again, and the "Intermission Music" tracks will transport you back to the '40s and '50s.

In *Mancini in Surround: Mostly Monsters, Murders & Mysteries* (60471-2-RC), the noted composer/arranger/conductor Henry Mancini leads his own pops orchestra in his music from, among others, *The White Dawn*, *Mommie Dearest*, *It Came from Outer Space*, *Fear*, *The Prisoner of Zenda*, and *Sunset*. The new digital recordings make full use of the surround process to add to

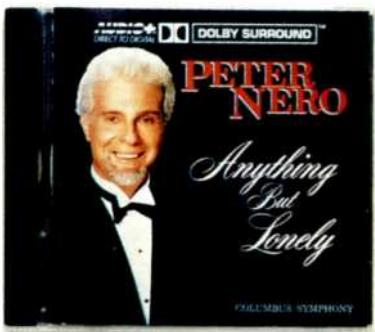
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**JOHN
SUNIER**





Listening to show music through Dolby Surround will transport you to the best seat in a Broadway theater.



FELDMAN

but wish that I had videodiscs of the films to watch as I listened. Still, if you're a Hitchcock buff, you can close your eyes and conjure up the scenes from memory.

Peter Nero—Anything but Lonely (Pro-Arte CDS 522) features more music from some of the great musicals, treated in much the same way as on *Opening Night*. The common thread here is that pianist/conductor Peter Nero is featured on all selections along with the Columbus Symphony Orchestra. Surround sound is particularly effective in imparting just the right quality to "Memory" from Andrew Lloyd Webber's *Cats* and Leonard Bernstein's ballad "Maria" from his classic *West Side Story*. The album title comes from the song of the same name from Webber's *Aspects of Love*, one of his less successful musicals. Perhaps the most outstanding track is the last one, which contains about 35 short excerpts from the most popular songs written by Richard Rodgers. Not all benefit equally from Dolby Surround, but that didn't decrease my enjoyment as I recalled the many years of pleasure that the collaboration of Rodgers and Hammerstein and Rodgers and Hart had brought us.

The Telarc CD, *Spies: By Way of the World* (CD-83305), contains a variety of popular music involving instruments (natural and electronic), vocals, and percussion sounds. What makes this disc different is that it was specifically mixed using Shure's Stereosurround audio format. (Shure, most noted for its superb line of phono cartridges, is also very active in professional audio circles through its microphones, mixers, and other electronic equipment.) From what I was able to gather about Shure HTS Stereosurround, it requires a center channel and a subwoofer, in addition to front and surround channels, to be most effective. (The Shure HTS Theater Reference System includes every audio component you need for this system, which is similar—but not identical—to a full Dolby Surround setup with Dolby Pro-Logic decoding for enhanced separation between channels.) Played through my four-speaker system, spatial positioning was precise. There was no image wandering, and the sound seemed to emanate from well beyond the two front speakers even when the disc was reproduced in basic stereo.

In the future, I am certain we can look forward to additional CDs with encoded surround sound, in case you needed any more reasons for assembling your own home theater sound system! **A**

SUNIER

the raise-the-hackles mood of many of the scores. *Mancini's Monster Hits* (60577-2-RV; 16 minutes; Collector's Edition, disc glows in the dark) features three tracks from some of the composer's less well-known monster movie themes (included on *Mancini in Surround*) plus "Surround Fantastique." The latter was composed for a one-minute trailer used as a demonstration of Dolby Surround in theaters. Both discs may still be available at select Yamaha dealers as part of a special promotion.

In the '70s, Charles Gerhardt conducted the National Philharmonic Orchestra in new recordings played directly from the original scores of famous film classics. Collectors rated the LPs of Gerhardt's Classic Film Scores equal to the RCA Fritz Reiner/Chicago Symphony LPs and the Mercury Living Presence series. However, when RCA reissued two of the titles on standard CD, they didn't get things quite right; the sound was often harsh. Now these recordings have been reissued as part of the RCA Victor Dolby Surround Series, and the seven titles I auditioned are beautifully presented and sonically satisfying, though the surround effects are often subtle. But even when nothing seems to be happening in the rear channels, all you need do is to mute them to have the soundstage collapse to a lifeless cardboard image. The most exciting effects can be heard on *Lost Horizon* (1669-2-RG). Dimitri Tiomkin's lovely and lavish score often features a choir in the rear channels and bells that ring all around the listening room. Although only the first track of the *Casablanca* CD (0422-2-RG) is from that classic, the other themes from Humphrey Bogart films will strike a chord with any Bogie fan. The same goes for the dozen themes on *Classic Film Scores for Bette Davis* (0183-2-RG), of which the music from *Dark Victory* is the "major work." On *Gone with the Wind* (0452-2-RG), the movie's wide-screen visual impact is





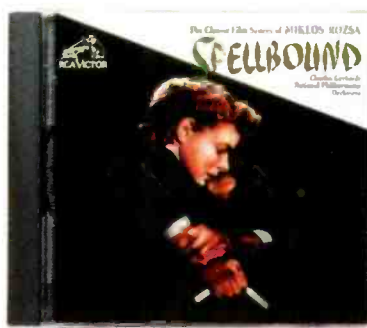
matched by the rich surround feeling of Max Steiner's familiar music. *Spellbound* (0911-2-RG), a collection of the work of Miklos Rozsa, displays this important composer's powerfully dramatic scores rooted in Hungarian origins. *Spellbound* was the first well-known use of the theremin's spooky sound in movie music, but the main work here is a suite from the thriller *The Red House*. These discs, plus *Now, Voyager: Classic Film Scores of Max Steiner* (0136-2-RG) and *Captain from Castile: Classic Film Scores of Alfred Newman* (0184-2-RG), should make you want to haunt the "classics" section of your local video emporium to rent the great titles that go with these moving scores.



Laura/Forever Amber/The Bad and the Beautiful (1490-2-RG) is an offshoot of the Gerhardt project and was produced by him. This disc is distinctive in that the composer, David Raksin, conducts the New Philharmonia Orchestra in his own music from the three films. Raksin observed that he felt both his music and the orchestra were "being flattered, that the gorgeous opulence of the Dolby Surround system enables me to hear the music as I had hoped it would one day be heard."



The most rousing of the soundtrack CDs is *Altered States* (3983-2-RG). John Corigliano's often atonal music for the 1981 film is nevertheless extremely visual, since it evokes the main character's hallucinations during mind-expanding trips and the ensuing physical transformations he undergoes. The deep bass end of the spectrum is conveyed with tremendous impact on all channels, not just those in front. Using one or more subwoofers will add substantially to the playback of this disc.



Motion Picture Classics, Volume One (60392-2-RG) and *Volume Two* (60393-2-RG) were culled from original tapes of Arthur Fiedler conducting the Boston Pops from 1954 through 1971. In toto, there are 34 tracks of hit themes, in familiar Pops arrangements. On the first volume, the most lengthy treatments are given to music from



Love Story (from 1944) and the Warsaw Concerto (which was used in a British film, *Suicide Squadron*). The surround effects on these discs are not particularly strong.

Several recordings in the RCA Victor series are by the Japanese synthesist Isao Tomita and were originally four-channel. The first of these, *Snowflakes Are Dancing* (60579-2-RG), has been a favorite of music listeners—including many in the anti-electronic music camp—since its first appearance back in 1974. Tomita's performances of Claude Debussy's tone paintings use electronic and spatial trickery to underscore the lush, impressionistic mood of "Reverie," "Clair de lune," and "The Girl with the Flaxen Hair." In "The Sunken Cathedral," you can visualize the cathedral slowly rising out of the water, with the sound of tolling bells gradually becoming closer and more and more distinct.

The 1982 stereo CD of Tomita's *Snowflakes Are Dancing* does have some back-channel information, but it is thin and does not contribute to the effect of sound spinning around the room—which does occur



in the RCA Victor Dolby Surround Series version. A similar comparison can be made using the original LP versions of some Gerhardt soundtracks, although, because the difference information was primarily ambience, there was even less rear signal. However, comparison with some old four-channel discrete quadrasonic open-reel tapes of both the Gerhardt and Tomita recordings demonstrated that the reduction from four channels to three, and the change from a discrete process to a matrix process, did cause some losses. This would be expected. But since these tapes are long out of print, were more expensive *then* than the CDs are now, are inconvenient to play, and few people have open-reel decks any longer (let alone, quad open reel!), this is not really pertinent. The CDs in RCA Victor's Dolby Surround Series are totally free of the annoying hiss that plagued the open-reel tapes (which were mostly made without the benefits of noise reduction), they are super-convenient and readily available, and the decoding process is a standard that many homes now enjoy. A

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1

DAVID BERNING EA-2101 AMP & TF-12 PREAMP

Manufacturer's Specifications

Preamplifier

Frequency Response: Phono, RIAA ± 0.25 dB, 20 Hz to 20 kHz; high level, 4 Hz to 50 kHz, ± 1 dB.

Gain: Phono to main output, 64 dB at 1 kHz; phono to tape output, 30 dB at 1 kHz; high level to main output, 32 dB.

Gain Accuracy: Gain and balance within 1 dB of setting over 80-dB range.

S/N (Unweighted, 20 Hz to 20 kHz): Phono, 60 dB re: 1 mV rms input; high level, 84 dB re: 1 V rms output, with gain set for unity (-32 dB level setting).

Distortion at 1 V rms Output: Less than 0.03% second or third harmonic, less than 0.002% fourth and higher harmonics.

Sensitivity for 1 V rms Output: Phono, 0.63 mV; high level, 25 mV.

Input Overload: Phono, 200 mV rms at 1 kHz; high level, 10 V rms.

Input Impedance: Phono, 47 kilohms, with provision for additional loading; high level, 100 kilohms.

Output Characteristics: Impedance, 3 kilohms; maximum level, 5 V rms.

Wireless Remote Control: Operates volume, balance, and muting; transmission range, 30 feet (10 meters).

Power Requirements: 100 to 130 V or 200 to 260 V a.c., 50 to 400 Hz; 40 watts.

Dimensions: 19 in. W \times 3½ in. H \times 13 in. D (48 cm \times 8.9 cm \times 33 cm)



with standard rack panel; with rubber feet, 3¼ in. H (9.6 cm).

Weight: 11 lbs. (5 kg).

Price: \$3,245; balanced line outputs, \$550 additional; buffered outputs, \$440 additional.

Amplifier

Power Output: 100 watts or more per channel, 30 Hz to 15 kHz, at 2% total distortion, with both channels driven.

Frequency Response: 4 Hz to 40 kHz, $+0$, -3 dB, at 1 watt out.

S/N: 80 dB, d.c. to 1 MHz; 100 dB, 20 Hz to 20 kHz.

Typical Harmonic Distortion Products for 1-kHz Signal: 0.4% second harmonic, 0.3% third, 0.1% fourth, and 0.3% fifth.

Sensitivity for 100 Watts Output: 0.8 V rms; balanced or unbalanced.

Input Impedance: 100 kilohms.

Ideal Output-Matching Impedance: 0.89, 3.55, 8, and 14.22 ohms for 1-, 4-, 8-, and 16-ohm taps, respectively.

Internal Small-Signal Output Impedance: 3.8 ohms for 8-ohm connection.

Power Requirements: 100 to 120 V or 200 to 240 V a.c., 50 to 440 Hz; 130 watts at idle, 550 watts max.

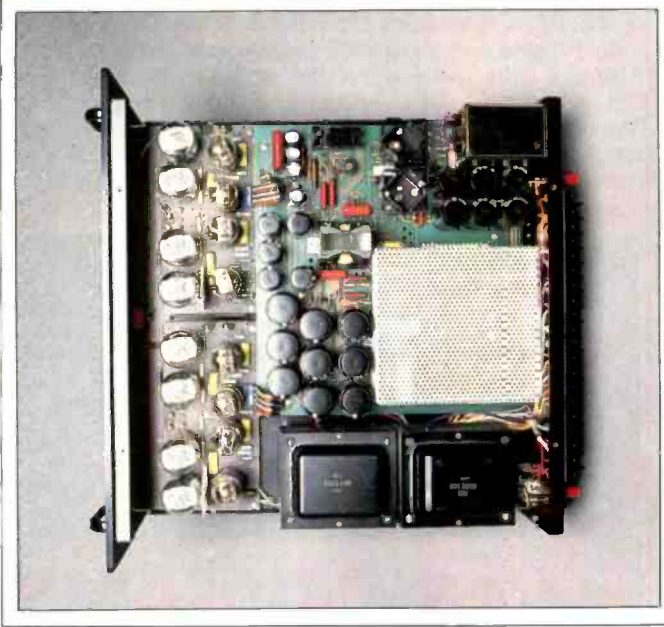
Dimensions: 19 in. W \times 5¼ in. H \times 17¼ in. D (48 cm \times 13.3 cm \times 44 cm) plus handles and connectors; standard rack mount.

Weight: 40 lbs. (18.1 kg).

Price: \$4,290.

Company Address: 12430 McCrossin Lane, Potomac, Md. 20854.

For literature, circle No. 90



My first experience with one of David Berning's designs was with a TF-10 preamp some years ago. I fondly remember it being a very good-sounding unit. If I recall correctly, it had a switching power supply and used a hybrid FET/tube circuit for each amplification stage.

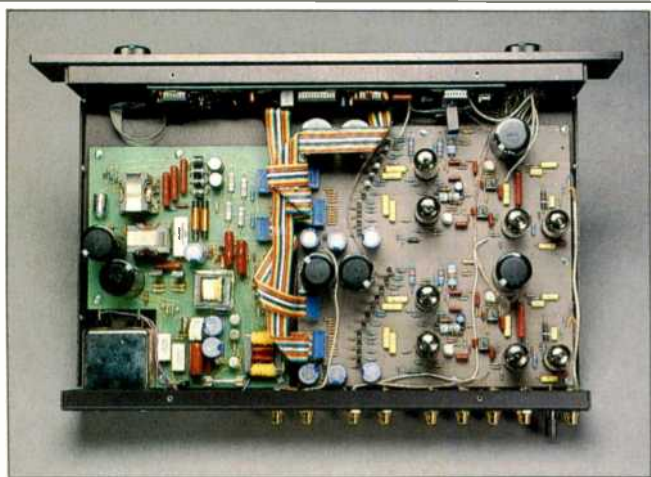
Like its predecessor, the TF-12 has a switching power supply and uses tubes as amplifying devices; however, it doesn't use FETs as in the earlier, hybrid circuitry. One of the design goals for this new preamp was to make possible reproduction from high-level sources, like CD players, without noticeable alteration of the sound—a laudable goal, for sure. Berning implemented this approach with a new dual-stage, digital switching-matrix system for volume and balance control. This system yields very good interchannel tracking and a wide range of control (some 80 dB). The Berning company feels that this digital switching matrix degrades the sound much less than the standard but high-quality potentiometers used as volume and balance elements in the majority of preamps. I thought it would be interesting to see to what degree the line section is audible.

What further sets the TF-12 apart from earlier Berning preamps is the inclusion of a wireless remote for volume, balance, and muting. A front-panel LED display gives the attenuation setting, in dB, for each channel, a very nice feature indeed. This permits you to note and reproduce the "just right" volume of different program sources.

The EA-2101 power amplifier also has a number of interesting technical innovations that set it apart from other amps. To start with, the power supply is a switching design (a Berning specialty) that provides regulated voltages to all stages, including the output stage! There are not very many tube power amplifiers around with regulated high voltage to their output stages (actually, I don't recall any). The other major innovation in the EA-2101 is the manner in which the output stage is operated, a patented "triode" mode that is completely different from the conventional way of driving an output stage (more about this under "Circuit Description"). The circuitry is fully balanced from input to output, allowing feed from unbalanced or balanced lines. Finally, and dear to my heart, the front-end tubes are all 6SN7s, octal-base dual triodes that are very linear.

The controls on the preamp's front panel include a five-position rotary source selector and four toggle switches ("Tape/Input" for tape monitoring, "Mono/Stereo," "Power/Off," and "Balance/Volume"). These are followed by a rotary "Level" control whose function is selected by the last toggle switch. Since the actual element turned by the "Level" control knob is an optical encoder, it doesn't have stops at the usual counterclockwise and clockwise limits of rotation, as regular potentiometers do. Instead, you can turn it indefinitely. When the circuit is powered up, one revolution of the control corresponds to 16 dB of attenuation change. (It feels weird to have such a control for volume—these newfangled digital things!) An attenuation display, in the middle of the panel, shows each channel's setting, in dB, to two significant digits. In the center of this display is the optical detector for the remote control. It's a very attractive front panel, in my opinion. On the rear panel are a power-cord socket/r.f. line-filter unit, Tiffany input/output phono connectors, and a gold-plated ground post.

Interesting technical innovations set the TF-12 preamp and the EA-2101 amp apart from more conventional components.



Inside the TF-12, the circuitry is broken into three major functions on as many circuit boards. Taking up more than 50% of the internal area, and located to the left as seen from the front, is the p.c. board carrying the signal circuitry and attenuator elements. This board is made of Teflon and is said to allow a more transparent sound than the usual epoxy/glass laminates. The channels are laid out separately but identically, in a dual mono arrangement. To the right of the signal board is the switching power-supply board. Numerous inductors and other parts indigenous to switching power-supply circuitry are in evidence. Mounted on stand-offs, behind the inside surface of the front sub-panel, is the third circuit board, which mainly houses the digital control for the unit's switching attenuator matrix. Part of the audio signal path appears to be on this board too, as the p.c.-mount "Tape/Input" monitor and "Mono/Stereo" toggle switches terminate here. Interconnection of signal circuitry is via discrete wiring. The other two toggle switches also terminate on the third board; in fact, the board is entirely supported by these four switches. Multi-color ribbon cables interconnect the power supply, the front-panel control circuitry, the tubes' power circuitry, and the input control to the switching matrix on the signal board.

The front panel of the EA-2101 amplifier has a nice, eye-catching touch: Most of it is taken up by a red plastic window that lets you see the warm glow from the heaters of the eight output tubes lined up across the amplifier's width. Rack handles are located on either side of the window, and a horizontally oriented rocker power switch is centered below it. Just to the right of the switch is a red LED for indicating power on.

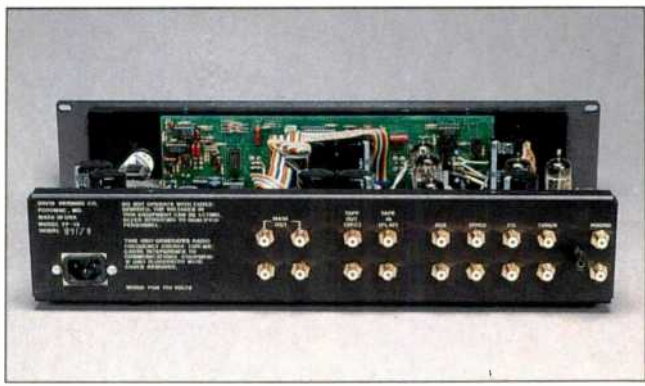
The amplifier's output arrangement on the rear panel is a bit unusual in its flexibility of configuration. Two large barrier strips, with eight connection screws each, are set end to end and take up a major portion of the rear panel's width. Pairs of five-way binding posts flank the barrier strips for connection to the speaker wires. The barrier strips are used for setting up each channel's four identical output windings to match the load in use. The EA-2101 comes with all windings wired in series by jumper links between the winding ends. A pair of wires attached to the output binding posts is connected to the desired taps for matching nominal

1-, 4-, 8-, and 16-ohm loads. You can also attach spade-lug terminations to the speaker cables and connect them directly to the barrier strip. If you wanted to commit the amp to use with 1- or 4-ohm loads, you could make optimal use of the transformer's four secondary windings by putting them in parallel (for 4 ohms) or series parallel (for 1 ohm). Other connectors on the rear panel include a socket for a standard a.c. line cord, Tiffany phono connectors for unbalanced inputs, and a pair of XLR connectors for balanced inputs. A small toggle switch between the unbalanced input jacks sets the unit for balanced or unbalanced mode.

Interior space of the EA-2101 is about equally divided between power-supply and amplifier circuitry. A large p.c. board contains the power-supply circuitry. A portion of the circuitry that is prone to radiate is covered by a perforated metal shield. The two channels of actual amplifier circuitry are arranged end to end and take up about the front 25% of the chassis. These amplifier circuit boards are made of Teflon, as in the preamp. In the space that remains, to the right of the power-supply board, the output transformers are mounted to the chassis bottom. This unit is fairly light for its power output rating, because the switching power supply operates at a higher frequency than the a.c. line, allowing the use of a smaller power transformer, and because the chassis is aluminum. Having the output transformers along the right edge makes the amp a little unbalanced and somewhat unweelcy.

Metalwork for both units is very simple, consisting of a bent-up piece of aluminum that forms the rear panel, bottom, and front sub-panel, while a perforated metal piece is bent to form the top and sides. The front panel of each is a quarter-inch piece of aluminum. Incidentally, the chassis is made of aluminum in order to be nonmagnetic and to prevent distortion induced by skin effect.

Parts appeared to be of good quality. Although workmanship was good, some of the leads could have been dressed a bit more attractively. The amplifier circuit boards seemed a little flimsy when I pushed in the middle of the board. This could cause some potential breakage in shipment due to vibration. The same comments apply to the main signal board in the preamp. I thought at first that a standoff under the middle of these boards would help, but the manufacturer said that there already is such a support there, and that the boards only seemed unsupported because Teflon circuit boards are so flexible.



The power amp's circuitry is fully balanced from input to output, allowing feed from either balanced or unbalanced sources.

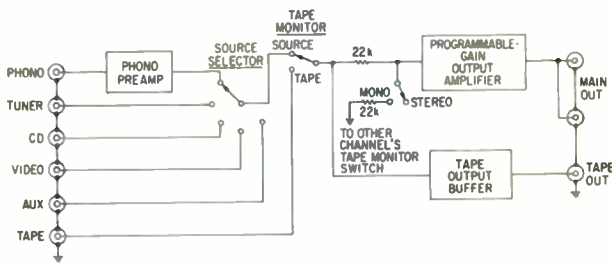


Fig. 1—Block diagram of Berning TF-12 preamp; see text.

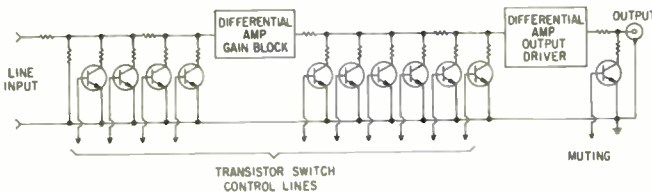


Fig. 2—Simplified schematic of the programmable-gain output amplifier shown in Fig. 1.

Circuit Description

As can be seen in Fig. 1, a block diagram of the TF-12 preamp, the general topology is fairly straightforward except for the absence of the usual volume and balance controls following the "Mono/Stereo" switch. A departure from conventional signal-circuit practice is the use of an output amplifier with digitally programmable gain. The overall approach taken in the design of the programmable amplifier uses two amplifier gain blocks with two digitally controlled variable attenuators arranged as shown, in somewhat simplified form, in Fig. 2. The operating principle is to vary the amount of shunt resistance by turning on the various switching transistors and to have the resulting shunt resistance act against fixed series resistance. By arranging the value of the various shunt resistors and the logic states of the switch transistors, various attenuation settings can be achieved by changing control-line logic states. The Berning literature indicates that the control switches are out of the direct signal path; this is relatively but not strictly true, in my opinion. Although the nonlinearity of a turned-on switching transistor's "on resistance" is small compared to the linear resistance of the attenuator resistor that is in series with it, this nonlinearity would still have some very small effect on the signal path.

The amplifier circuitry within the blocks is composed in each case of a single differential amplifier using 6DJ8 dual triodes. A differential topology was chosen, to be more immune to any effects of the power supply and to get a large measure of distortion reduction without loop negative feedback. Operating conditions are somewhat different for the two amplifier blocks. The first stage has some cathode feedback and plate-load resistors of higher value than the second, or output, block. In the output differential amplifier, the value of the plate-load resistor is in the low tens of kilohms, and a feedback loop from the tube's output plate back to its own control grid reduces the net output impedance to about 3 kilohms. Incoming supply voltage for the four differential-amplifier stages (two per channel) is dropped by decoupling resistors from the power supply's ± 190 V output to about ± 160 V at the actual circuits. Obviously, suitable bypass capacitance is present at all of the decoupled supply points. Another interesting but not unprecedented feature is that each amplifier block is capacitor-coupled at its input and direct-coupled at its output. Solid-state op-amp circuitry acts as output offset servos, keeping d.c. offset at each block's output to low values.

The phono circuitry looks to be somewhat more conventional. Operating from a positive supply only, the first stage consists of both halves of a 12AX7 in parallel, acting as a common-cathode amplifier. Output of the first stage is capacitor-coupled to a second stage, again configured as a common-cathode amplifier; it uses one-half of a 12AT7 tube. An RC equalization network is connected from the output of the second stage back to the first stage's cathode resistor, thus causing the required RIAA curve to be generated by feedback equalization. The other half of the 12AT7 tube is used for the tape output buffer. Configuration is as a cathode follower with capacitor-coupled input and direct-coupled output. An op-amp servo operates on the input-grid potential so as to keep the d.c. output close to 0 V.

I am not going to delve into the specific details of the power supply, other than to say that it appears to be a rather sophisticated design. It uses a half-bridge topology to drive the main high-frequency power transformer, rather than the more usual push-pull drive.

In the EA-2101 amplifier, let's start with the unique operation of the output stage. In most such stages, the input signals go to the control grids of the output tubes. When the output tubes are beam-power types or power pentodes (such as EL34s) with suppressor grids instead of beam-forming plates, the screen grid is either tied to a regulated supply, tied to a primary tap on the output transformer (as in ultralinear operation), or tied to the plate of the tube when normal triode operation is desired. In each case, the screen grid has a high positive potential, and the control grid has a negative potential to control the overall current conduction through the tube. Looking at volt-ampere curves for output tubes reveals that, for a fixed control-grid voltage, the conduction is also a function of the screen-grid voltage. However, each volt of change on the control grid still has more effect on the output current than each volt of change on the screen grid does. What Berning has done is to set the control grid at the same potential as the cathode, by shorting these elements together! The idling screen-grid voltage

The EA-2101 power amp's patented "triode" mode of operation is completely unconventional.

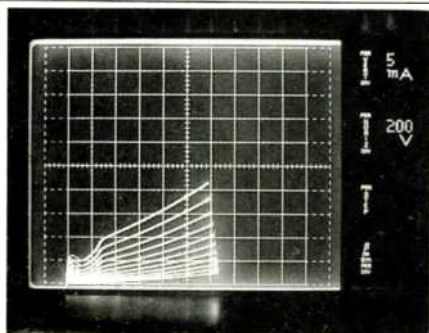


Fig. 3—Plate voltage (horizontal axis) vs. plate current (vertical axis) of 6JN6 tube for normal pentode-connected operation, at several different control-grid voltages differing by 2 V per step. Plate currents here and in Fig. 4 are lower than they would be in actual output tube operation. Scales: Vertical, 5 mA per div.; horizontal, 200 V per div.

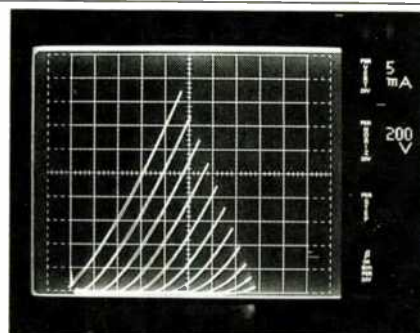


Fig. 4—Same as Fig. 3 but for Berning's screen-grid drive, with screen-grid voltages varying by 5 V per step. Notice the even spacing between traces and the resemblance to triode operation in the trace shapes at these low levels.

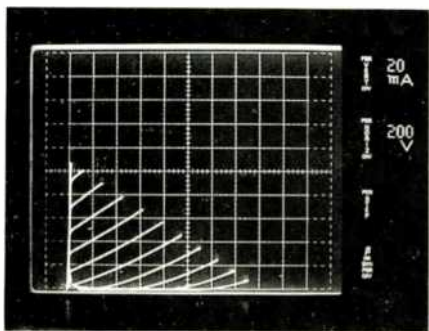
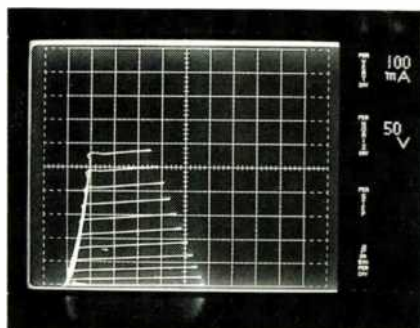


Fig. 5—Same as Fig. 4 but for medium currents and increases in screen-grid voltage of 10 V per step. Note the change of vertical scale to 20 mA/div.

Fig. 6—Same as Fig. 4 but for high currents typical of output tube operation; screen-grid voltage is changing here by 20 V per step. Note the low voltage across the tube when driven sufficiently hard. Scales: Vertical, 100 mA/div.; horizontal, 50 V/div.



is at some very low value to reduce the plate current to a very low value, 3.75 mA per tube. Four tubes in push-pull parallel are used in the EA-2101, so the idling plate current for an output stage is four times 3.75 mA, or some 15 mA. The reason the idling plate current can be so low is that the linearity of the tubes, when screen driven, is much better than when control-grid driven. Figures 3 to 6 show some of this in graphic form. Figure 3 is for a normal output tube when operated at lower currents. As can be seen from the uneven spacing between the traces in the figure linearity is pretty lousy in this mode, which is why no one, including Berning, uses it with these tubes. By contrast, Fig. 4, which shows the low-current linearity of the same tube operated with screen-grid drive, is much better. Further, the traces

look like triode characteristics at these current levels. Figure 5 shows the characteristics at somewhat higher levels. What is interesting is that the traces look like those of a normal triode but with both positive and negative grid voltages. If this were an actual triode, the curve that originates at the vertex of the vertical and horizontal axes would be for a grid voltage of 0, with the curves to the left of and above it representing positive voltages and those below and to the right of it representing negative voltages. Lastly, Fig. 6 shows the VI characteristics at the higher current levels that would be typical of full-power operation of the tube. Some of the other benefits of this mode of operation, besides linearity, are efficiency of operation and extended tube life: Thanks to the low idling plate current, the a.c. power drawn

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PHILIPS

An unusually flexible output strapping system lets you take maximum advantage of the output transformer's windings.

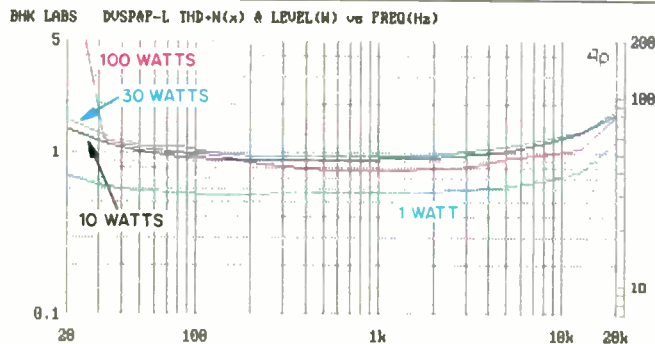


Fig. 7—THD + N vs. frequency and power, EA-2101 amp.

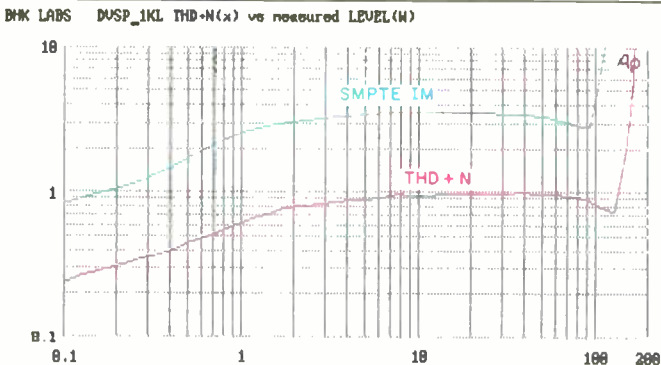


Fig. 8—THD + N for 1-kHz input, and SMPTE-IM distortion, vs. output power for 4-ohm load.

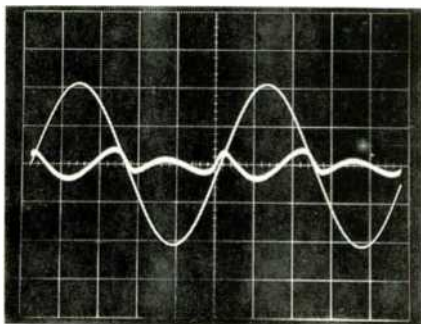


Fig. 9—Output and distortion residue for 10 watts out into 8 ohms at 1 kHz. The THD + N measured 1%.

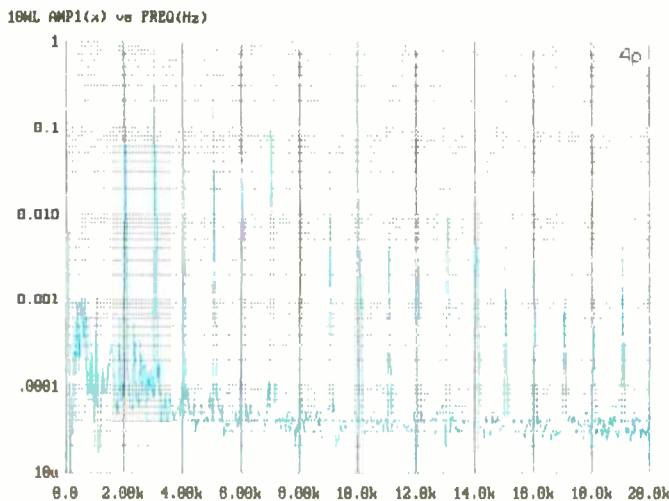


Fig. 10—Spectrum analysis of distortion residue shown in Fig. 9.

off the line at idle should be less than with conventional output stages. The lower idling plate dissipation also means that the tube runs much cooler and will therefore last longer.

As nice as all this looks, there is a price to pay, and that is in the drive required to fully modulate such an output stage. I would estimate that the amplification factor of such a stage might be five to six times lower than in normal tube operation. This means that the voltage gain required to get full power would be that much greater, and perhaps just as important, the amount of signal swing at the controlling screen grid would be a lot higher too—some 200 to 400 V peak. Therefore, more stages of amplification are likely to be required in such a scheme. Sure enough, the EA-2101 has

three differential triode gain stages in cascade. The last gain stage drives a cathode follower that is direct-coupled to the output-stage screen grids. One thing I failed to mention is that the input impedance at the screen grid is somewhat nonlinear and not the high impedance seen at the control grid in normal tube operation. The cathode follower helps to drive the output-tube screen grids with reasonable linearity. Of the four front-end stages, the second and third are direct-coupled and the others are capacitor-coupled. Cathodes of the first and third differential voltage-amplifier stages are tied together for no local feedback and have tail resistors down to a -180 V source. Feedback resistors are used in the second voltage-amplifier stage, and in fact, a

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A high-powered center channel combined with Yamaha's DSP and Digital Dolby Pro Logic enables Yamaha's RX-V1050 receiver to recreate the experience other receivers have promised, but have never quite delivered.

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The only receiver that can make your home theatre sound as good as the original.



The EA-2101 is fairly light for its 100-watt/channel power rating, thanks to its switching power supply and aluminum chassis.

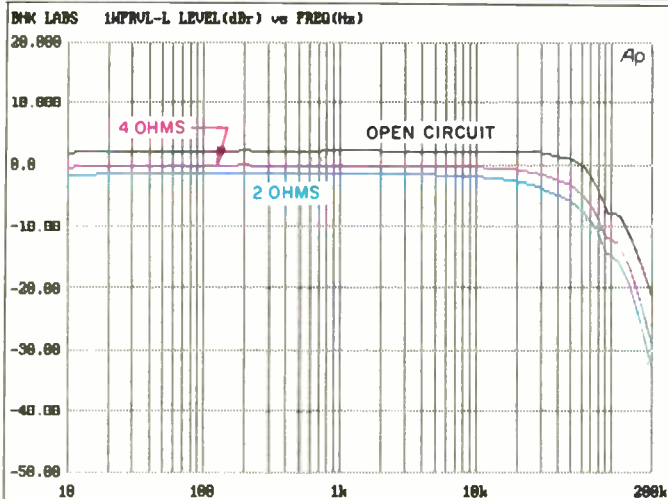


Fig. 11—Frequency response of EA-2101 vs. load.

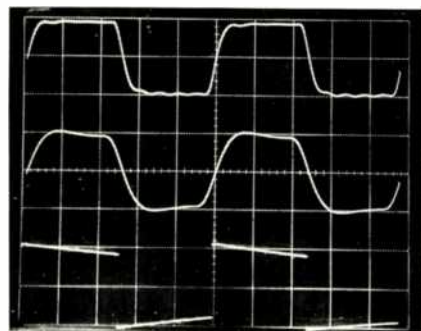


Fig. 12—Square-wave response of EA-2101 at 10 kHz into 8-ohm load (top trace), 10 kHz into 8 ohms paralleled by 2 μ F (middle), and 40 Hz into 8 ohms (bottom). Scales: Vertical, 5 V/div.; horizontal, 20 μ S/div. for 10-kHz traces, 5 mS/div. for 40-Hz trace.

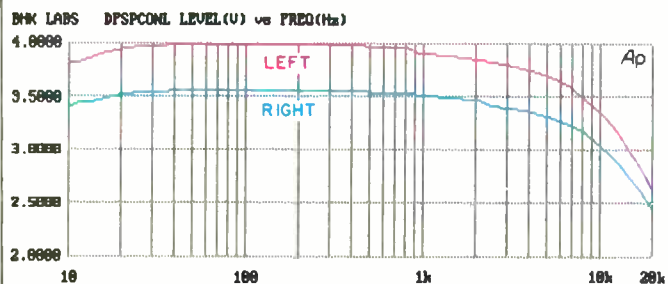


Fig. 13—Damping factor vs. frequency for 4-ohm load.

push-pull feedback loop from the output tube plates is taken back to this stage's cathodes. The control-grid circuits of the cathode-follower driver stage have separately adjustable bias control of the screen-grid potential of the output stage tubes. As mentioned previously, the input can be driven balanced or unbalanced with equal ease.

The power supply is a resonant, switching type. As discussed, the various outputs of this supply are regulated, even the +700 V to the output stage. All of the tube heaters, including those in the output tubes, are operated off regulated d.c. A number of safety features are unique to the EA-2101. The power supply has a multi-step, soft-start sequence that reduces the inrush current when the amp is first turned on. This eliminates burning of the power switch's contacts, as the main current draw is delayed about a second after the switch is closed. Low line voltage is sensed in this power supply, and if the line voltage is below a certain threshold, the unit won't turn on. Further, when the EA-2101 is operating and the line voltage drops to a sustained voltage below the nominal value, the power supply shuts down and must be manually restarted. A protection circuit monitors the current level in each pair of output tubes; if current is judged to be excessive, the power supply goes into a foldback mode, protecting the output tubes and the power supply. Overall, a very interesting circuit.

Measurements

Before measuring the EA-2101, I had been listening to it with the output windings strapped in a series-parallel mode for 4-ohm loading. I left it in that connection for the first tests I made, which were for distortion characteristics. The distortion shown is for the left channel, an arbitrary choice, as both channels behaved very much alike. Figure 7 shows how THD + N varies as a function of power output and frequency. While the amount of distortion is high, it doesn't rise much with increasing frequency above 1 kHz. At rated power of 100 watts, distortion rises rapidly below 30 Hz, presumably due to onset of output transformer saturation. Figure 8 illustrates how 1-kHz THD + N and SMPTE-IM distortion vary with power output. The results for operation with the output windings in series and with 8-ohm loads on the 8-ohm taps remained essentially as shown. What is interesting to me is that the amount of distortion is pretty constant with power above 2 or 3 watts and that the IM is about four times the THD over most of the power range. The latter is a classic, theoretical relationship between the two kinds of distortion when the distortion characteristic is simple and does not change with level. The nature of the distortion residue above 3 watts is what I call "gain reduction at the origin," or crossover-type, distortion. This kind of distortion is worse at low levels and usually decreases as the power goes up because the nonlinearity is an increasingly smaller fraction of the waveform's amplitude. In contrast, this amplifier has lower and simpler distortion below 3 watts and essentially constant distortion above that level. Figures 9 and 10 show, respectively, the THD residue at 10 watts into 8 ohms on the 8-ohm tap and its corresponding spectral nature. There is a considerable amount of higher order harmonic residue here, although the magnitude does decay with harmonic order. A conventional tube output

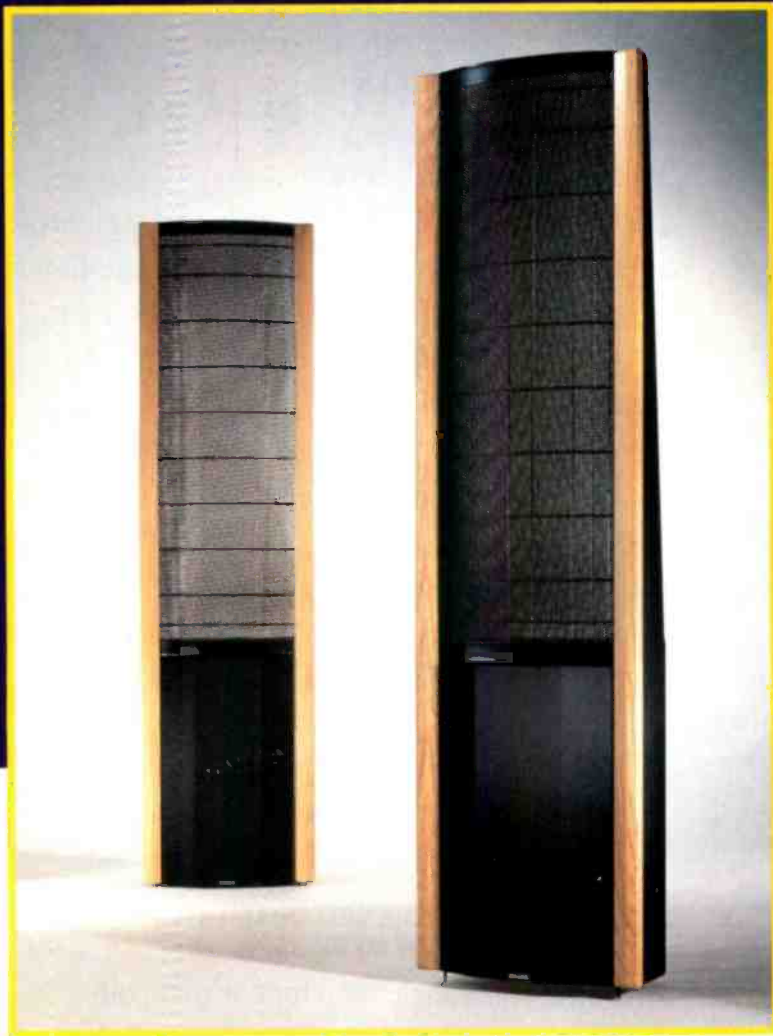
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Since that time, however, the evolution of digital recording sources has progressed far beyond what anyone ever expected. Beyond what even the most advanced metal tapes in the world are capable of reproducing.

Which is why we created the new MA-XG. A tape which is not only the best audio tape in TDK's history.

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DIGITAL MUSIC DEMANDS PERFECTION IN A CASSETTE.

Music from digital sources is dynamic to say the least. It can go from absolute silence to maximum loudness instantaneously. And for an audio cassette to reproduce its

power and dynamic range accurately and free from distortion, the audio tape has to have extremely high output capability or what is known as MOL (Maximum Output Level).

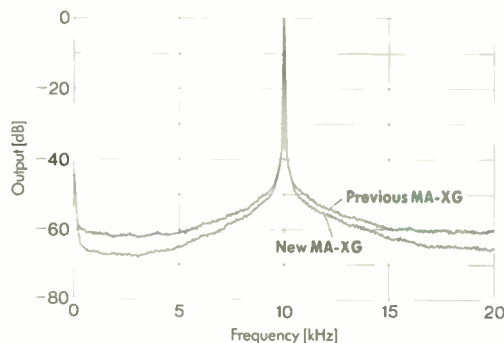
But digital music can also go from maximum loudness to absolute silence instantaneously. And the lack of background hiss makes the clarity of the pianissimos and the transparency of the passages that linger and fade striking. To convincingly reproduce this kind of delicacy requires a tape with extremely low bias noise. Otherwise, music signals which are softer than the tape noise will be masked and inaudible.

The perfect recording tape then, for CDs and other digital sources, is one with the highest possible output and the lowest possible noise. The kind of tape it was almost impossible to design. Almost.



THE WORLD'S BEST DUAL-LAYER PURE METAL TAPE.

Rather than settle for a tape which compromises output for low noise, or low noise for output, TDK opted for a tape that compromised nothing. So the MA-XG combines two separately "tuned" layers of ultrafine Finavinx magnetic particles. The bottom layer utilizes a unique high-density Finavinx particle designed for highest possible output. The upper layer consists of low



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In Recorded History.

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What this unique design results in is a metal tape with the highest output (+7.5 dB at 315 Hz) and the lowest noise (-59 dB) of any analog cassette. Or more simply put, the ultimate "digital ready" tape.

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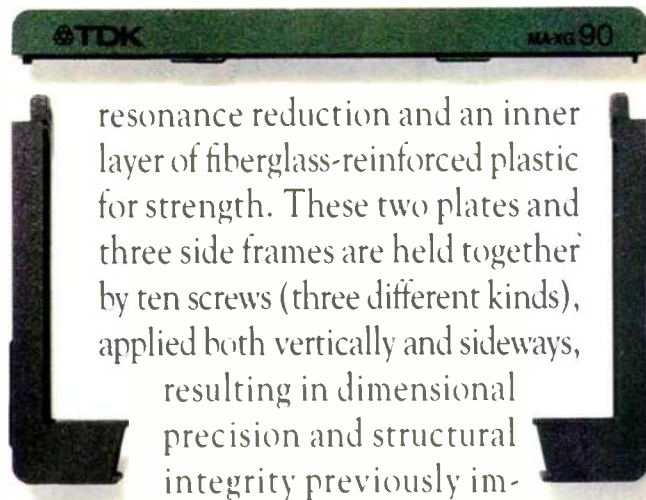
You don't even have to listen to the MA-XG to know how advanced its design is. Just hold it in your hand. Its extra heavy-weight RS-III mechanism



utilizes an unprecedented super-rigid five-piece construction which provides the ultimate defense against vibration and the sound-smearing effects of modulation noise as shown on the modulation noise chart. The unified dual-layer molded face plates consist of a non-rigid plastic outer layer for



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resonance reduction and an inner layer of fiberglass-reinforced plastic for strength. These two plates and three side frames are held together by ten screws (three different kinds), applied both vertically and sideways, resulting in dimensional precision and structural integrity previously im-

possible to achieve. It even employs a system of internal sound stabilizer weights and super high-precision guide pieces to ensure maximum vibration attenuation and the highest degree of azimuth accuracy.

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That the TDK MA-XG is the ultimate recording tape is not just our opinion. It's a belief shared by the ultimate authority: *Audio* magazine. After an exhaustive test of 88 audio cassettes (the results of which were published in the March 1990 issue), *Audio* found the MA-XG to be not only the best of any metal (Type IV) tape, but the best of any tape. Period.



So, if you're going to record digital music, make sure you record it on the new MA-XG. Because the best music in recorded history shouldn't lose anything in the translation. ◀◀

TDK

As Serious As You Can Get.

Driving the screen grids rather than the control grids of the EA-2101's output tubes yields good linearity and efficiency.

Table I—Output noise, EA-2101 amplifier. The IHF S/N was 76.3 dB for the left channel and 87.2 dB for the right channel. Switching noise from the power supply was the main contributor to the left channel's wideband reading, while harmonics of the 60-Hz line frequency dominated the other left-channel measurements.

Bandwidth	Output Noise, mV	
	LEFT	RIGHT
Wideband	2.3	0.78
22 Hz to 22 kHz	0.84	0.24
400 Hz to 22 kHz	0.44	0.15
A-Weighted	0.42	0.127

Table II—Gain and sensitivity, TF-12 preamplifier.

	Gain, dB			
	LEFT		RIGHT	
	Instr. Load	IHF Load	Instr. Load	IHF Load
AUX to Main Out	32.8	29.5	32.8	29.5
AUX to Tape Out	-1.0	-3.1	-1.0	-3.1
Phono to Main Out	64.2	62.0	64.1	62.0
Phono to Tape Out	31.4	29.2	31.3	29.1

	IHF Sensitivity	
	LEFT	RIGHT
AUX to Main Out	16.7 mV	16.7 mV
AUX to Tape Out	0.72 V	0.72 V
Phono to Main Out	400 μ V	400 μ V
Phono to Tape Out	17.1 mV	17.3 mV

stage operated at this very low idling current would have a lot more distortion than the BERNING design. Even so, this characteristic and amount of distortion could give the amp's sound a measure of brightness and harshness.

Voltage gain was measured next. With the output strapped in the "normal mode" (all the secondary windings in series) and with 8-ohm loads on the 8-ohm taps, gain was 30.9 and 30.6 dB for left and right channels, respectively. Corresponding IHF sensitivities were 82.5 and 85 mV.

Frequency response at an output level of 1 watt is shown in Fig. 11 for open-circuit, 4-ohm, and 2-ohm loading on the 4-ohm tap. This presentation provides insight to a number of things. First, the magnitude of output impedance can be judged by how far apart these curves are spaced; since the voltage output doesn't vary much with loading, the output impedance is low. Second, the degree and uniformity of high-frequency damping is shown by the consistent shape of the curves above, say, 30 kHz. The amount of output impedance is typical for a tube output stage with output transformers, and the high-frequency damping is nicely controlled as a function of loading. Rise- and fall-times at a

± 5 V output level into 8 ohms were about 8 μ S. In the square-wave pictures (Fig. 12), the 10-kHz trace (top) is nicely damped in terms of overshoot, but some ringing can be seen at about 100 kHz, which may relate to the response glitch in this frequency region seen in Fig. 11. Behavior with an added 2- μ F load (middle trace) is quite good, with overshoot and ringing well controlled. The amount of tilt in the 40-Hz trace (bottom) is reasonable but not as low as I have seen in some other tube amplifiers.

Damping factor versus frequency for the series-parallel connection of output windings is shown in Fig. 13, referenced to a 4-ohm load. With the windings all in series configuration and the measurement made at the 8-ohm tap, the damping factor remained about the same.

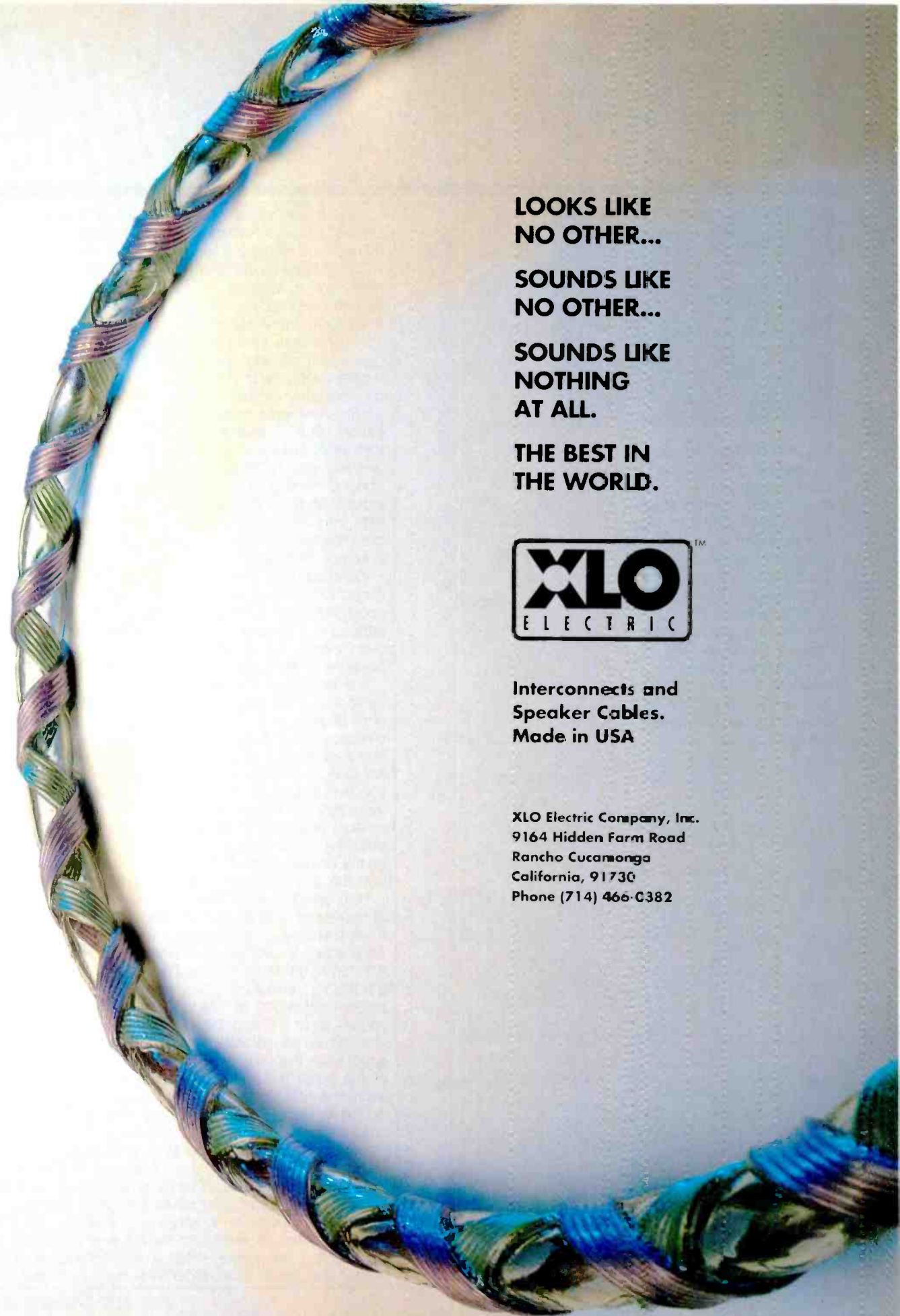
Interchannel crosstalk was found to be greater than 80 dB down in both directions, which is quite good.

Output noise as a function of measurement bandwidth is listed in Table I. Leakage of the switching frequency in the power supply makes up most of the wideband reading. Although it is higher in the left channel, it is still very low in absolute terms. With this high frequency removed by limiting the bandwidth to 22 kHz, the remaining noise in the left channel is mostly hum, which could be audible in some situations with high-efficiency speakers. The right channel is considerably better.

Even though the high-voltage supply is said to be regulated, the pulse power is slightly greater than the steady-state power in the EA-2101. Consequently, dynamic headroom measured 156 watts, or 1.9 dB above rated continuous power, and clipping headroom was 145 watts, or 1.6 dB, for 8-ohm loading on the 8-ohm taps. With a 1-ohm load on the 8-ohm tap and with one channel driven, a peak current of some ± 10 amperes could be obtained with the tone-burst signal for dynamic headroom. When the 1-ohm load was connected to the nominal 1-ohm tap (actually 0.89 ohm, one secondary winding alone), the available current before visible distortion set in was ± 15 amperes. If the secondary windings were all paralleled, the amount of available current would probably increase a little more.

A couple of miscellaneous notes on the amplifier: The a.c. line draw was about 2.1 amperes at idle and 6.4 amperes when delivering 100 watts per channel. For the EA-2101's low computed idling plate dissipation of some 10 watts per channel, 2.1 amperes strikes me as a lot of input line current for a high-efficiency switching power supply. BERNING's specs indicate an idling power draw of some 130 watts. I computed the power drawn by the tube heaters as being about 90 watts (120 V times 2.1 amperes equals 252 VA). Either this power-supply design has a rather poor power factor (more likely) or the 130-watt figure is low.

The TF-12 preamp's gain and sensitivity for the various inputs and outputs are presented in Table II. A minor glitch in the operation of the gain-control system made the gain of the left channel 1 dB higher than that of the right when the attenuations read the same on the front-panel indicators. Because I couldn't decide which channel's indicator was correct, I equalized the gains by setting the left channel's display to indicate 1 dB more than the right channel's. I then used this setting for the preamp gain measurements shown in the Table.



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The TF-12's line amp section does pretty well into 10-kilohm loads, which a lot of tube preamps can't begin to handle.

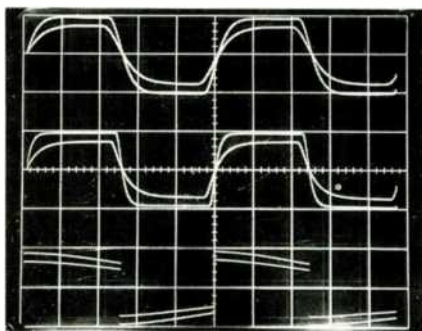


Fig. 14—Square-wave response of TF-12 line amp section, for instrument and IHF loads. (The smaller trace in each overlaid pair is for IHF loading.) Top trace is for 20 kHz at 0-dB attenuation, middle trace is 20 kHz at 30-dB attenuation, and bottom trace is 20 Hz at 0-dB attenuation. Scales: Vertical, 5 V/div.; horizontal, 10 μ S/div. for 20-kHz traces, 10 mS/div. for 20-Hz trace.

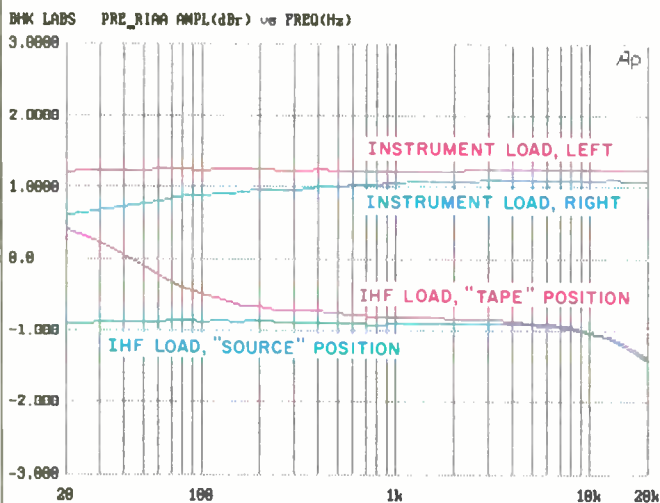


Fig. 15—RIAA equalization error; see text.

Impedances of the main and tape outputs were near the claimed value of 3 kilohms, about 2.9 kilohms for the main outputs and about 2.6 kilohms at tape out.

The two channels of the line amplifier section behaved pretty much alike in regards to distortion, so I arbitrarily decided to discuss only the results for the left channel. Maximum output at the visual onset of clipping was 7.8 V with either instrument or IHF load. Total harmonic distortion plus noise was not easy to measure, as some amount of power-supply switching frequency was present on the main outputs. Interestingly, there was more of this leakage with full line amp gain than with normally used settings of attenuation. When I used a low-pass filter to eliminate the high-frequency switching leakage, THD + N with instrument load was less than 0.1% at 2 V output up to about 2 kHz, rising to about 0.2% at 10 kHz. With an IHF load, the distortion was more than four times as great but did not rise as much at high frequencies. This line amp is a competent driver and does pretty well into a 10-kilohm load, which a lot of tube preamps can't begin to handle.

How accurate are the actual output attenuations compared to the front-panel readout values? Generally pretty good, with no more than ± 0.5 dB of error down to 70 dB of attenuation. Channel-to-channel attenuation settings were even closer, within 0.3 dB down to 70 dB of attenuation once the initial 1-dB imbalance was adjusted.

Interchannel crosstalk had a characteristic that was flat up to about 100 Hz; it then rose at a 6-dB/octave rate. With gain at maximum, crosstalk was worse in the right-to-left direction, being more than 80 dB down up to 200 Hz and, on that 6-dB/octave slope, down about 41 dB at 20 kHz. The left-to-right direction was about 10 dB better. When attenuation was set at 30 dB, a more likely setting, crosstalk was more symmetrical in the two directions and about the same amount as in the left-to-right direction just mentioned. Line amplifier crosstalk was in phase, meaning that, for a pulse on the driven channel, the crosstalk leakage's leading edge is in the same direction as the driving pulse.

Rise- and fall-times of the output amplifier were measured at maximum gain and at an attenuation of 30 dB. At maximum gain, rise- and fall-times at an output level of ± 5 V were about 5.8 μ S with instrument loading and 9.0 μ S with IHF loading. (My instrument load is about 90 kilohms in parallel with about 200 pF, and the IHF load is 10 kilohms in parallel with 1,000 pF.) At the 30-dB attenuation setting, the figures were 2.8 and 7.0 μ S. Oscilloscope pictures of 20-kHz square waves at these two gain settings, and of a 20-Hz square wave at 0-dB attenuation, are shown in Fig. 14. Each of the trace pairs is for instrument and IHF loading; the smaller amplitudes in each pair are for the IHF load. Evident in the figure are the nicely damped exponential edge shapes. The effect of the IHF load's 1,000 pF on the high-frequency response can be seen, as well as the change in rise-time between the two attenuation settings. In the bottom trace (20 Hz), the amount of tilt is reasonable, and the IHF loading has no particular effect on frequency. The overall waveshape suggests a very mild, shelving bass boost, since the trace as seen from the 0-V axis is not convex.

In testing for output noise, I decided to measure the output magnitude itself rather than my usual convention of

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I began to find the TF-12's remote volume control a necessity for getting the "just right" volume at my listening position.

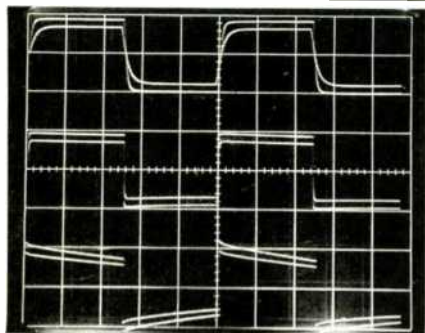


Fig. 16—Response of phono preamp section to pre-equalized square waves at (top to bottom) 10 kHz, 1 kHz, and 40 Hz. Overlaid traces show effect of instrument and IHF loads; smaller trace in each pair is for IHF loading. Scales: Vertical, 1 V/div.; horizontal, 20 μ S/div. for 10 kHz, 200 μ S/div. for 1 kHz, and 5 mS/div. for 40 Hz.

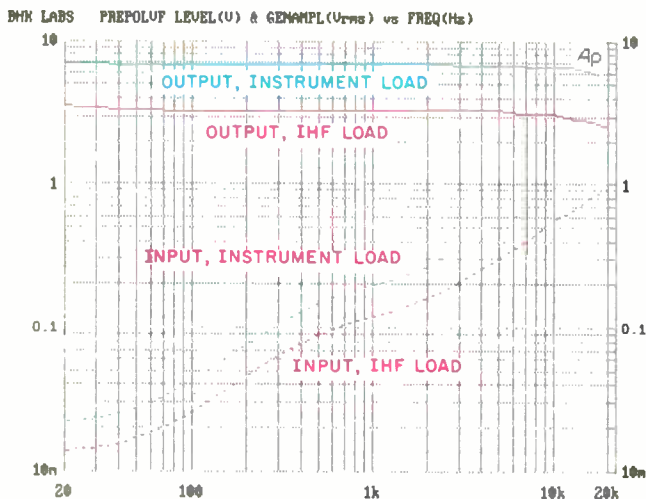


Fig. 17—Phono overload vs. frequency; see text.

Table III—Output noise, TF-12 line amp section, at two attenuation settings. The IHF S/N at -30 dB was 71.5 dB for the left channel and 65.7 dB for the right channel.

Bandwidth	Attenuation Setting			
	-30 dB		0 dB	
	LEFT	RIGHT	LEFT	RIGHT
Wideband	890 μ V	1.9 mV	18.2 mV*	16.0 mV*
22 Hz to 22 kHz	50 μ V	62 μ V	830 μ V	750 μ V
400 Hz to 22 kHz	28.5 μ V	48 μ V	780 μ V	700 μ V
A-Weighted	110 μ V	230 μ V	340 μ V	295 μ V

*See text.

referring it to the input of the line amplifier. Results are shown in Table III. Although amounts of noise per se in the audio band are perfectly acceptable with the 30-dB attenuation setting, which is representative of what the unit does under normal conditions, I feel that the amount of switching noise indicated by the wideband reading with the attenuation set at zero is a bit much from a technical standpoint. Who knows, though; it might dither the following power amplifier and make it sound better!

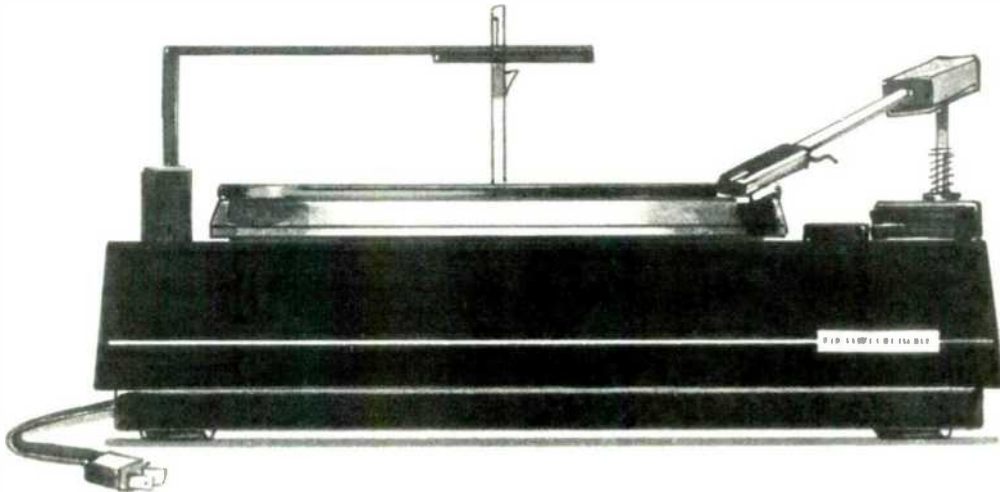
RIAA equalization error of the phono stage is plotted in Fig. 15 for left and right channels with instrument loading; these are the top two curves in the figure. Equalization accuracy of the left channel is very, very good. Shown in the bottom two curves is the effect of IHF loading and, interestingly, the effect of switching the monitor to tape input, thereby unloading the phono preamp output from driving the following circuitry. This rise in the low-end response also occurs for higher impedance loading of the tape output on phono function. It does have a subtle consequence that you might not think about, in that when you are recording from phono onto tape and are monitoring the tape, the recorded low-frequency response would change by the amount shown in the figure.

Figure 16 illustrates response to pre-equalized square waves through the phono section. Results are shown for the less flat (right) channel. Again, the effects of IHF loading are seen in the multiple traces for each frequency. Generally speaking, the waveforms look pretty good. Asymmetrical behavior, the result of high-frequency overload, started to set in at about ± 1.5 V output, 50% greater output than shown in the figure.

Distortion behavior of the phono circuit, like that of the line amplifier, was very consistent between channels, so subsequent discussion on distortion will be for the left channel. The phono circuit's THD + N was quite uniform over the audio range with either instrument or IHF loading. At 1 V output, it was on the order of 0.018% with the instrument load and rose to about 0.5% with the IHF load. Like the line amplifier, the phono circuit will drive 10 kilohms with higher distortion but otherwise with few ill effects.

Figure 17 shows one of the many neat things that I can easily configure my fabulous Audio Precision measurement machine to do. This is a plot of phono overload as a function of frequency, showing the attainable output level as a function of frequency and loading at a specified regulated dis-

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Sonic characteristics of Berning's amp and preamp complement each other nicely when the units are paired together.

ortion level (in this case, 3%), and the corresponding input level to the phono stage. As I have mentioned in past reviews, ideal behavior is for the output level to be flat with frequency. The TF-12 comes very close to this ideal. As can be seen, the 1-kHz overload level is greater than 100 mV. Slick, huh?

Interchannel crosstalk in the phono stage had some strange but good properties: The high-frequency crosstalk level was puzzlingly independent of terminating source impedance, and the low-frequency crosstalk level was better with open-circuit termination! The similarity of crosstalk behavior in the two directions was good. The overall amount was on the order of 70 dB at the low end, dipping to a minimum of some 87 dB in the middle of the audio band and coming back up again to 70 dB or so at the high-frequency end of the audio range.

Phono noise referred to input is shown in Table IV. The wideband measurement is mostly r.f. or switching-frequency leakage. The amount of in-band noise is satisfactorily low for moving-magnet cartridges, but hiss would likely intrude with moving-coil cartridges of low to medium output (50 to 200 μ V) if a step-up device isn't used.

A few final notes on the preamp: Overall phono, line input, and line amplifier polarities are noninverting. A muting circuit operates to mute the main output, but as is typical in most preamps, the phono preamp is not muted. The a.c. line draw was about 0.24 ampere at 120 V input.

Use and Listening Tests

Signal sources used to evaluate the Berning gear included an Oracle turntable fitted with a Well Tempered Arm and Spectral Audio MCR-1 Select MC cartridge, a Magnavox CDB-560 CD player feeding a Wadia 2000 decoding computer, a Nakamichi 250 cassette deck, a Nakamichi ST-7 tuner, and a Technics open-reel recorder. My reference setup includes a selector-switch and switched-attenuator unit that I built; my reference tube preamp is one selectable source. Other high-level sources, like the CD system or the Vendetta Research SCP-2B MC phono preamp that I use for



Table IV—Phono section noise, referred to input. Switching noise dominated the wideband and A-weighted 100-ohm measurements for both channels and the left-channel A-weighted figure for IHF loading. The IHF S/N was 72.4 dB for the left channel and 74.0 dB for the right.

Bandwidth	Source Impedance	Referred Input Noise, μ V	
		LEFT	RIGHT
Wideband	100 Ohms	7	4.8
22 Hz to 22 kHz	100 Ohms	2	2
400 Hz to 22 kHz	100 Ohms	0.72	0.7
A-Weighted	100 Ohms	1.3	0.94
A-Weighted	IHF Load	1.2	1

playing records most of the time, are selected for listening with this control unit. Power amps on hand included a pair of Carver Silver Sevens, my reference EAR 519s, an Air Tight ATM-1, and a reference set of Cary Audio CAD-50sLs. A Gryphon Audio preamp was in residence for the latter part of the review period. Speakers used were pairs of the Spica Angelus, Siefert Research Magnum III, and Martin-Logan Monolith III. I also used experimental two-way systems loaned to me by Arnold Nudell.

I listened to the EA-2101 amp on all of the speakers mentioned above and would characterize its sound as very spacious and detailed, with a tendency to some upper midrange irritation or edginess. Compared to some of the tube amps I had on hand, the EA-2101 sounded a little underdamped in the low end. Every time I would hook it up, I would say, "Wow, listen to that!" But after using it for a while, it would begin to irritate me. I should mention that I am perhaps overly sensitive to this phenomenon; others could just as well respond only positively to the amp's qualities.

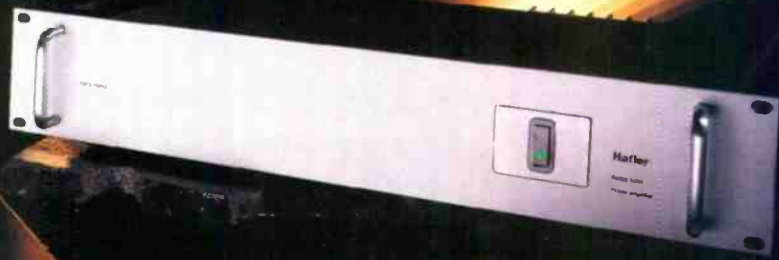
I approached the sonic evaluation of the TF-12 preamp by comparing the sound of the line amplifier with my reference input selector switch and level attenuators. I can report that the TF-12 did a good job of preserving the music. The differences I noted were sins of omission, subtractive in nature. Detail and space were softened a bit, and the overall believability of the music was accordingly reduced. Playing vinyl discs through the whole preamp produced a nonirritating sound that was perhaps a shade too soft.

It sure was nice to have the remote volume control when using this preamp! I am beginning to think that being able to get the "just right" volume at the listening position via a remote is really almost a necessity in order to get the most out of your system. When I used the remote muting function, there was a mild pop when coming out of mute.

When I paired the Berning units together, their individual characteristics were complementary, and the overall sound was very listenable and musical indeed. The amplifier's tendency to be slightly irritating came through on some material but not nearly as much as when used alone. In summary, I think the Berning gear is technically innovative and that it produced some very good sound in my environment. I would definitely recommend going out and giving this amp and preamp an audition.

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2

WESTLAKE
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BBSM-6F
SPEAKER**Manufacturer's Specifications****System Type:** Three-way, vented-box system.**Drivers:** Two 6-in. cone woofers, 3½-in. cone midrange, and 1-in. soft-dome tweeter.**Frequency Response:** 60 Hz to 18 kHz, ±3 dB, on axis.**Sensitivity:** 91 dB, ±0.5 dB, at 1 meter, with 2.83 V rms applied.**Crossover Frequencies:** 600 Hz and 6 kHz, both 24 dB/octave, phase-compensated within 30°.**Impedance:** 4 ohms nominal, 2 ohms minimum.**Nominal Power Rating:** 80 watts below 600 Hz, 50 watts from 600 Hz to 6 kHz, 30 watts above 6 kHz.**Recommended Amplifier Power:** Minimum of 100 watts per channel.**Dimensions:** 22 in. W × 10¼ in. H × 13 in. D (55.9 cm × 27.3 cm × 33 cm).**Weight:** 50 lbs. (22.7 kg) each.**Price:** \$2,400 per pair in oiled walnut (BBSM-6F) or black utility (BBSM-6); optional BWI-0410 bi-wire cables, \$446 per pair.**Company Address:** 2696 Lavery Ct., Newbury Park, Cal. 91320.

For literature, circle No. 91

Westlake Audio is best known in the professional sound market, where they are a major supplier of monitors for recording studios. Westlake Audio's extensive monitor line consists of 15 systems ranging from the small, \$1,600/pair BBSM-4F two-way direct-radiator design up to the massive, five-way SM-1F that can be purchased complete with electronic crossovers and pedestal for \$50,000 per pair!

I evaluated the third system in Westlake's monitor line, the BBSM-6F direct-radiator system, which represents their first entry into the consumer market. According to the specification sheet, the BBSM-6F has been designed for "wide bandwidth, low IM distortion, good power handling, pinpoint stereo imaging, and a coherent wavefront. . . ." The most distinguishing feature of the BBSM-6F is its use of dual



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Now, following the success of the value-packed GFA-535, Adcom introduces its new 60-watt-per-channel GFA-535II. Although its power rating is conservative, its ability to provide pure, distortion-free performance is no small wonder. And, its power output may be considered more than adequate for most home applications using loudspeakers of at least moderate efficiency.

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A major factor contributing to the superior performance of all its amplifiers is Adcom's understanding of the benefits derived from high current output design. The ability to deliver large amounts of current instantaneously and continuously into varying load conditions is a true test of an amplifier's performance. In fact, it is this demanding condition of varying impedances and reactive loads that causes most other amplifiers to become unstable and shut down. Adcom high current amplifiers, on the contrary, are designed to cope with these real-life conditions and perform without stress.

Specifically, the Triple-Darlington output stage of the GFA-535II is designed to reduce the effects of speaker impedance variations thereby minimizing

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instantaneous distortion alert

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distortion throughout the entire audio spectrum even when driving difficult speakers.

While the GFA-535II is the smallest of the Adcom family, it shares the same high-current design philosophy that has made its bigger brothers so highly respected.

Additionally, by taking advantage of direct coupling, Adcom eliminates the use of coupling capacitors and their inherent tendency of introducing subtle, but detectible distortion. Its circuitry also keeps the damping factor high at all frequencies, lowers phase shift and improves performance into all speakers systems including electrostatics.

Keeping Cool Even Under The Most Difficult Conditions

The cooler an amplifier operates, the longer its life will be. Over time, excessive heat build-up causes

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The new Adcom GFA-535II incorporates several improvements designed to minimize heat build-up. Larger heat sinks for each channel increase heat dissipation while improving dynamic bias tracking. Greater overall thermal stability has been achieved.

More cooling vents on the top cover and chassis also contribute to the GFA-535II's cooler operation, even when driving speakers of lower impedances.

Sustained and excessive high power operation may activate a thermal overload protection circuit which will be indicated by an LED on the front panel. When the GFA-535II cools to a safe temperature, its operation is automatically restored. This protection feature assures the continued, long life of the GFA-535II.

Details You Can Hear

Many other refinements have been incorporated into the new GFA-535II to improve its performance and make it an even better value.

Higher grade power supply filter capacitors have been utilized to provide greater power delivery at low frequencies and lower distortion.

A new servo circuit reduces DC voltage at the output. This minimizes woofer cone offset with no signal present, which not only can degrade short term speaker performance, but can reduce their life expectancy because of higher voice coil temperatures.

Even the smallest details are considered important at Adcom. Higher quality, gold-plated input jacks feature Teflon insulators for quieter, dependable source connections. Upgraded gold-plated binding posts make speaker hookups easy, secure and loss-free.



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All Adcom components are known for their high value, consistently offering superior performance at a reasonable cost. The GFA-535II is perhaps the finest example of Adcom's ability to deliver extraordinary value. Sharing many of the technical breakthroughs of Adcom's bigger models, the GFA-535II provides the remarkably lifelike sound of Adcom, yet at a moderate power level.

The GFA-535II is perfect for those who appreciate state-of-the-art performance and do not require high power levels. For a minimum investment, it is a popular entrée into the world of high-end audio.

Specifications (to FTC Requirements)

Power output, watts/channel, continuous, 20 Hz - 20 kHz,
<0.04% THD: 8 ohms/60
4 ohms/100

Signal-to-noise ratio, A-weighted,
60 watts into 8 ohms: >110 dB

Input impedance: 100,000 ohms

Input sensitivity:

60 watts into 8 ohms: 0.97 V rms

1 watt into 8 ohms: 130 mV rms

Damping factor (20 Hz - 20 kHz): >180

Dynamic headroom into 4 ohms: 3.0 dB

Chassis dimensions: 3" (76mm) x 17" (432mm) x 11 1/4" (286mm)

Maximum dimensions: 3 3/8" (86mm) x 17" (432mm) x 12 1/2" (317mm)

Shipping weight: 23 lbs. (10 1/2 kg)

Available options:

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The speakers are designed for good imaging even when you're listening as close as 18 inches away.

woofers in a horizontal, side-by-side, configuration. This configuration is common to all of Westlake's monitors and is primarily driven by the desire of most studios to have a monitor that has ample low-frequency acoustic output but is mounted in a box that is wider than it is tall, to fit their space requirements.

The BBSM-6F has a tweeter centrally mounted, above the midrange, and is flanked by the two woofers and their associated vented-box ports. Its totally symmetrical design eliminates the need for dedicated right and left systems. The front-panel driver placement of the BBSM-6F facilitates the speakers' use as so-called "near-field" or "close-field" monitors in the studio. Recording engineers typically will place small monitors (believe it or not, these systems are quite small compared to typical behemoth studio monitors) on the top rear of the recording console, which places them within only 2 to 3 feet of the listener. Westlake Audio claims that you can even listen to the BBSM-6Fs as close as 18 inches away without sacrificing any of the system's imaging qualities.

The enclosure is fairly large and quite heavy, considering the size of the woofers. Most of the crossover is mounted on the detachable rear panel of the BBSM-6F, with the remaining portion behind one of the woofers. Connection is made through a large barrier terminal strip on the rear of the system. The high- and low-frequency portions of the crossover are separately connected to the terminal strip, to facilitate bi-wiring. Westlake Audio sells a fairly extensive line of single and bi-wire cable assemblies for use with their systems. The review samples were supplied with a set of 10-foot bi-wire cables using 4-AWG conductors!

Removing the system's drivers revealed a tight-fitting, well-constructed enclosure using all 3/4-inch-thick medium-density fiberboard. Diagonal braces are used inside both ends of the enclosure to strengthen the side walls. The midrange is housed in a separate enclosure attached to the rear panel of the main enclosure by a brace to minimize vibration. All inside surfaces of the enclosure are covered with thick fiberglass; the midrange enclosure was completely stuffed. Curiously, the magnetic pot structures of all the drivers were completely covered with a rubber-like adhesive or damping material similar to a silicone compound used for caulking bathtubs.

Removing the cabinet's rear panel (which is attached by 21 screws!) exposed the main part of the crossover, which is constructed point-to-point on the rear panel and takes up most of the panel's area of 9 x 20 inches. This complex crossover consists of 30 parts: 10 inductors, 11 capacitors, and nine resistors. All inductors are air-core. Most capacitors are high-quality, $\pm 5\%$ Solen brand parts, the largest of which is a 200- μF unit 2 1/4 inches in diameter and 4 1/4 inches long! The high-frequency portion of the crossover is wired on a hardboard panel separately mounted behind the right woofer. The crossover of the BBSM-6F is one of the largest and most complex I've seen, second only to the extremely large network of the Thiel CS5 (reviewed February 1991).

All connections to the drivers consisted of stranded, 12- and 14-gauge hookup wire that was soldered to the driver terminals rather than attached by clips. However, in a number of places in the crossover, the workmanship left some-

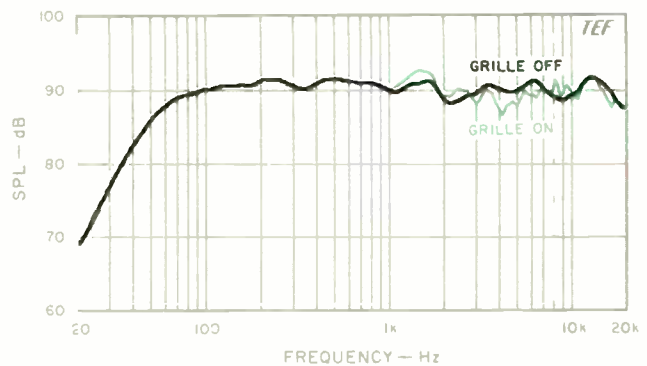


Fig. 1—One-meter, on-axis, anechoic frequency response, for an input of 2 watts into 4 ohms (2.83 V).

thing to be desired. Many solder connections were not mechanically secure and were held only with solder. When I removed the rear panel, one set of leads connecting the hot terminals of the woofers to a terminal strip on the crossover board became unattached due to a cold-solder joint.

The crossover consists of a sixth-order, low-pass filter (three capacitors and three inductors) driving the woofers and a fourth-order, high-pass filter driving the midrange. The 6-kHz crossover was formed by a sixth-order low-pass for the midrange and an eighth-order high-pass for the tweeter (four series capacitors and four shunt inductors to ground)! The manufacturer did not state the crossover design philosophy except to mention that high-order roll-offs were used for all transitions.

Measurements

Figure 1 shows the anechoic, on-axis, equivalent 1-meter frequency response, smoothed with a 10th-octave filter, for 2.83 V rms input (2 watts into the rated 4 ohms). The curve was taken at 2 meters and referenced to a distance of 1 meter; the microphone was normal to the enclosure's front surface, midway between the midrange and tweeter (which happens to correspond to the actual center of the box's front panel). Also shown is the effect of the grille on the response. The grille added significant deviations in the response above 1 kHz of about +2, -3 dB, with a boost in the range from 1 to 3 kHz and a depression between 3 and 7 kHz. Interestingly, I noted that Westlake Audio's instructions recommend that the grille be removed for calibrated accuracy and not to "disturb dispersion and frequency response." I agree! All other tests were made with the grille removed.

The woofers had a linear excursion capability of 0.3 inch peak to peak and a limit of 0.7 inch, quite good for 6-inch drivers.

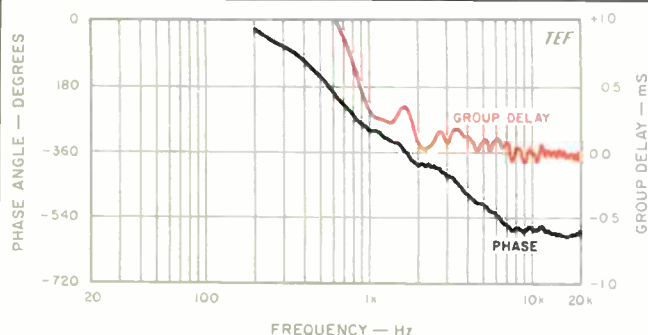


Fig. 2—On-axis phase response and group delay, corrected for tweeter arrival time.

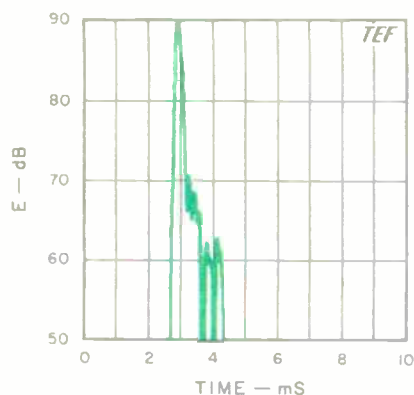


Fig. 3—One-meter, on-axis energy/time curve, measured with the grille off.

Without the grille, the curve in Fig. 1 fits within a commendably flat window of about ± 1.75 dB from 60 Hz to 18 kHz, which is significantly better than the manufacturer's rating! Note, however, that with the grille on, the curve more or less equals the manufacturer's rating. The curve exhibits some roughness above 1 kHz, with a falling response above 15 kHz. Averaging the axial response, over the range from 250 Hz to 4 kHz, yielded a sensitivity of 90.6 dB, essentially equalling Westlake Audio's 91-dB rating. The two systems were quite closely matched, within ± 0.5 dB from 100 Hz to 20 kHz.

Figure 2 shows the axial phase and group-delay measurements of the system, corrected for the tweeter's arrival.

The phase response exhibits a moderate total phase rotation of about 290° between 1 and 20 kHz. A comparison of the average group delay of the midrange (2 to 6 kHz) to the tweeter's range (10 to 20 kHz) indicates that the midrange driver lags the tweeter by about 0.15 ms. Although this time offset is fairly short, it is nearly one wavelength at the relatively high, 6-kHz crossover.

The energy/time response of the BBSM-6F is shown in Fig. 3. Because the linear sweep from 200 Hz to 10 kHz is roughly centered over the 6-kHz crossover, the main peak at 3 ms contains roughly equal contributions from the midrange and tweeter. The 90-dB main arrival at 3 ms is quite compact and only exhibits broadening at levels below 70 dB SPL, with a couple of lower level returns between 3.8 and 4.2 ms. A perfect energy/time response curve would appear as a single sharp spike centered at 3 ms, with a width of about 1 ms at the base (50-dB line) and tapering to a rounded point at the top.

A high-level, low-frequency sine-wave sweep revealed no significant cabinet side-wall resonances. A comparison of the woofer's excursion with the port open and covered by hand demonstrated that the port reduced the woofer's excursion a good 60% at the 42-Hz Helmholtz box-resonance frequency. The woofers did exhibit significant dynamic offset in the range from 70 to 160 Hz (also between 25 and 36 Hz) above 8 V rms, where the cones displaced outward. In addition, at 34 Hz with levels above 10 V rms, the low-frequency drivers would go into a strange half-frequency subharmonic oscillation mode, where the cone would visually vibrate at about 17 Hz. Presumably this nonlinearity was also related to the same problems that generate dynamic offset. Port noises were minimal at high drive levels. However, at high input levels at and near the 42-Hz box tuning, port air velocity was very high. At 42 Hz, an input of 17 V rms generated port air blasts that would blow out a match 5 feet away. (Yes, I really tried this.)

The woofers' linear excursion capability was a good 0.3 inch peak to peak, with an excursion limit of about 0.7 inch peak to peak, quite good for 6-inch woofers. The woofers overloaded gracefully at high levels, with no objectionable noises. The effective piston diameter of the 6-inch woofer (actual outside frame diameter was $6\frac{3}{4}$ inches) was about 5 inches (measured from the middle of the surround on one side to the middle of the surround on the other). The air-moving capability of the two 6-inch drivers corresponds roughly to that of a single 8- or 9-inch driver of the same excursion.

Figure 4 is a "3-D" plot of the BBSM-6F's responses on and off the horizontal axis. For a system with perfect off-axis response, all the off-axis curves would have exactly the same shape as the on-axis curve (the bold curve at the rear of the diagram), including any aberrations seen in the on-axis curve. The curves seen here are fairly well behaved and indicate good, wide horizontal high-frequency coverage. The off-axis ridge between 1 and 3 kHz indicates some broadening of the polar response, presumably related to box dimensions.

The vertical response curves are shown in Fig. 5, with the on-axis response shown as a bold curve halfway between the front and rear of the plot. The white space in the middle



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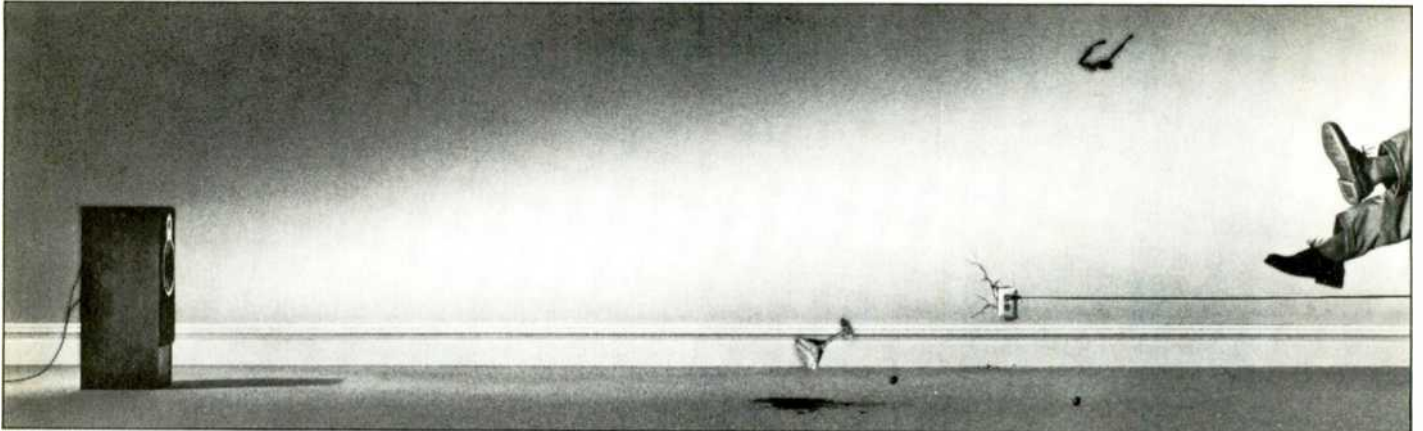
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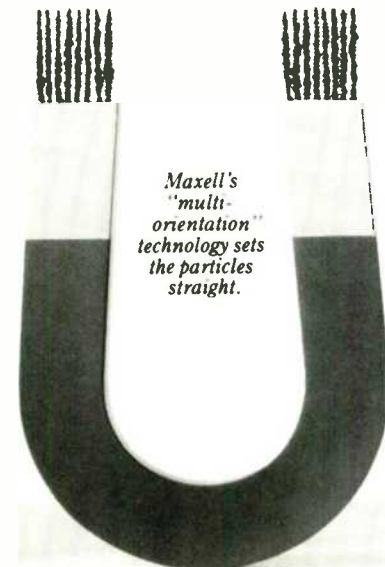


ELL'S BLOW-AWAY SOUND.

During manufacture, some tapes are run through a magnetic field and the magnetic particles adhere to the film in a willy-nilly, helter-skelter pattern—similar to the arrangement you'd find on the end of a magnet if you dunked it into a bowl of metal filings.

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Maxell's
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technology sets
the particles
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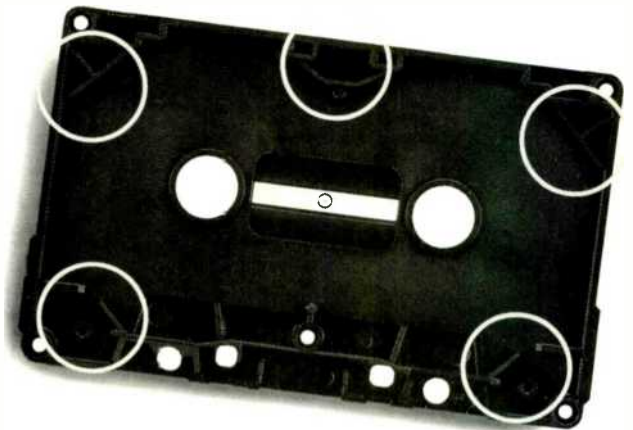
IEC Tape Specifications		
Tape Selector Position	Unit	IEC II High Bias (Cr) XLII-S 100
Backing Material-		
		Dual Surface Tensitized Polyester Base-Film
Physical Properties		
Tape Width	mm	3.81
Coating Thickness	μm	4.5
Total Thickness	μm	11.0
Yield Strength	N	5.5
Breaking Strength	N	10.5
Magnetic Properties		
Magnetic Material		Black Magnetite
Coercivity	mA/m (Oe)	58(720)
Retentivity	mT(G)	180(1800)
Squareness		0.90
Electro-acoustic Properties		
Optimum Bias		+1.0
Sensitivity	315 Hz	+0.5
	6,300 Hz	+1.5
	12,500 Hz	+3.0
	16,000 Hz	+4.5
Output Uniformity at 315 Hz		0.3
Output Uniformity at 0 kHz	VU	0.4
Dynamic Range	315 Hz	65.5
	10 kHz	57.5
MOL (Maximum)	315 Hz	+6.0
Output Level	10,000 Hz	-2.0
AC Bias Noise		-50.5
Erasing Effect		70
Print-Through		51

The XLII-S Performance Story.

cassettes, it reduces modulation noise and helps maintain phase accuracy. Also, by making the window smaller, we were able to improve the cassette's overall structural integrity, building in five support points instead of the standard three.

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Up/down behavior is quite symmetrical because the directional lobe is aimed straight ahead, just as it should be.

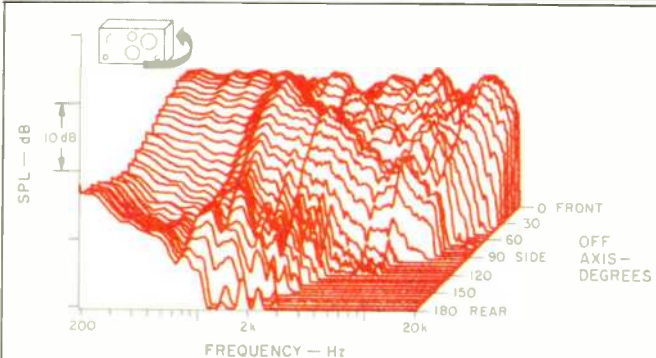


Fig. 4—Horizontal off-axis frequency responses, taken from the front, around the side, and to the rear of the speaker.

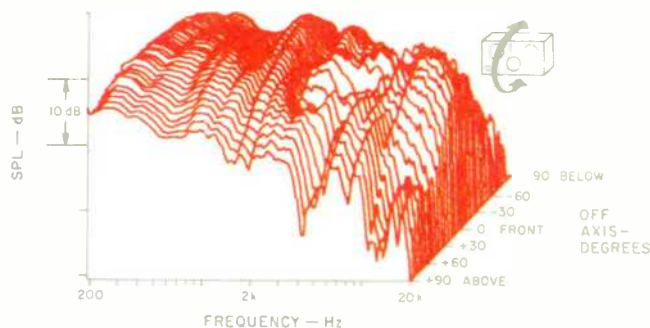


Fig. 5—Vertical off-axis responses, taken from below, up the front, and to the top of the speaker.

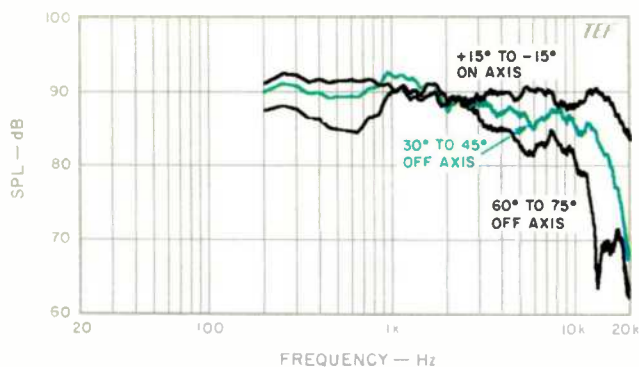


Fig. 6—Mean horizontal responses, derived from data of Fig. 4.

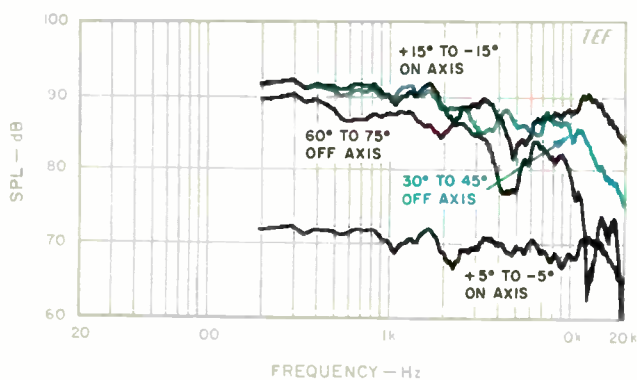


Fig. 7—Mean vertical responses, derived from data of Fig. 5.

of the graph indicates increased directivity in the upper crossover region, from 4 to 8 kHz. Only the on-axis and $\pm 5^\circ$ curves are relatively flat through this region; the high crossover frequency of 6 kHz is the main contributor to this problem. Not shown clearly in the graph is the system's very symmetrical up/down response behavior through the crossover region, which indicates that the tweeter and midrange are essentially in phase with each other. This means that even though the system is quite directional vertically throughout the crossover region, the directional lobe is aimed straight ahead (minimum lobing error), precisely as it should be.

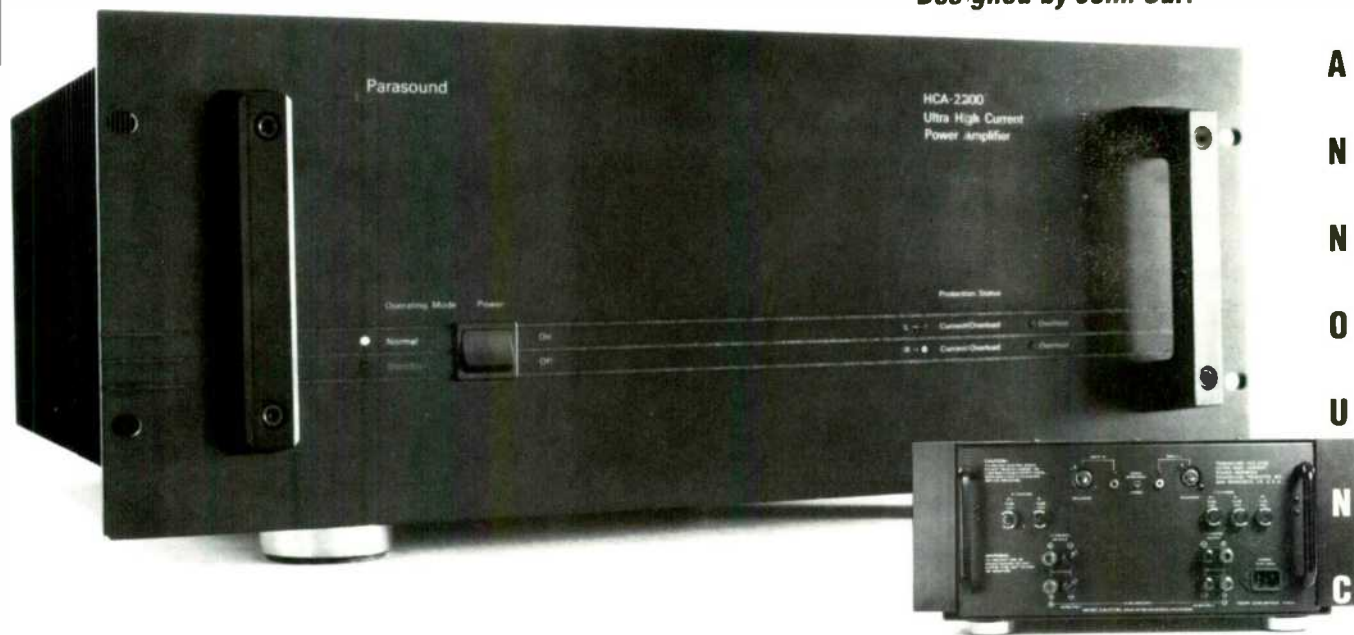
Figures 6 and 7 show, respectively, the horizontal and vertical on- and off-axis response curves. The mean axial ($+15^\circ$ to -15°) horizontal response curve in Fig. 6 is quite flat and extended except for some high-frequency roll-off above 17 kHz and a slight dip in the region from 8 to 10 kHz.

The 30° to 45° mean response is fairly similar to the axial curve but exhibits a gentle downward trend above 2 kHz and a sharp roll-off above 12 kHz. The 60° to 75° off-axis response is much rougher than the previous two responses, with higher directivity below 1 kHz and a more rapid roll-off above 3 kHz. The similarity of the three curves through the area from 1 to 3 kHz shows the loss of directivity noted earlier in the "3-D" curves of on- and off-axis response.

Figure 7 shows the vertical responses of the BBSM-6F. The mean vertical axial curve ($+15^\circ$ to -15°) is rough between 1 and 4 kHz and has a hole at crossover, between 4 and 7 kHz. Examination of the individual curves that comprise the mean axial response (not shown) indicated that up/down behavior was quite symmetrical but that high side-to-side directivity made the responses beyond $\pm 5^\circ$ exhibit a hole at crossover. The lower curve in Fig. 7, an average of just the -5° , 0° , and $+5^\circ$ responses, is much

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Distortion drops rapidly, from the significant to the unmeasurable, as frequency rises from 41.2 Hz (E_1) to 440 Hz (A_4).

smoother. This indicates that a listener must be within approximately $\pm 5^\circ$ of the axis vertically to hear a smooth response. The 30° to 45° response is significantly smoother than the on-axis averaged response but has greater high-frequency roll-off. The 60° to 75° mean response exhibits even greater high-frequency roll-off coupled with a hole in the frequency range from 3.5 to 6 kHz.

The BBSM-6F's impedance, from 10 Hz to 20 kHz, is shown in Fig. 8. Immediately evident is the amplifier-punishing impedance low of 1.9 ohms at 140 Hz. Between 100 and 500 Hz, the system's impedance does not rise above 2.2 ohms! Only amplifiers with high current capability should be used with the BBSM-6F. The system's minimum impedance of 1.9 ohms, coupled with its passband maximum of 13 ohms (a ratio of 6.8), make the BBSM-6F very sensitive to cable resistance. To keep cable-drop effects from causing peaks and dips in response greater than 0.1 dB, cable series resistance should be limited to a (very low) maximum of about 0.026 ohm. This means that cable no smaller than 10 AWG should be used for a typical 10-foot run.

Figure 9 shows the complex phase plot of the BBSM-6F's impedance, over the range from 8 Hz to 30 kHz. The smoothly changing spirals indicate an absence of resonance problems. The impedance phase angle (not shown) reached a maximum of $+39^\circ$ at 28.8 kHz, which is above the audible range, and a minimum of -59° at the bass frequency of 72 Hz.

Westlake Audio supplied optional cables designed for bi-wiring (feeding the crossover's high- and low-pass sections with separate cables from the same amp terminals). An excellent recent engineering report by Fred E. Davis ("Effects of Cable, Loudspeaker, and Amplifier Interactions," *Journal of the Audio Engineering Society*, June 1991) prompted measurements of the two cables by comparing the voltages at the amplifier and speaker ends of the cable during a frequency sweep from 20 Hz to 20 kHz. The Straight Wire cable I ordinarily use has an almost linear attenuation of between 0 and 0.1 dB over the frequency range, with maximum attenuation at the BBSM-6F's impedance minimums. In contrast, the Westlake Audio cable had a relatively low attenuation of about 0.02 dB up to 7 kHz, a slight boost of about 0.02 dB in the range from 2.5 to 5 kHz, and a roll-off above 7 kHz that reached -0.27 dB at 20 kHz. This roll-off is due to the high inductance of the large 4-gauge wire used in this cable, and the 0.02-dB boost is due to resonance of this inductance with the capacitive reactance of the speaker system's input impedance.

The 3-meter room curve of the system, including both raw and sixth-octave smoothed responses, is shown in Fig. 10. The BBSM-6F was located in the right-hand stereo position, aimed at the listening location, and the mike was placed at ear height (36 inches) at the listener's position. The system was swept from 100 Hz to 20 kHz with a sine-wave signal at 2.83 V rms (corresponding to 2 watts into the 4-ohm rated impedance). The parameters of the test sweep were chosen so that the direct sound plus 13 mS of the room's reverberation were included. The curve is fairly flat and extended except for some midrange emphasis between 480 Hz and 1.8 kHz and room-effect response roughness at lower frequencies.

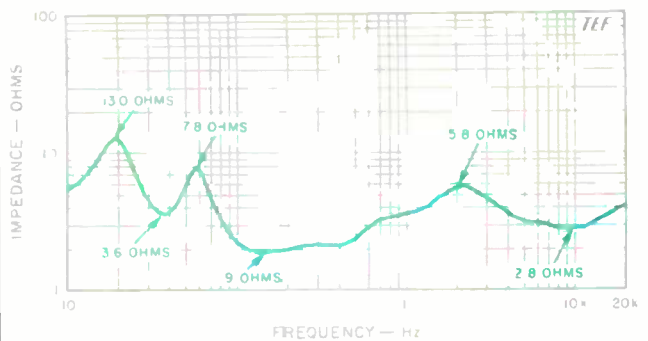


Fig. 8—Impedance; see text.

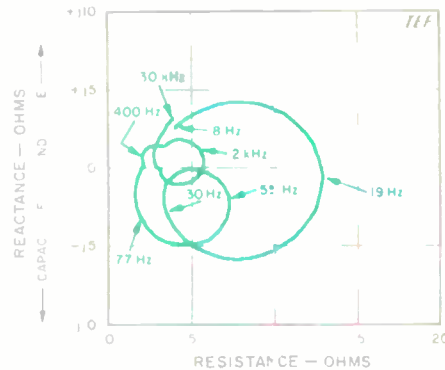


Fig. 9—Complex impedance, showing reactance and resistance vs. frequency.

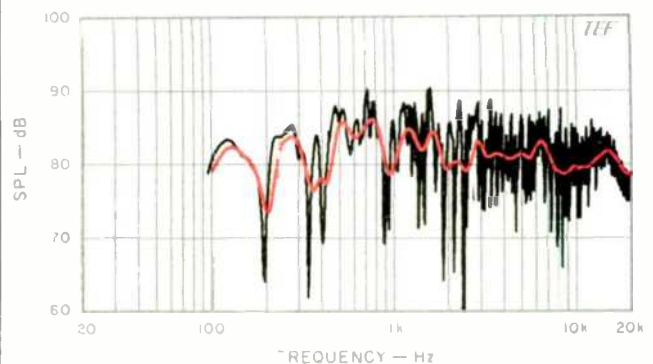
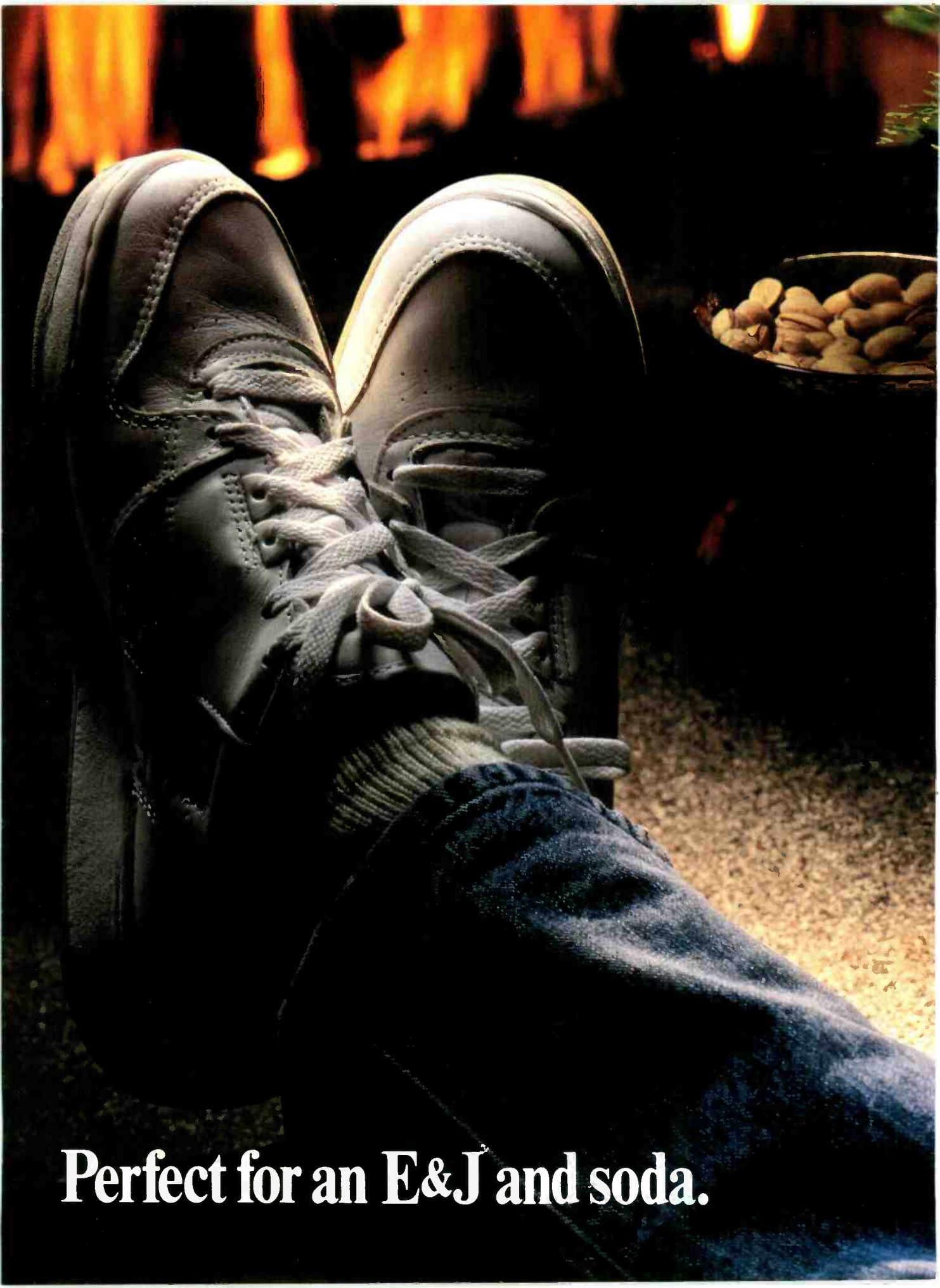


Fig. 10—Three-meter room response, showing both raw and smoothed data.



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The BBSM-6Fs render drum rim shots and such quite realistically, and on high-level playback of jazz or rock, they really boogie!

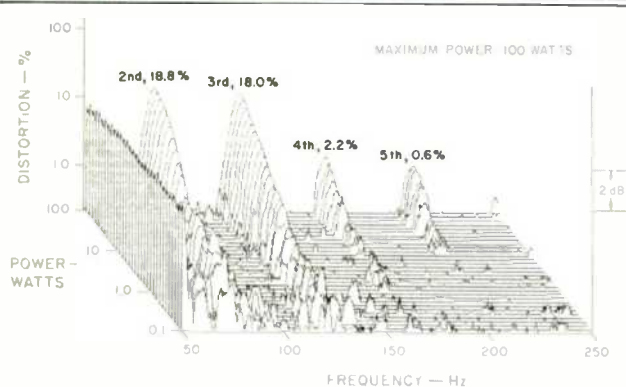


Fig. 11—Harmonic distortion products for the musical tone E₁ (41.2 Hz).

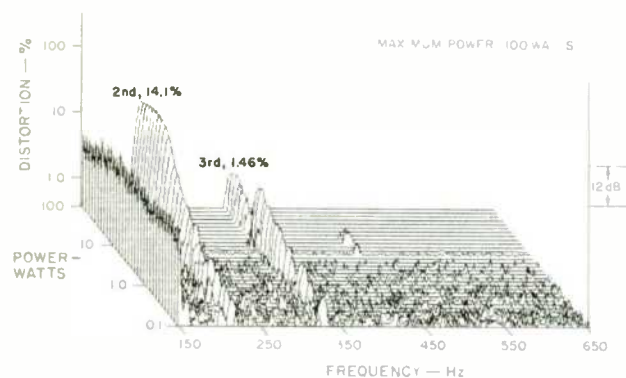


Fig. 12—Harmonic distortion products for the musical tone A₂ (110 Hz).

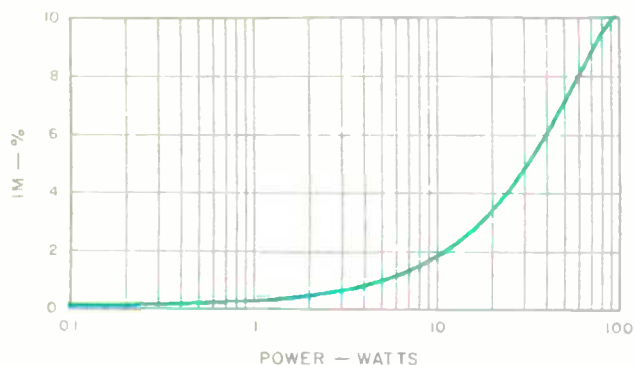


Fig. 13—IM distortion on 440 Hz (A₄) produced by 41.2 Hz (E₁) mixed in one-to-one proportion.

Distortion with increasing power of musical notes E₁ (41.2 Hz) and A₂ (110 Hz) is shown in Figs. 11 and 12. No graph for A₄ (440 Hz) is shown because the distortion products were below the measuring capability of my equipment.

The E₁ (41.2-Hz) harmonic distortion data shows that full-power second- and third-harmonic distortion reaches a significant 18% to 19%. At 41.2 Hz, 100 watts generates a loud 100.5 dB SPL at 1 meter. In the A₂ (110-Hz) harmonic data shown in Fig. 12, the second harmonic reaches a significant 14.1% at full power, with the third reaching only 1.5%. Interestingly, the third reaches an intermediate maximum of about the same level at a lower power level. At 110 Hz, the Westlake system generates a loud 1-meter level of 108 dB SPL at 100 watts.

The IM on a 440-Hz (A₄) tone, created by an equal input level 41.2-Hz (E₁) tone, is shown in Fig. 13. At full power, the distortion reaches a moderate 10%.

After the sine-wave distortion tests, an examination of the crossover network revealed that the tests had severely overheated a resistor in the bass leg of the network. This resistor, a 0.33-ohm, 5-watt unit (marked R1 on the supplied schematic), is in series with the large 200- μ F capacitor mentioned previously. Fortunately, the resistor continued to work and did not require replacement.

The system's short-term peak input and output power capabilities for tone bursts are shown in Fig. 14. The peak input power was calculated by assuming the measured peak voltage was applied across the rated 4-ohm impedance. At frequencies where the BBSM-6F's impedance is much lower than 4 ohms, the actual input power is higher.

The maximum peak electrical power-handling capacity of the BBSM-6F is shown in the lower curve of Fig. 14. Above 200 Hz, the power limit of my Crown Macro Reference amplifier was reached before the speaker's limit was reached. Between 70 and 160 Hz, the input power was limited by the dynamic offset of the woofers, where the cones would visibly move forward during the burst.

The upper curve in Fig. 14 shows the maximum peak sound pressure levels the BBSM-6F can generate. Also shown is the "room gain" of a typical listening room, which adds about 3 dB to the response at 80 Hz and 9 dB at 20 Hz. Above 600 Hz, the peak maximum output rises to a loud 126 dB! With room gain, a single BBSM-6F can generate peaks in excess of 110 dB SPL above 42 Hz, and 120 dB above 180 Hz. Even higher low-frequency peak levels can be expected for two systems operating in a standard stereo configuration.

Use and Listening Tests

Westlake Audio provides excellent use and setup information for the BBSM-6Fs. Their professional roots show in a series of very detailed application notes that cover everything from cabling and bi-wiring to setup information. An application note was even supplied for the proper procedures for driver replacement. The caliber and amount of technical information supplied in these notes exceeds any that I have received from other manufacturers.

In general, Westlake Audio recommends a fairly dead acoustical environment for the BBSM-6Fs. This includes treatment of all reflecting surfaces between the system and

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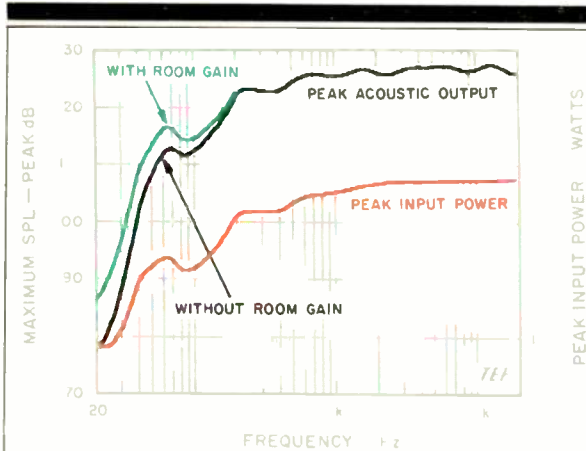


Fig. 14—Maximum peak input power and maximum peak sound output vs. frequency at 1 meter on axis.

listener that might generate potential interfering acoustic signals. They state that the "best sound and imaging will usually occur when the speakers are focused directly at the listener." Detailed alignment instructions are included to ensure that the distances from each speaker to the listener's head are matched to within 1/2 inch. Fortunately, these setup instructions agree quite closely with the way I normally evaluate systems, with the possible exception of the dead environment.

The input connector of the BBSM-6F is a large, heavy-duty, four-terminal barrier strip with the high- and low-frequency portions of the system separately connected. Short, heavy-gauge wires with spade lugs attached are provided to connect these sections in parallel when the system is not bi-wired. Although Westlake Audio provided a well-constructed set of heavy-gauge cables for bi-wired operation, I did not bi-wire the systems for my listening. This was partly due to the results of the cable measurements mentioned previously as well as for convenience.

The review systems were supplied in a very good-looking oiled walnut finish with brown grilles. With grilles on, the systems are quite handsome, accented with a rectangular cutout on the lower right of the grille displaying a silver nameplate with black and red lettering. However, with grilles off, the systems take on a heavy-duty, business-industrial look that doesn't quite fit the domestic environment. I did all my listening with the grilles off, as Westlake recommends.

For listening, I mounted the speakers horizontally on stands (not provided), which placed them so that the center of each box was about 32 inches high. As this height was about 4 inches lower than I desired, I slightly adjusted the stands' feet to tilt the box axis upward, so that it was aimed

at my head. The horizontal orientation of the boxes initially looked strange as compared to the normal vertical orientation of other similarly sized speakers.

Initial listening revealed a system that was significantly more sensitive than my reference B & W 801 Matrix Series 2. The Westlake Audio BBSM-6Fs had good overall balance and excellent imaging; however, they had significantly less bass impact than the reference and a somewhat forward sound. The BBSM-6Fs just about equalled the high-frequency smoothness and extension of my reference but exhibited some midrange tonal differences that were not to my taste.

The BBSM-6F's excellent peak output and dynamic range capability were demonstrated very well on Hiroko Kokubu's *Light and Color* CD of Brazilian-style music (JVC VICJ61), which I recently brought back from Japan. The dynamic range and high-level cleanliness of the systems were demonstrated by their reproduction of Carl Czerny's four-hand piano works played by Tal and Groethuysen (Sony SK 45936). The Westlake speakers exhibited a smooth upper midrange and treble, which allowed me to follow very nicely the individual flute parts over the harpsichord and piano backing on the Rampal, Kudo, and Ritter CD of music by Telemann, Kuhlau, Bach, Mozart, and Doppler (Sony Classical SK 46482). The systems portrayed a very realistic room sound and reverberation decay on the same CD.

Only slight tonal changes were evident on the pink-noise stand-up/sit-down test, with the change mainly occurring only in the stand-up position. The BBSM-6F's low-frequency output on third-octave band-limited pink noise was quite strong at 40 Hz and above. In the 31.5-Hz third-octave and below, the output was greatly diminished and was accompanied by noticeable cone motion and high out-of-phase port activity. In the 40-Hz third-octave, corresponding to the 42-Hz box tuning, high input levels generated port air blasts that could be felt at the listening position! Fortunately, although port air velocities were high, wind noise was not objectionable.

On appropriately recorded program material, the lateral imaging and soundstage presentation of the BBSM-6Fs were excellent. On high-level playback of jazz and rock 'n' roll, the speakers would really boogie! The high peak levels of drum rim shots and the like were rendered quite realistically. Reproduction of spoken male voice did reveal some upper midrange emphasis when compared to my reference systems.

In summary, the BBSM-6Fs deliver a number of important performance attributes in a relatively small package. These include high output capability, accuracy, precise imaging, smoothness, and even coverage. In addition, the Westlake Audio speakers work very well in situations where the listener has to be physically close to the systems, such as in small listening rooms and remote recording situations. On the downside, they require high-quality amplification that can drive low-impedance loads of only 2 to 3 ohms, along with minimum-loss cabling. Although these facts, coupled with the speaker's relatively high cost of \$2,400 per pair, complicate a buying decision, the BBSM-6Fs do deserve serious consideration and evaluation by those requiring a relatively compact, high-performance loudspeaker system.

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3

PIONEER PREMIER KEX-M900 CAR STEREO WITH DSP

Manufacturer's Specifications

Digital Signal Processing Section

Tone Controls: Shelving; bass control adjustable by ± 12 dB at 63, 100, 160, or 250 Hz; treble control by ± 12 dB at 4, 6.3, 10, or 16 kHz.

Three-Band Quasi-Parametric Equalizer: Adjustable by ± 12 dB at center frequencies of 20, 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200,

250, 315, 400, 500, 630, and 800 Hz and 1, 1.25, 1.6, 2, 2.5, 3.15, 4, 5, 6.3, 8, 10, 12.5, 16, and 20 kHz; three user memories.

Seven-Band Graphic Equalizer:

Adjustable by ± 12 dB at center frequencies of 60, 125, 250, and 500 Hz and at 1, 3.15, and 10 kHz; six user memories.

Loudness Contour: +12 dB at 100 Hz, +7 dB at 10 kHz, with volume at -30 dB.

Sound-Field Control: Fixed settings for "Studio," "Jazz Club," "ConcertHall," and "Stadium."

FM Tuner Section

Usable Sensitivity: 7 dBf for 30-dB S/N (see text).

Mono 50-dB Quieting Sensitivity: 10 dBf.

Mono S/N: 74 dB, IHF A-weighted.

THD: Stereo, 0.3% at 1 kHz for 65-dBf signal input.

Frequency Response: 30 Hz to 15 kHz, ± 3 dB.

Alternate-Channel Selectivity: 70 dB.

Stereo Separation: 40 dB at 1 kHz for 65-dBf signal input.

AM Tuner Section

Usable Sensitivity: 18 μ V for 20-dB S/N.

Selectivity: 50 dB.

Cassette Player Section

Frequency Response: 25 Hz to 22 kHz, ± 3 dB, with metal tape.

S/N: 73 dB with Dolby C NR, 67 dB with Dolby B NR, 61 dB without NR.

Wow and Flutter: 0.06% wtd. rms.

Stereo Separation: 45 dB.

Fast Forward/Rewind Time: Approximately 100 S for C-60 tape.

General Specifications

Power Requirements: 14.4 V d.c.; 10.8 to 15.6 V allowable.

Dimensions: Main chassis, 7 in. W \times 2 in. H \times 6 $\frac{5}{8}$ in. D (17.8 cm \times 5.0 cm \times 16.8 cm); tuner chassis, 7 in. W \times 1 $\frac{1}{16}$ in. H \times 5 $\frac{7}{8}$ in. D (17.8 cm \times 2.7 cm \times 15.0 cm).

Weights: Main chassis, 4.0 lbs. (1.8 kg); tuner chassis, 1.8 lbs. (0.8 kg).

Price: \$1,200.

Company Address: P.O. Box 1540, Long Beach, Cal. 90801.

For literature, circle No. 92



The Pioneer KEX-M900 is, as far as I know, the first DIN-sized head unit with built-in digital signal processing (DSP) as well as the first three-source DSP head unit. Like stand-alone car and home DSP units, the KEX-M900's DSP section lets you simulate various listening environments (a studio, jazz club, concert hall, or stadium) through digital simulation of the direct and indirect reflections from the walls, ceiling, and floor that make up the complex sound fields of such locations.

But this DSP section also performs three different types of equalization, whose effects can be tracked on a large dot-matrix display. The section includes a seven-band graphic equalizer, a three-band "parametric" equalizer with center frequencies selectable in third-octave increments from 20 Hz to 20 kHz (actually quasi-parametric, as its bandwidths aren't variable), and bass and treble controls with several frequency hinge, or turnover, points. Bass and treble settings can be combined with either type of equalizer settings, and all settings can be stored in memories (three for parametric, six for graphic EQ settings) for quick recall. Not only that, but bass, treble, and parametric EQ settings can be applied separately to the front or rear speaker pairs or to all speakers together.

A digital filter with eight-times oversampling and a one-bit, zero-crossing D/A converter with double-step noise shaping are used to decode digital signals from the DSP section or from the fiber-optic digital input. This input and an analog input permit hooking in separate Compact Disc players. Pioneer advises that the KEX-M900 has built-in control for Pioneer's CDX-M40 and -M50 and Premier CDX-M60 CD changers, including the ability to program up to 32 selections from each six-disc magazine and to program as many as 72 disc titles to appear on the dot-matrix display when each titled disc is played.

With so much digital circuitry cramming the chassis and creating potential r.f. noise, Pioneer has made the AM/FM tuner section a separate chassis. This is the latest version of Pioneer's highly acclaimed Supertuner car audio AM/FM sections, the Supertuner IV. It features 24 station presets (18 FM and six AM) with preset scan, seek tuning, and "Best Stations Memory," which scans the tuning band to select the six strongest stations in unfamiliar territory.

The cassette tape player section, incorporated in the KEX-M900 itself, features full logic control, a dual-azimuth tape head, music search, and Dolby B and C noise reduction. Other features of the KEX-M900 include an Automatic Sound Levelizer that raises or lowers the volume level in response to changes in the car's interior noise, and a Source Levelizer Adjuster that maintains the same relative volume levels when switching between sources.

The unit can also be controlled with Pioneer's "smart" remote control, which is included. It allows you to program one button to handle a selected, frequently performed operation not already present on the remote. Though equipped with only six pushbuttons, an up/down volume rocker button, and another two-way rocker switch whose function depends on the program source in use (tape, tuner, or CD), the remote offers about as much control as a passenger or driver would normally expect in a car audio system. Additionally, the KEX-M900's front panel is detachable to dis-



courage theft, allowing you to remove the display and controls and leave only an unusable black box with a blank faceplate in the dashboard.

The unit's multiplicity of functions, and its use of multi-function control buttons whose effects vary with the program source and mode of operation, requires an owner's manual of 50 pages (not counting those devoted to installation and troubleshooting!)

Control Layout

Just about every control button on the KEX-M900 changes function at least some of the time. For example, the six small buttons at the upper left, closest to the driver, can be used for clock time adjustment, for memorizing tone control settings, for CD disc-number searching (if a CD changer is installed), and for tuner preset selection. Four other buttons, clustered somewhat like a "+" sign or the cursor keys on some computer keyboards, serve either as left/right balance and forward/rear fader controls, as EQ level up/down adjusters and frequency selectors, or as CD disc-title controllers. A small button nearby switches from the normal control mode for the current source into one of three "volume-tone control modes." In the first of these, the four buttons beneath the display (labelled "F1" through "F4") are designated "Bass," "Treb.," "EQ," and "Flat." In the second mode, those same buttons take on the functions needed for initiating the Automatic Sound Levelizer ("ASL"), loudness compensation, Sound Field Control ("SFC") on/off, and SFC "Mode" selection. Finally, in the third mode, these four buttons are used to select the equalizer mode (parametric or graphic), choose combined or separate front and rear frequency adjustment, set the Source Levelizer Adjuster ("SLA") for the desired balance between radio, tape, and CD volume levels, and optimize the Sound Field Control for listeners in the left or right seats. As these are mainly setup adjustments, they're accessed only if the mode selector button is held down for at least 2 S. A rocker to the right of the mode selector button is used for obtaining fast forward, reverse, and music search in tape or CD mode; searching for selections in programmed CD play;



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DSP circuits handle spatial simulations, compensation for road noise, graphic and quasi-parametric EQ, as well as tone control.

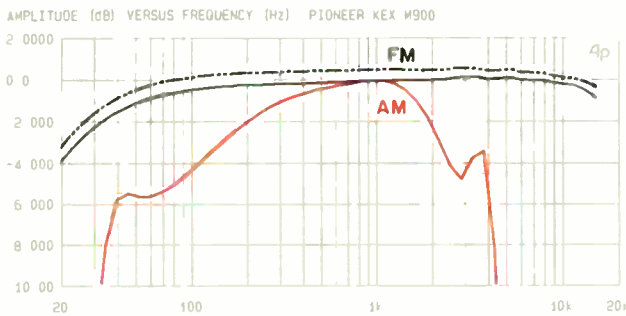


Fig. 1—Tuner frequency response for FM stereo (left channel is solid curve, right channel is dashed) and for AM signal with 74- μ S pre-emphasis.

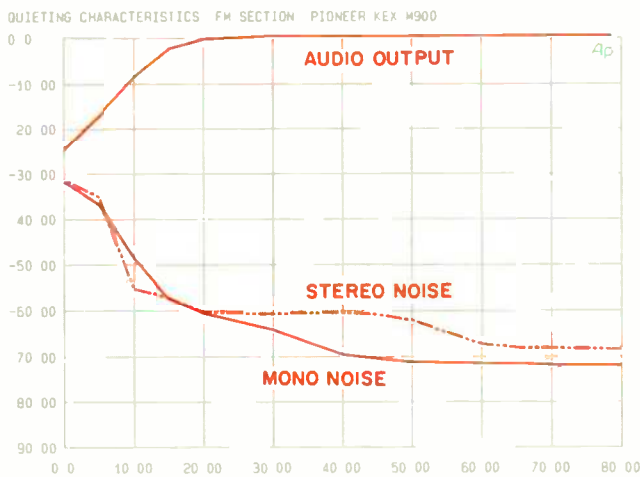


Fig. 2—FM quieting characteristics.

tuning up or down, and adjusting seek-tuning sensitivity. A double-arrowed button between this rocker and the "F1" button selects tape direction, erases CD programs, and switches tuner bands.

When playing cassettes, the "F1" through "F4" buttons select Dolby B and C NR, "Blank Skip" (which fast-winds past unrecorded tape sections of 15 S or longer), single-song repeat, and "Radio Intercept" (which sets the radio to play during fast forward or rewind). When "R. Int" is pressed, the display changes to show the current station, and two buttons change functions again to operate preset scan and stereo/mono selection.

During CD play, if a changer is installed, the four "F" buttons change functions again, to play the first 10 S of each track ("T.Scan"), to memorize and recall programs

("ITP"), to choose track-by-track selection or audible fast forward and reverse ("Manu"), and to select repeat or random play "Mode." The "DISP" button just to the right of these can be used to switch into disc-titling mode or to display previously entered disc titles up to 10 characters long. The four keys in the "+" configuration are used to select and enter the alphanumeric title characters.

Finally, when listening to radio, the four buttons beneath the major display area, as well as the nearby rocker buttons, take on such other functions as tuning and local mode sensitivity selection, band selection, preset scan tuning, seek or manual tuning selection, and FM mono selection. In addition, a tiny button at the upper right of the panel is used for "Best Station Memorization," selecting and memorizing the six strongest signals in a given area. Just below this is a button used to bring up the time display.

A few buttons I haven't mentioned yet are the source select button (which also turns the unit on or off) to the right of the display and the large "+" and "-" buttons to the left of the display that usually adjust volume but are also used for setting the Source Levelizer Adjuster and the sensitivity of the Automatic Sound Levelizer. In the event of abnormal symptoms such as failure to power up or failure of other buttons to respond when pushed, a tiny "Clear" button resets all controls to their factory settings, erasing any settings you have entered in the memory. Note, too, that disconnecting the car battery will also require you to reset all your desired presets and other memory settings.

The last control that needs to be mentioned is one located at the upper right of the front panel. Pressing this button causes the entire front panel to swing down, revealing the slot for tape cassette insertion. More important, swinging down this entire front panel is the first step in removing the panel from the rest of the set! A handy little case is supplied for storing the detachable panel at home or in your pocket, and I can't think of a better theft-prevention technique for a fairly expensive car audio component. With the front panel removed and the inner flap closed, no one would guess that this sophisticated head unit is installed in your dash. And even if they do, there's no way that a potential thief could use (or sell) the unit! This arrangement sure beats the four-digit code-number anti-theft methods I've encountered. Those may prevent a thief from operating the stolen component, but the thief may not know that till he tries to use or sell the item, after ripping apart your dashboard.

Measurements

Most of the features found in this combination of components are, of course, best evaluated with listening tests in a mobile environment. Still, some lab measurements were in order, especially concerning tuner and tape player performance, but also including the action of the various equalizer modes and tone controls. As for reaction to the DSP environment simulations, and the complexity of the front panel, I leave those to Technical Editor Ivan Berger, who, as in previous reports of this type of equipment, will be installing this Pioneer Premier component in his car for his usual "listen while driving" evaluation.

Frequency responses for the FM and AM tuner sections of the KEX-M900 are plotted in Fig. 1. In FM, roll-off at 30 Hz



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Removing the front panel makes it hard for thieves to spot the Pioneer and virtually impossible for them to use or sell it.

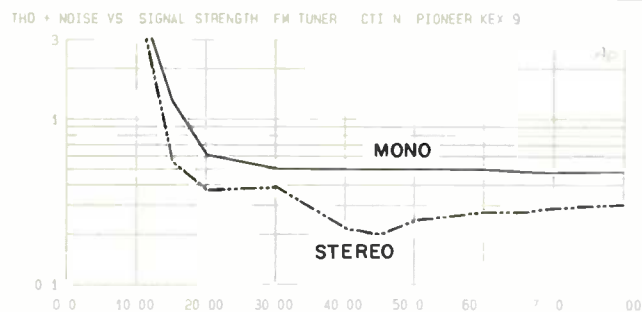


Fig. 3—THD + N vs. signal strength, FM section.

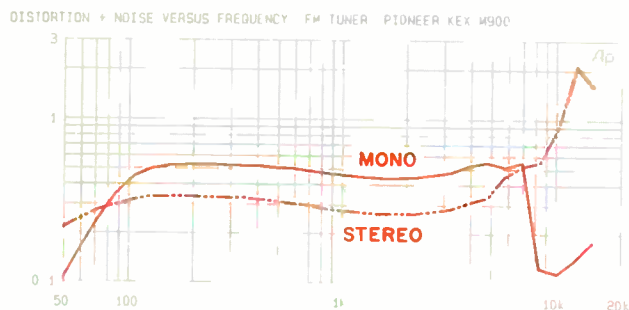


Fig. 4—THD + N vs. frequency.

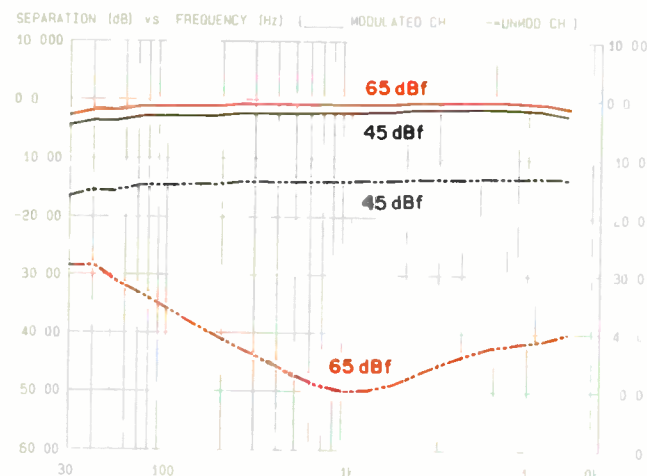


Fig. 5—Frequency response and stereo separation at two signal levels.

amounted to about 2.4 dB, while at the treble end of the FM audio band, response was down by only 0.7 dB. As usual, AM tuner response suffered by comparison. The -6 dB points for AM response occurred at 40 Hz and at just over 4 kHz, but response was anything but "flat" between those two frequencies, as can be seen.

It is easy to understand why Pioneer calls this a "Super-tuner." The KEX-M900's FM circuitry exhibited quieting characteristics comparable to those found in better home FM tuners—which is not typical of car FM. As Fig. 2 shows, 50-dB quieting for my sample required an input signal level of only 13 dBf, a little higher than the 10 dBf Pioneer specifies, and best S/N measured 72 dB for mono and nearly 68 dB for stereo. My only gripe with Pioneer concerns their "usable sensitivity" specification of 7 dBf. They are quick to qualify it; the company means the signal level that produces a 30-dB signal-to-noise ratio—but the industry definition of usable sensitivity is the point at which the *sum of noise and distortion* (THD + N) is 30 dB below the audio output level. While Fig. 2 does show that the 30-dB S/N point is indeed at 7 dBf, I soon learned that the actual usable sensitivity is considerably higher.

Figure 3 shows that the usable sensitivity point, equivalent to 3% THD + N, is at about the same 13-dBf level as the 50-dB quieting point. As Fig. 3 also shows, mono THD + N for strong signals was only 0.43%; surprisingly, THD + N for stereo reception was considerably lower, measuring only 0.26% for a 1-kHz modulating signal at 65-dBf signal strength, a bit lower than the 0.3% claimed by Pioneer. The plots shown in Fig. 4 (THD + N versus frequency for a fixed signal strength of 65 dBf) serve to confirm the results of Fig. 3 almost perfectly and also show that distortion plus noise remained fairly constant over much of the audio spectrum. The sudden rise of apparent THD + N for stereo operation at high audio frequencies was caused by spurious high-frequency "beats" rather than by actual harmonic distortion or random noise.

Stereo FM channel separation (Fig. 5) was excellent too, measuring nearly 50 dB at 1 kHz and remaining above 40 dB even at 10 kHz. Of course, as is usual with car audio FM tuners, Pioneer allows the tuner to "blend" left and right channels at weaker signal levels, thereby reducing background noise and also reducing separation. Thus, at a signal level of 45 dBf, separation decreased to about 12 dB at mid-frequencies, still enough to deliver some sense of stereo imaging within the confines of an automobile's interior.

To separate actual harmonic distortion from noise, and to get an idea of other crosstalk components during stereo FM reception, I ran a spectrum analysis of the outputs of both channels with a strong FM signal, modulated by 5 kHz in the left channel only, applied to the tuner. The upper curve of Fig. 6 shows the output of the left channel, while the lower, dashed-line curve (using the right-hand dB scale) shows separation of about 47 dB at 5 kHz as well as other harmonic and crosstalk components. Notice the excellent 38-kHz suppression—rather unusual in a car FM tuner.

Tests of the tape player section came next. Calibrated TDK test tapes, recorded with spot frequencies at -20 dB below 250 nWb/m, were used to plot the results shown in Figs. 7A (normal-bias tape) and 7B (high-bias tape). Both of

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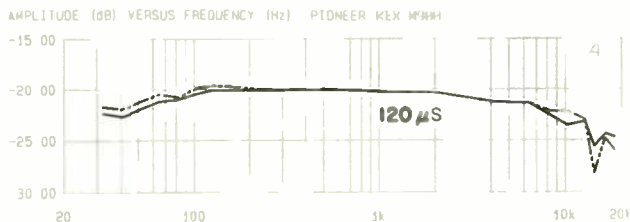
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With its 50-dB quieting at 13 dBf, like a good home tuner's, it is easy to see why Pioneer calls this a "Supertuner."



Fig. 6—Spectrum analysis, FM stereo mode, one channel modulated with 5 kHz (solid curve), other channel unmodulated (dashed curve). Use the right-hand scale for the lower curve.



A

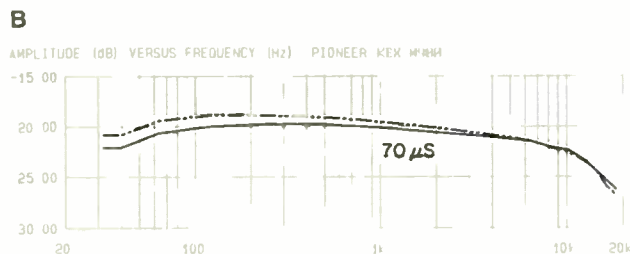


Fig. 7—Frequency response playing Type I calibrated reference tape (A) and Type II calibrated reference tape (B). Solid curves are left channel, dashed curves are right channel.

these test tapes have spot frequencies extending up to 18 kHz and down to 31.5 Hz. Allowing for some discrepancies in azimuth alignment, my conclusions were that the tape player performed extremely well compared with many other car tape players I have measured recently.

Using a previously recorded "silent" tape (recorded with bias signal but no audio input signal), I measured overall signal-to-noise ratio without Dolby NR (-56.1 dB), with Dolby B NR (-64.16 dB), and with Dolby C NR (-71.54 dB). While these figures fall a bit short of those claimed by Pioneer, it is more than likely that Pioneer's figures are referenced to the recording level at which 3% THD is reached (the standard reference for S/N readings), whereas my reference was with respect to Dolby level, 200 nWb/m. In any case, all three readings compare favorably with results obtained for top-grade home cassette decks measured the same way.

To further illustrate the effectiveness of the Dolby B and Dolby C noise-reduction systems, I plotted the distribution of noise versus frequency (using a 1/3-octave filter) in Fig. 8. Notice that the noise reduction extends to lower frequencies with Dolby C than it does with Dolby B.

Figure 9 shows a dual plot of wow and flutter for the tape player section. The upper, more erratic curve was made using IEC peak weighting and shows a wow and flutter that averaged about 0.1% over the 30-S duration of the test. Using Japan Industry Standard weighting (also known as weighted rms), the approach used by most tape player manufacturers when quoting wow and flutter, I measured just over 50.06%, as indicated by the smoother, lower curve of Fig. 9.

Before disconnecting the two components from my bench d.c. power supply, I decided to check out at least some of the equalization capabilities of the system. From my earlier description you can understand that the number of possible EQ combinations that can be achieved with this equipment is almost beyond measure. Accordingly, I set up an arbitrary response curve using the parametric EQ facilities of the KEX-M900. I did not know the pinouts for the unit's DIN multi-pin AUX input jack, so the only way I could plot the response of my arbitrary settings was to sweep an audio signal and use it to modulate my FM signal generator. Results are shown in Fig. 10, where I have also replotted the response of the tuner with all tone and EQ controls set to their neutral, or "flat," positions. The same approach was used to plot the action of the loudness control at various volume-control settings from 0 dB to approximately -35 dB (Fig. 11). Finally, to illustrate the flexibility of the tone controls and the ability to change their turnover frequencies, I ran a multiple sweep (again, via the FM system) showing first, for reference, the "flat" response of the FM tuner section. This was followed by successive sweeps of the maximum bass and treble boost and cut settings, using the highest and lowest turnover frequencies available for each control (Fig. 12).

There is certainly no doubt in my mind that Pioneer has done a remarkable—perhaps miraculous—job of cramming all of these control features, including the digital sound-field system, into a DIN-sized head unit and half-DIN auxiliary tuner chassis. I just worry that this complex unit's myriad



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– Lewis Lipnick, Stereophile Magazine August 1991, Volume 14 Number 8

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Pioneer did a wonderful—maybe miraculous—job of cramming so many digital functions into a DIN-sized head unit.

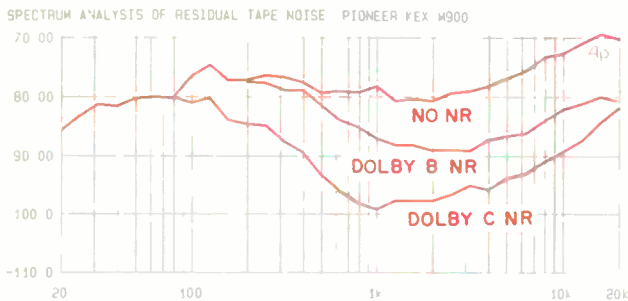


Fig. 8—Spectral distribution of tape noise.

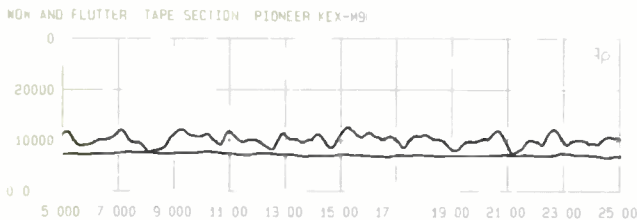


Fig. 9—Wow and flutter over a 30-S period, using IEC peak weighting (top curve) and JIS weighting, or wtd. rms (bottom curve).

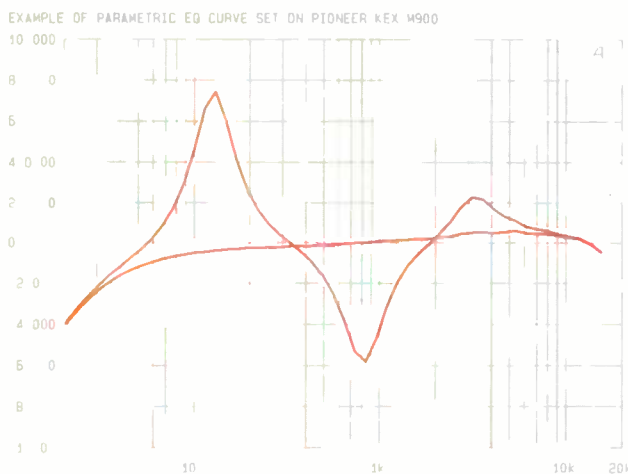


Fig. 10—Sample curve of three-band parametric EQ, taken via FM input (see text), with FM frequency response superimposed for reference.

adjustments and control functions may be a bit much for even an audiophile to handle while driving. I'll be interested to see what Mr. Berger has to say on that score and whether or not he thinks that DSP soundstage processing in a car is all that Pioneer says it is. One thing's for sure: If you're going to spend \$1,200 on this unit, do yourself a favor and spring for one of the matching CD players. And whatever else you do, *don't* skimp on the amplifiers and speakers you use with this system. And now, Mr. Berger, take to the road!

Leonard Feldman

Behind the Wheel

The KEX-M900 has a good selection of features—almost every feature known to man, in fact. Its performance, especially on FM, is superb. Its ergonomics are reasonable for such a function-packed unit. Its detachable faceplate is the most perfect theft-discourager I know of. My one real complaint is about its display.

Like most other complex LCD displays (and this one is super-complex, to handle all the DSP functions), the display in the KEX-M900 loses contrast rapidly as you move away from its designed viewing angle. If your car's console angles the stereo upward, so it faces you directly (and if you have no glass moon roof to reflect sunlight on the stereo's face), the Pioneer's display will probably cause you little difficulty. But in cars like my Scorpio, where the stereo's front panel faces the back of the car, people in the front seats are far off the display axis, making the screen dim by night and unreadable by day. (Back-seat passengers do better in this setup—and one can run the unit from there with the supplied remote.)

With performance like the Pioneer's, I could live with the dim display if all I needed it for was to tell me what station I was tuned to. But without the display, you can't tell which control mode you're in, and without that info, you don't know what the four large buttons under the display will do when you press them, and you are unsure about the functions of some other controls as well.

That's a pity, because many of the functions controlled by the "F1" through "F4" buttons are extremely useful. For example, you can custom tailor the KEX-M900's sound by using the equalizer either as a three-band quasi-parametric (not true parametric because bandwidth is not controllable) or as a seven-band graphic. The bass and treble controls have selectable turnover frequencies. And you can use either equalizer with the tone controls or separately, with the additional option of changing tone and EQ for front and rear simultaneously or individually. You can, for example, set up separate equalization for each end of the car, then adjust overall bass and treble for each recording.

On the road, I found the Automatic Sound Levelizer very useful, because its sensitivity let me set it up for just the degree of effect I needed. And I found the digital sound-field control a definite asset most of the time.

Of the four Sound Field Control settings ("Studio," "Jazz Club," "ConcertHall," and "Stadium"), I found only the first and mildest usable for most music. "Jazz Club" sounded more like a very reverberant concert hall (I liked it fine for slow symphonic works), and "ConcertHall" was more like a cathedral. The "Stadium" setting did reproduce the diffuse



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MTX[®]

Serious about sound

Pioneer's Supertuner IV is unquestionably the hottest tuner I've used on the road, invariably matching or beating my reference unit.

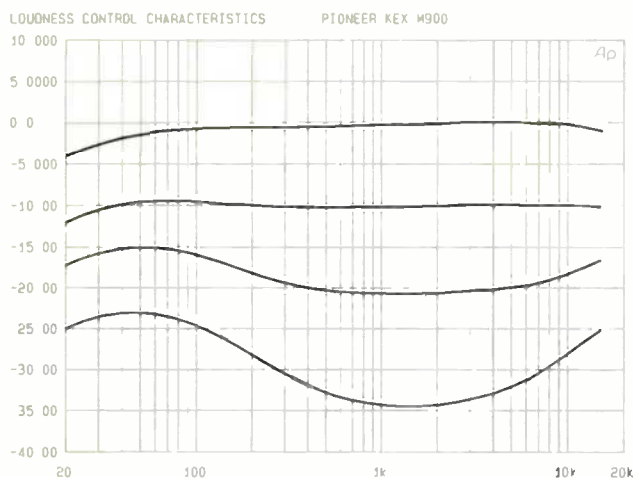


Fig. 11—Loudness compensation characteristics for volume settings from 0 dB (top curve) down. (The first two steps are each 10 dB, but because the volume control is digital, it was not possible to get a precise 10-dB jump down from -20 dB.)

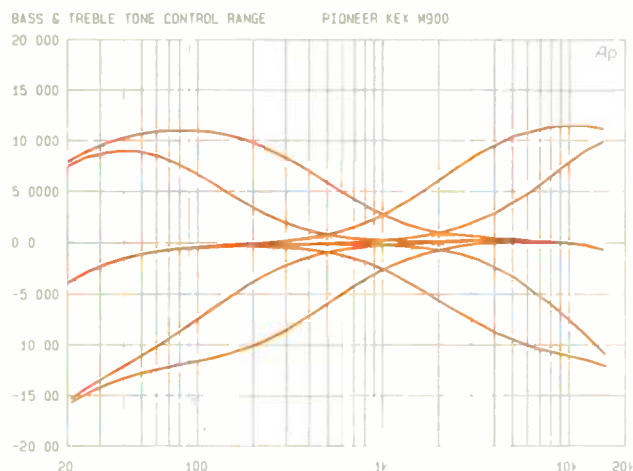


Fig. 12—Bass and treble control range, measured via FM tuner section, showing maximum boost and cut for highest and lowest turnover-frequency settings.

and boomy sound of a stadium concert quite accurately, but that's never been a sound I liked. To me, it would have made more sense to have setup adjustments that could moderate the effects of the preset sound fields, and possibly to have put more of the added delays and reverberations into the rear channels and a bit less in the front. Nonetheless, I found myself using the Sound Field Control, in its "Studio" mode, almost all the time. It gave the music a little more room to breathe—and generated such a tightly focused center image that I could almost believe a center speaker had been added. I only had to switch "SFC" off for speech, as one must with every mobile DSP unit I've heard so far. Some DSP maker should develop an algorithm that senses when the signal includes only a single, centered voice and cuts out the ambience on the assumption that someone's talking.

While I kept wishing the KEX-M900 played CDs, I did not get a chance to try either of its external CD options. These include not only control of a CD changer with a fiber-optic signal cable, but also control of a single-disc CD player with a wired connection. Judging from the manual, you could have a changer in your trunk for your everyday listening as well as an in-dash player for whatever CD suddenly takes your fancy. Other features worth a quick mention include the digital clock and the wireless remote control. The remote has an up/down volume rocker, an instant "Attenuator" button (not duplicated on the unit itself, alas), source selector buttons, and multi-purpose buttons to select tape direction and track, Compact Disc and track, or radio band (three FM and one AM) and preset. It also has a unique "Learn" button that can be taught to trigger any other front-panel button you wish. However, it triggers a specific button, not a specific function—so its effect will depend on the current function of whichever button it's been taught. The remote works over a very wide range of angles but not quite wide enough to work if it's attached to the steering wheel.

As to performance, Pioneer's Supertuner IV is unquestionably the hottest tuner I've used on the road. It invariably picked up stations as well as, or better than, my reference Soundstream, though I still have a very slight preference for the latter's sound. Even AM was excellent, sounding better than Fig. 1 would lead you to believe. The AM sound is warm but clear, enough to fool my sharp-eared wife into thinking it was FM when we tuned in WQXR, a New York classical AM station. There is no scan tuning, but every other tuning facility I know of is present, together with a local/distant setting with four levels of sensitivity for FM and two for AM. The only tuner problem I ran into was that, except in fringe areas, "Seek" worked for me only when the "Loc.S" mode was on, which raised the station-finding threshold a bit higher than I wanted it.

Tape sound was also good, with no Dolby-tracking problems even with Dolby C NR and no sign of overload when playing even metal tapes with high recording levels. At night, the display made very clear exactly what the transport was doing, another plus. I'd have preferred not having to lower the front panel to insert or eject tapes but recognize Pioneer's reasons for this. And aside from the display, the ergonomics are really admirable for a unit that offers as many worthwhile features as the KEX-M900. *Ivan Berger*

The most important opinion IS YOURS...

"I shall say, however, that when listening to the SA-1000/100 at low volume, in the early hours of the morning when everything is quiet, these components produce the best sound I have heard in my house. Exceptional in every way or from any point of view from which you care to analyze it."

Jorge Goncalves
Audio, Portugal

"However compact and reasonably priced the SA-100, it behaved like a behemoth in the Krell league."

-Ken Kesser
Hi Fi News & Record Review, England

"The Counterpoint SA-100 has no negatives. To the contrary, it is always great: the sound is rich and sweet, the voices and instruments are clear and exciting, and the image is superb. Who could ask for more?"

-Henry See
UHF, Canada

The Counterpoint SA100 is the essence of great craftsmanship... its sound is majestic, authoritative, and exciting, with a balance of strength and grace...

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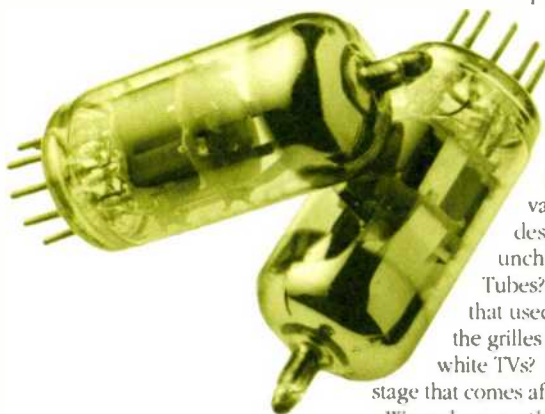
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CAN TUBES WARM UP CD SOUND?

How a very old technology can make a brand new compact disc player sound extraordinarily good.



Our new SD/A-490t has a clock that "ticks" 33 million times a second, multi-stage noise shaping, pulse width modulators and enough other edge-of-the-art circuitry to finally qualify us for entry into the hallowed Compact Disc Techno-Jargon Hall of Fame. But it also includes two vacuum tubes whose classic design has remained unchanged for over 35 years.

Tubes? Those warm glass things that used to glow cheerily through the grilles of old radios and black & white TVs? Yes. In an important circuit stage that comes after all the digital wizardry.

We and many other critical listeners believe that this anachronistic addition to an already excellent CD player design significantly enhances its sound. Read on and decide for yourself.

THE AMPLIFIER THAT DOESN'T AMPLIFY.

Between a CD player's D/A converter and external outputs is circuitry called a buffer amplifier stage. When you hear the word amplifier, you think of something which makes a signal louder. But that's not a buffer amp's purpose. In fact, contrary to popular lore, a CD player's buffer amplifier doesn't boost the signal strength at all — the final output of a CD player's D/A converter already has sufficient voltage to directly drive a power amplifier!

Instead, the buffer amp is a *unity gain* device which 1) increases output current, and 2) in the process, acts as a sort of electronic shock absorber.

A signal emerging from a CD player's digital-to-analog conversion process has sufficient voltage but insufficient current for proper interaction with a preamplifier or power amp. By acting as a current amplifier, the buffer stage helps lower impedance to a level that's

compatible with modern components — about 50 ohms in the case of the SD/A-490t.

At the same time, the buffer stage helps isolate the relatively fragile D/A chip set from the nasty outside world of demanding analog components.

TUBES VERSUS SOLID STATE.

All compact disc players have buffer amplifiers. But more than 98% of them use solid state devices for this stage: either integrated op-amp circuits or discrete transistors.

A handful of hard-to-find, esoteric designs in the \$1200 to \$2500 range employ one or more tubes instead. As does our readily-available \$699 SD/A-490t. For fundamental physical reasons, tubes have different transfer function characteristics than transistors. When used in ultra-expensive, audiophile preamplifiers and power amplifiers, their sound is variously described as "mellower", "warmer", "more open and natural" or simply "less harsh than solid state".

At the heart of these perceived differences are three basic facts:

1. Tubes produce *even-order* distortion (i.e. 2nd, 4th, 6th harmonics, etc.) while transistors create *odd-order* distortion, particularly 3rd harmonics which are less psychoacoustically pleasant.
2. In a buffer stage, a tube acts as a pure Class A device, which is considered the optimal amplifier configuration. Op-amps function as Class A in and Class B out, with potential crossover distortion as voltage swings from positive to negative.
3. Tubes "round off" the waveform when they clip. When over-driven, solid state devices cut off sharply, causing audible distortion.

THE SD/A-490T'S OUTPUT SECTION

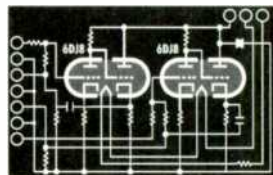
Our new CD player uses two 6DJ8 dual triodes (each literally two separate tubes in a single glass envelope) placed between the digital-to-analog converter and a motorized volume control.**

Operated at less than 30% of their maximum capacity, these tubes achieve a highly linear output voltage with very low static and transient distortion while providing very high dynamic headroom.

And because they're "loafing" at 1/3 their rated current capability, the SD/A-490t's tubes are designed to last the life of the CD player without replacement or need for adjustment.

A "LESS IS MORE" DIGITAL APPROACH FOR CLEANER ANALOG SOUND.

It would be pointless to have a tube output stage if the digital circuitry which precedes it





wasn't first rate. The SD/A-490t uses Single-Bit D/A circuitry to eliminate a form of exceedingly audible distortion inherent in most current CD player designs, and to provide better signal linearity than ever before.

If you've read current CD player brochures, you've probably stumbled across descriptions of de-glitcher circuits, laser trimming and even 22-bit converters. All these are merely fixes, applied to the same basic kind of D/A converter in an attempt to overcome built-in shortcomings.

In contrast, the SD/A-490t uses a completely new technology which avoids many of the problems that older approaches have struggled to surmount. We'd have to buy a whole section in this magazine to fully explain the differences (if you're interested, call 1-800-443-CAVR for an appropriately long and detailed brochure), but here's a short synopsis.

Traditional converters require 16 separate reference circuits, each of which must be accurate to one part in 65,536 — but, due to the realities of mass production, rarely are. If they're not "dead-on", an unpleasant form of noise called *zero-cross distortion* is produced. Because Carver's Single Bit D/A Converter transforms a 16-bit signal into a 1-bit pulse signal array, the "ladder" of 16 ultra-high-precision reference devices is not required: In effect, the SD/A-490t need only manipulate a stream of varying-width on/off pulses instead of having to accurately create 65,536 different amplitude levels at all times.

Zero-cross distortion is non-existent, and the SD/A-490t's Single Bit converter is able to decode linearity in excess of 115 dB below peak level with exceptionally low noise. You'll particularly notice the difference in the heightened purity and clarity of music during very quiet passages. Every nuance, intonation and harmonic of the original recording is there. Yet

*The Carver SD/A-490t. At \$699, its suggested retail is \$500 less than the nearest competitor with tube output****

"digital" harshness is noticeably absent even before it enters the SD/A-490t's mink-lined tube stage.

AN ARRAY OF FEATURES AS RICH AS ITS SOUND.

We've designed the SD/A-490t to be both useful and easy-to-use. 21-key front panel or remote programming. Fixed and variable output. Programming grid display. Random "shuffle" play.

Variable length fade. Automatic song selection to fit any length of tape. Even index programming for classical CD's.

Plus our proprietary Soft EQ circuitry which compensates for variables in spacial (L-R) information and midrange equalization found in many CD's mastered from analog tapes.

BRING YOUR TWO BEST CRITICS TO A CARVER DEALER.

It's tempting to further regale you with how well we think the SD/A-490t's tubes and Single Bit circuitry improve the sound of a compact disc. But your own ears should be the final arbiter of quality.

Thus you are invited to bring a few familiar compact discs down to your local Carver dealer and compare for yourself, hopefully creating your own superlatives in the process.

Suffice it to say that almost all critical listeners not only are able to hear a difference, but prefer the sound of the remarkably affordable SD/A-490t's dual triode transfer function.

**A device which neither amplifies nor attenuates a signal is said to have unity gain. In other words, what goes in comes out unchanged. Or does it?*

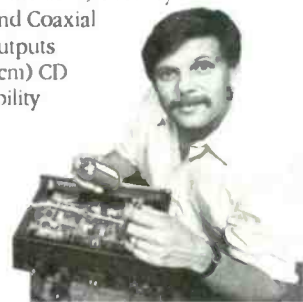
***Remote control variable output is a wonderfully convenient feature, but it would be pointless to eliminate solid state circuitry in the buffer amp stage and then use a solid state circuit for the final gain attenuator. So the SD/A-490t changes volume the old fashioned, physical way: a nice, clean carbon potentiometer, in this case, physically rotated by a small motor.*

****Source: 1990 Audio Magazine Annual Equipment Directory.*



THE SD/A-490t

- Dual 6DJ8 Vacuum Tube Output Stage
- Over-sized Disc Stabilizer Transport
- 24-Track Programming with 21-key front panel & remote input
- Music Calendar Display
- Indexing
- Random Play
- Motorized Volume Control
- Time Edit/Fade Taping Feature with user-variable time parameters
- 2 to 10 Second Variable Length Fade
- Exclusive Carver Soft EQ (Digital Time Lens) circuitry
- Optical and Coaxial
- Digital Outputs
- 3-Inch (8cm) CD Compatibility



Bob Carver
CARVER

CARVER CORP., LYNNWOOD, WA, U.S.A.
 Call 1-800-443-CAVR for information and dealer listings.

4

AUDIOSOURCE SS THREE SURROUND PROCESSOR

Manufacturer's Specifications
Surround Modes: Dolby Pro-Logic, "Hall," and "Matrix."
Frequency Response: "Matrix," 20 Hz to 20 kHz; "Hall" and "Dolby Surround," 100 Hz to 7 kHz.
Signal/Noise Ratio: Surround decoder, 98 dB.
Delay Time: 20 or 30 mS.
Input Sensitivity: 150 mV.
Input Impedance: 47 kilohms.
Maximum Input Level: 2.5 V.
Line Outputs: Main, center, surround, subwoofer, and tape.
Line Output Levels: Center and surround, 1.5 V; subwoofer, 0.25 to 2.5 V, adjustable.
Subwoofer Crossover: 80 or 150 Hz.
Amplifier Output: Two channels, 30 watts per channel.

Power Requirements: Processor, 90 watts, 120 V a.c., 60 Hz; remote, two AA batteries.

Dimensions: Processor, 16½ in. W × 2⅞ in. H × 9⅞ in. D (41.9 cm × 5.2 cm × 23.2 cm); remote, 2½ in. W × 6⅞ in. H × ¾ in. D (6.4 cm × 17.0 cm × 1.8 cm).

Price: \$399.95, including remote control.

Company Address: 1327 North Carolan Ave., Burlingame, Cal. 94010.

For literature, circle No. 93

The AudioSource SS Three processor features Dolby Pro-Logic, which achieves better surround sound localization than passive-matrix decoders can. The unit includes automatic input balancing to minimize leakage to the surround channels and to eliminate the need to adjust balance for different sources. A "Hall" surround mode generates spa-

ciousness with stereo material that does not have Dolby Surround encoding, and a "Matrix" mode synthesizes stereo from monaural sources. The subwoofer output has switch-selectable 80- and 150-Hz roll-offs, and its level is adjustable over a 20-dB range. An LED-type meter displays the four channel levels and automatically switches, when

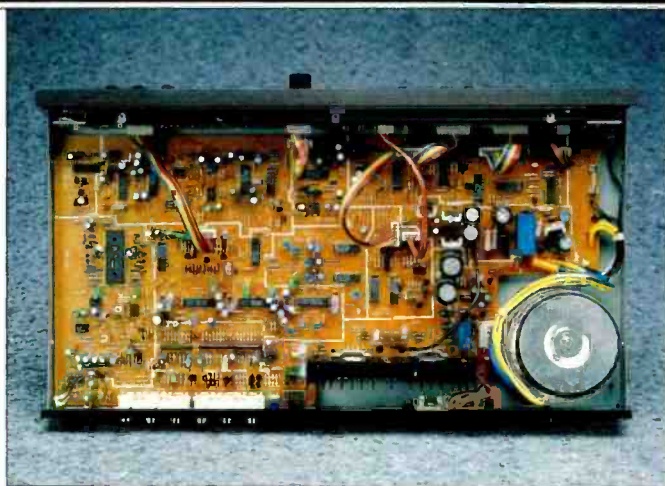


needed, to show the settings of the output-channel volume controls. A built-in test signal generator sequences automatically from channel to channel when actuated. To help set up a first surround system, the SS Three includes a built-in amplifier with outputs for center and surround speakers. The power transformer is of toroidal design for high current output with minimum magnetic leakage. The processor includes a full-function remote control.

Control Layout

The front panel of the SS Three is simple in comparison to some other decoders. The arrangement of the controls and switches is logical and not confusing. The orange push-on/push-off power switch is at the lower left of the panel. When power is on, the switch is illuminated and a little spot near the top is bright red. Some distance to the right are eight round, black switch buttons. The top four, from left to right in a row, are "Monitor," "Matrix," "Test," and "Normal/Phantom." The bottom four, from left to right, are "Hall," "Dolby Surround," and "20" and "30" mS for "Delay." A white line below ties "Hall," "Dolby Surround," and "Delay" together. Either delay time can be selected for Dolby Surround, but 30 mS is the fixed delay time for "Matrix" and "Hall" modes. A push of any button yields audible and tactile clues on its activation. Most of the button labels are self-explanatory, but some are not. "Test" feeds a noise signal successively to each output except the subwoofer. Balancing the channel speaker levels is much easier when using this important feature. "Normal/Phantom" controls the operation of the center channel. In "Normal" position (indicator off), monaural and center signals feed to the center channel. In the "Phantom" position (indicator on), for systems not having a center-channel amplifier and speaker, any monaural or center signals go equally to the left and right channels. Each button has a small, bright red indicator near its top to show when that function is on. The test signal is easily heard.

Further to the right is the four-channel level meter, with the "Input Level" pot to its right. Each meter column has a total of six rectangular LEDs, five green and a red one at the top. At the bottom of the columns, from left to right, are "S," "L," "C," and "R" for surround, left, center, and right channels, respectively. Next to the right-channel LEDs, from bottom to top, is a scale reading "-10," "-5," "0," "+3," "+6," and "Max." Normally, the meter display shows channel input levels. The input level control affects all levels equally. Pushing one of the output volume controls (covered later)



switches the display to show the four output volume settings—another helpful feature. Notice the difference: The input display shows *actual levels*; the output display shows volume *settings*. At the right end of the panel are spring-loaded, momentary-contact rocker switches for, from left to right, "Rear" (surround), "Center," and "Master Volume." A push on the top of any of the three switches increases that volume; a push on the bottom decreases it. "Master Volume" affects all outputs, including subwoofer. At the lower right end of the panel is the "Remote Sensor" port. All the labels are white, perhaps a little small but fully legible against the black panel.

Six pairs of phono jacks are at the left end of the back panel, with the top row usually for left and the bottom row for right. Jacks are provided for main-signal input and output, tape output and input, plus outputs for "Center," "Subwoofer (Mono)," and "Surr Out (Rear)." A screwdriver-slotted "Level" trim pot and an "80 Hz/150 Hz" slide switch are provided for subwoofer control. Also on the rear are color-coded, spring-loaded terminals for the center and surround speakers and a switch to feed both 30-watt channels to the rear speakers or to feed one channel to the center speaker and split the other 30 watts between the rear speakers.

I removed the top and side cover to examine the internal construction. I was immediately struck by the large, chassis-size p.c. board, cut out just enough for the good-size toroidal power transformer next to the back panel. All the components are identified, and circuit sections are labeled. Integrated circuits are widely used, and discrete transistors are relatively few. Support for the board is just adequate; less springiness would be desirable. Interconnections to the front-panel p.c. board use multi-conductor cabling. I could see the soldering on the back of this board, and it was excellent. The transformer was just warm to the touch after hours of processor evaluation. It was higher in temperature when I purposely drove the surround amplifier. A fuse is mounted in clips on the main p.c. board. I could flex the chassis using low force, but the assembly became acceptably rigid with the cover back in place.

The remote control has a total of 15 buttons, fewer than some have but enough for controlling all important functions. The "Power" on/off button is closest to the transmitting



The display can be switched to show true volume levels or volume-control settings, a helpful feature.

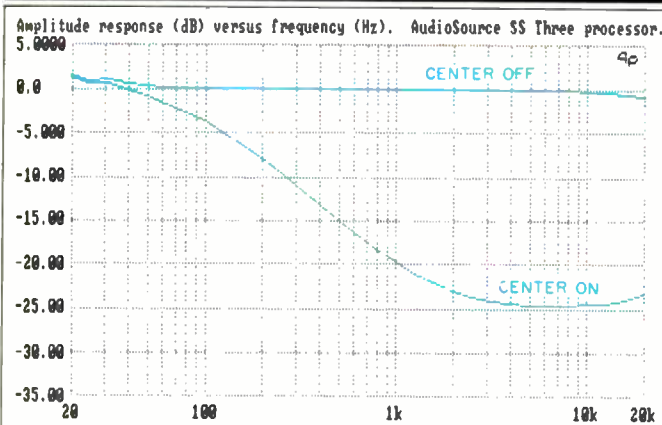


Fig. 1—Frequency response of main outputs at 1 V input and output, with both channels driven. Response shape with center channel on complements center-channel response; see text and Fig. 2.

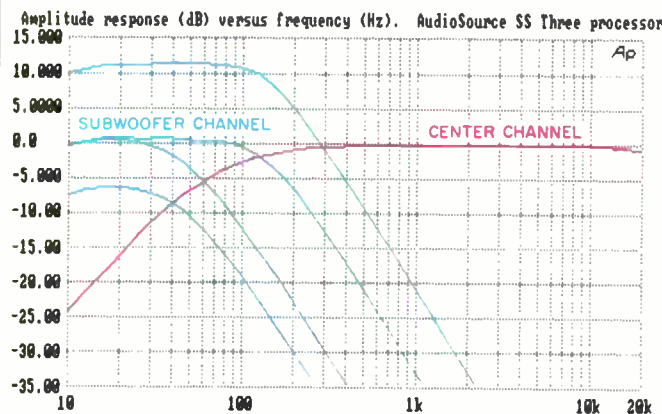


Fig. 2—Frequency response of center and subwoofer outputs, showing effects of changing subwoofer levels and roll-off frequencies (lower curves with 80-Hz setting, upper curves with 150-Hz setting).

end and to the right side. Below are two rows of four buttons each. From left to right, the topmost row has "Monitor," "Matrix," "Hall," and "Surround." The next row, from left to right, has "Test," "Phantom," "Delay 20 mS," and "Delay 30 mS." Some distance below are two rows of three buttons each, to raise and lower rear, center, and master volume. All the buttons are black except for "Power" (red) and "Master Vol" (yellow). The volume controls have the same physical layout as on the front panel, which helps to minimize errors. If desired, the remote control is easily held in one hand and the buttons pushed by the thumb.

Measurements

Let me first point out that I made all measurements after my listening and viewing. When the same signal ($L = R =$ monaural) drove both main channels and the center channel was off ("Phantom" mode), the response (Fig. 1) was close to flat, with a 1.2-dB elevation at 20 Hz and a 0.9-dB roll-off at 20 kHz. The -3 dB points were at 5 Hz and 55 kHz. In normal center mode and using the monaural input, the main-channel output levels are reduced greatly except at the lowest frequencies. This response, also shown in the figure, is complementary to the center-channel response shown in the next figure. The rationale for this design is that the main speakers are more likely to have good response and better power handling below 100 Hz. When just one main channel was driven, the frequency response was -0.35 dB at 20 Hz and -0.75 dB at 20 kHz. This would be the response whenever the left signal is not the same as the right.

Figure 2 shows the subwoofer and center-channel responses. The subwoofer roll-offs, at 12 dB/octave, are 3 dB down at 45 and 150 Hz for the 80- and 150-Hz settings, respectively. The center-channel response rolled off below 200 Hz and was -3 dB at 86 Hz. The high-frequency end was down 0.7 dB at 20 kHz. As I noted above, the low-frequency response is complementary to the boost in the main-channel response when the center channel is on. The crossover points with equal subwoofer and center output levels were -5.5 dB at 60 Hz and -2.2 dB at 125 Hz for the two switch settings. The exact subwoofer/center crossover points are not very significant because the output from the main speakers is also part of the total bass. The subwoofer output level can be adjusted with a trimmer, which is desirable, over a total range of more than 17 dB.

Figure 3 shows the response of the surround channels in Dolby Pro-Logic and "Hall" modes. The Dolby Pro-Logic response was 3 dB down at 120 Hz and 8.8 kHz, showing general agreement with Dolby Surround standards. I obtained this curve by feeding the test signal (a swept sine wave) to the left channel and a separate signal source to the right channel to ensure a continual difference (surround) signal during the sweep. I ran the "Hall" mode response at an arbitrary level to show the odd comb-filter effects. Figure 4 shows the crosstalk in the surround channels in Dolby Pro-Logic mode when feeding the sweeping sine wave to both left and right inputs. No manual adjustments of input balance were needed or possible, as the SS Three has automatic input balancing. The figure shows the crosstalk was down a good 35 dB or more across the entire band.

A New Classic

THE McINTOSH MC 7300 AMPLIFIER



Over the last 42 years, McIntosh products have achieved a worldwide reputation for engineering excellence.

Today, the same engineering excellence, the same painstaking workmanship, and the same attention to detail are evident in the MC 7300 Power Amplifier.

THE McINTOSH OUTPUT CIRCUIT

The MC 7300 output circuit uses 20 metal cased bipolar epitaxial power transistors and 4 metal cased driver transistors. The output transistors feature high f_T (gain - frequency product) and large SOA (safe operating area). The power transistor characteristics, the power supply voltage used, and the output autotransformer ratio have been matched for high efficiency, maximum power output with low distortion, and reliable long life operation.

THE McINTOSH AUTOTRANSFORMER

The McIntosh output circuit, superior in its performance, demands a superior method of coupling the amplifier output to the loudspeaker load. A McIntosh designed and manufactured autotransformer ensures peak performance and protection, as well as outstanding compatibility between amplifier and speaker.

McINTOSH HIGH OUTPUT CURRENT

Today's advanced loudspeaker designs have presented amplifiers with a new set of problems. Although a speaker impedance may be rated at a nominal 8 ohms, the actual load can drop to 2 ohms at certain frequencies. Some esoteric speakers may present as little as 1 ohm at certain frequencies. This presents an excessive demand for more current from an amplifier's output stage.

The MC 7300's new output stage is designed to deliver 85 amperes of peak current into low impedances with McIntosh safety and McIntosh reliability.

McINTOSH POWER GUARD™

Clipping, which looks and acts like non-musical square waves (music produces rounded waves), is caused when the amplifier is required to produce more power output (with low distortion) than it is designed to deliver. Amplifiers, when driven to clipping, can deliver up to 40% harmonic distortion - distortion that significantly decreases listening enjoyment, and increases listening fatigue. A clipped signal also produces extra distortion energy, which can damage speakers.

McIntosh precision engineering has developed the Power Guard circuit* to prevent

amplifiers from being overdriven into hard clipping; ensure that the amplifier produces its maximum output without increased distortion; and protect the speaker from excessive heating.

(*Power Guard is a patented McIntosh design, U.S. patent #4048573)

It is no accident, then, that a McIntosh amplifier is a smart investment, one that will fill your home with years of audio excitement:

- It is more reliable than other amplifiers
- It has a longer, trouble-free life than other amplifiers
- It sounds better than other amplifiers
- Its resale value is the highest of all amplifiers

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When a center speaker is in use, the main and center channel responses become complementary, feeding bass to the main speakers.

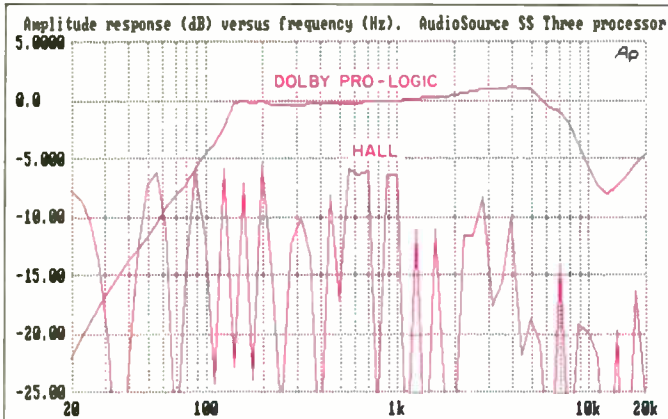


Fig. 3—Frequency responses of surround channels; see text.

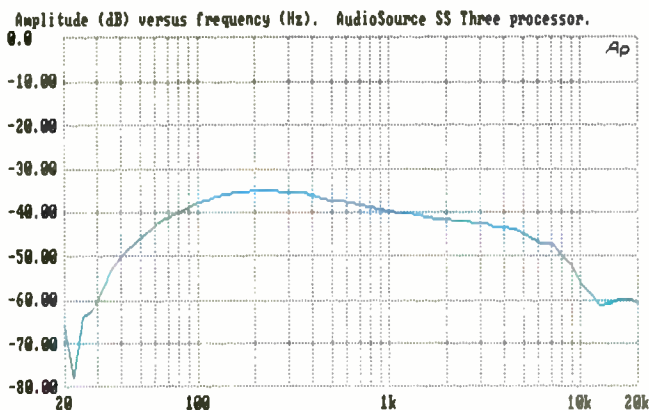


Fig. 4—Surround-channel output in Dolby Pro-Logic mode for mono signal in left and right channels, with either "Normal" or "Phantom" center mode.

The signal-to-noise ratio in Dolby Pro-Logic mode for a 1-V reference was 81.0 dBA for the main channels and 84.1 dBA for the surround channels. The ratios were 84.5 dBA and 87.6 dBA, respectively, with the 1.5-V rated output level as the reference.

Figure 5 displays THD + N across the band for the main channels at 1.0 V input and output. The distortion was 0.06% or less over most of the band, but there was a somewhat odd rise to 0.16% around 30 Hz.

The thresholds of the input-level meter segments did not match the dB calibrations, turning on at -6.6 ("−10"), -3.4 ("−5"), 0 reference ("0"), $+2.2$ (" +3"), $+4.9$ (" +6"), and $+8.5$ ("Max"). All four meters tracked closely. The "Max" LED turned on with a 155-mS, 5-kHz tone burst having a continuous level 1 dB above indicator turn-on. This response time is too long to detect the shortest high-level peaks. The time for the "−10" LED to just turn off was 380 mS, longer than for a VU meter. The time is shorter than for a standard peak-responding meter but goes well with the measured turn-on time. In actual use, I judged the meter dynamics to be fine for monitoring input level.

With the input level control at maximum, sensitivity was 261 mV for maximum acceptable input level according to the meter "Max" indicators. The "0" indicator turned on at 100 mV. Clipping first appeared at the surround amplifier output. The maximum, no-clip input level varied from 200 to 650 mV depending on the combination of the settings on the input and master volume controls. The surround-channel "Max" LED reliably indicated when clipping was nearing for most of the volume combinations. With the input volume reduced, amplifier overload appeared at an input level of 11.2 V. The main (line) output clipped at 4.1 V.

When the dB display showed volume settings, its LEDs turned on at -15.8 ("−10"), -9.1 ("−5"), 0 reference ("0"), $+9.8$ (" +3"), $+19.9$ flickering to $+30.0$ steady (" +6"), and $+58.5$ ("Max"). Notice in particular the " +6" indicator's turn-on range of 30 to 40 dB. This very wide range might lead to some user confusion because the other steps are much smaller. Holding in the "Master Volume" button raises or lowers overall level without changing the relative levels between channels—until any channel reaches its minimum or maximum volume. Continuing to press the same end of the "Master Volume" control after that, or pressing it again, will change the settings of any other channels that have not yet reached the limits of their range. To maintain relative levels, therefore, this button should not be held in any longer than it takes for any channel to reach its maximum or minimum indication.

The output polarity in the main, center, and subwoofer channels was the same as the input polarity. The input-to-output level change for the main channels was -9 dB with the input level control at 3 o'clock and "Master Volume" set to just turn " +6" on. Gain of unity or higher was easily reached by increasing the volume settings. The input impedance was 55 kilohms; the output impedance was 3 kilohms, which is low enough in most cases but could be too high when feeding 10-kilohm inputs. The two sections of the input level pot tracked within 0.5 dB from wide open to 25 dB down, its maximum attenuation. The attenuation of the "Master Volume" control sections tracked within 0.3 dB all the way to about 80 dB down, excellent performance. The attenuators have about 38 steps of 2 dB apiece and then a couple of larger final steps, reaching a total of 80 to 85 dB down, depending on the channel. With the down button held in, the total attenuation from 0 dB (max) to muting level was covered in 5 S. I also muted the signal by switching to "Monitor," which reduced the output by 85 dB. The measured delay settings were 20.0 and 30.0 mS, exactly to specification.

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AudioSource's SS Three provided very good localization and smooth sound fields with most movies and videos.

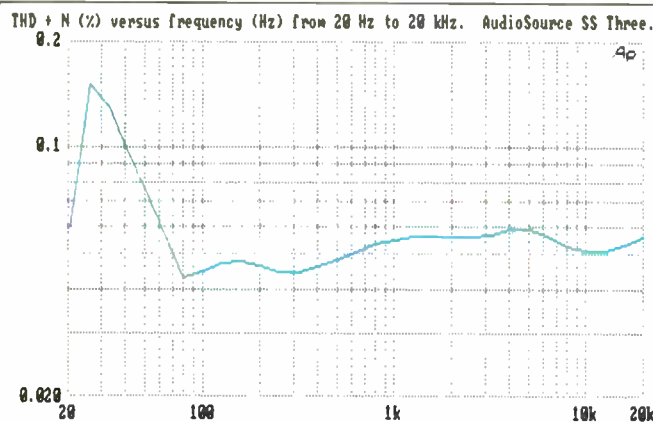


Fig. 5—Main-channel THD + N in Dolby Pro-Logic mode, at 1 V in and out.

The built-in test signal is shaped pink noise, rolled off above and below 1 kHz. The -3 dB points were at 400 Hz and 2.5 kHz. Any spurious signals from the digital delay were at least 85 dB below a 1-V output signal. The remote control was reliable out to at least 25 feet on the sensor's axis and could be pointed as much as $\pm 20^\circ$ off at this distance. At normal viewing and listening distances, the control could be positioned up to $\pm 60^\circ$ off the sensor's axis when it was aimed at the unit, or it could be pointed $\pm 60^\circ$ off when located on the sensor's axis. The power amplifier had less than 0.5% distortion up to 10 watts per channel with both channels driven using 8-ohm loads. Distortion increased rapidly at higher power levels. The maximum output was about 50% higher (16 watts) with 4-ohm loads. The amplifier did not put out the specified 30 watts per channel (unspecified load) even when the tone bursts were of very short duration.

Use and Listening Tests

The associated equipment used for the in-use evaluation was the same as used in other recent profiles. As usual, I connected a two-channel oscilloscope across the left and right inputs and operated it in X-Y mode to show the existence or absence of stereo and surround information. (The reference surround unit was the combination of Yamaha's DSP-1 processor and their DSR-100PRO Dolby Pro-Logic decoder.)

The SS Three's owner's manual is brief and lucid, providing simple and direct instructions on setting modes for typical sources, but additional comments would benefit users who want to experiment. Four diagrams will help many users make connections. At least momentary confusion, however, might be generated, as all figures show "Video Out" on the VCR connected to "Monitor Video Out" on the video display instead of "Monitor Video In," as it is labelled in most systems. I used the built-in level-calibration signal

for basic system balancing but trimmed center and surround levels during the movie viewing and listening later.

Return of the Jedi (with Harrison Ford, Carrie Fisher, and Mark Hamill on CBS/Fox Video VHS tape) demonstrated the great advantage of Dolby Pro-Logic in keeping dialog front and center. ("Hall" mode was sometimes better for surround sound by adding openness, but it was definitely poorer with dialog because it lost the desired center presence.) The SS Three effectively showed the excellence of the source and the obvious superiority over regular stereo for the sound. The subwoofer was a definite plus for this film. Most of the time I preferred the 20-mS delay, but I liked the expansion effect in the sound field when I used 30 mS for music. *Out of Africa* (with Robert Redford and Meryl Streep, an MCA Home Video VHS tape) got off to an impressive start with the sounds of trapshooting correctly localized. All on-screen dialog was strictly monaural, and it was very positively centered. Off-screen dialog was also well localized. The music surround had a spaciousness during the biplane scene that matched the panorama of the screen.

South Pacific (with Rossano Brazzi and Mitzi Gaynor on CBS/Fox Video VHS tape) required mode switching for the best results. I preferred Dolby Pro-Logic for all dialog, but I liked "Hall" better and "Matrix" much better for the songs.

The X-Y display showed odd little artifacts in the source at times, including an unwanted L - R spur across the L + R monaural signal. This caused some audible distortion in Dolby Pro-Logic mode. Michael Jackson's *Moonwalker* (on a CMV Enterprises videodisc) starts off with little surround sound. "Badder" and "Speed Demon" in the middle of the first side deliver more of interest, and I had the center/front/surround balance I wanted by that time. "Smooth Criminal" has much surround of high quality, with good effects, and Dolby Pro-Logic delivered good localization across and out of the scene. The subwoofer was helpful several times on this track. I increased the center level to get more vocal presence in "Come Together," another good track.

Next, I sampled a series of Compact Discs. Beethoven's *String Quartets, Op. 18, Nos. 1 and 6*, performed by the Colorado Quartet (Fidelio 8823), sounded most realistic with either "Hall" or "Dolby Surround." The center channel was on but at a low level. I preferred 20-mS delay with the Dolby mode. However, "Hall" was more than acceptable, and this mode has 30-mS delay only. The string tone had a slight bite in the loudest sections, a characteristic I had not heard at this quartet's live performance of the same works. I could not get the room ambience I wanted using either mode. The rendition of Handel's *Concerti Grossi, Op. 6, Nos. 1-4* by Trevor Pinnock and the English Concert (DG/Archiv 410897-2) has noticeably more room sound than the quartet disc. The AudioSource decoder was more successful with this disc in delivering a satisfying illusion. Dolby Pro-Logic was the choice for a fuller sound overall, but "Hall" delivered better frontal articulation.

The next disc contained Sibelius' Symphony No. 4, "Luonnotar," and "Finlandia," performed by the Philharmonia Orchestra with Vladimir Ashkenazy conducting and Elisabeth Söderström, soprano (London 400056-2-10). I hadn't heard any of this music in some time. I got reacquainted and was reminded how "Finlandia" is more than a sweet song sung



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Dolby Pro-Logic's advantage
in keeping dialog centered
was obvious when I viewed
Return of the Jedi.

by amateur choruses. I had to reduce the input level when I heard obvious overload. The red LEDs had been flickering, and I had not noticed them from my listening position. I thought the surround was fuller with Dolby Pro-Logic, and I preferred that mode. I preferred it even more for "Luonnotar" and the solo voice after I raised the center level. The Symphony No. 9 of Robert Simpson was a new one to me. The performance by Vernon Handley and the Bournemouth Symphony Orchestra (Hyperion CDA66299) produced several exciting climaxes. The music benefited from a high surround level, 30-mS delay, and Dolby Surround. I couldn't achieve the exact combination of frontal detail and full room sound I wanted, but I got close to it.

Stravinsky's *The Firebird: Suite* (1919 version) is one of my favorite showpieces, and I really enjoy listening to the version by Robert Shaw and the Atlanta Symphony Orchestra (Telarc CD-80039). The start was good, with low rumbling from the tympani and double basses. Dolby Pro-Logic was closer to the sound I wanted, and 30-mS delay was better for a sense of fantasy in the character of the surround. *La Cage aux Folles*, by Jerry Herman and Harvey Fierstein, stars George Hearn and Gene Barry (RCA RCD14824). The musical was a great contrast to *The Firebird*, and changes were in order. Sometimes "Matrix" mode was better for the voices. Shortening the delay to 20 mS and bringing the center level up high, however, made Dolby Pro-Logic the much better choice. Occasional center-level jumps were distracting, but a check of the oscilloscope monitor revealed they were characteristic of the source. Next I tried Verdi's *Un Ballo in Maschera*, sung by Margaret Price and Luciano Pavarotti with Georg Solti leading the National Philharmonic Orchestra and the London Opera Chorus (London 410 210-2). The opera seemed best in "Hall" mode at first. I felt challenged in trying to get both good vocal presence and a full surround field. I went back to "Dolby Surround" and the settings I had for the musical. I spent the time to trim levels more carefully and found I could obtain really good separation of the different vocal lines. Stage localization was good for both width and depth.

Using a subwoofer showed its value at various points during Saint-Saëns' Symphony No. 3 ("Organ") by Michael Murray with Eugene Ormandy and the Philadelphia Orchestra (Telarc 80051). The entrance of the organ was more solid in sound and in placement using Dolby Pro-Logic. I did need to bring the center level down slightly to secure good balance with the orchestra. The oscilloscope showed noticeable room sound on Leo Sowerby *Piano Works* performed by Gail Quillman (New World Records NW-376-2). I didn't find it so obvious in the listening, however, and decided I preferred the relationship of piano and room sound in "Hall" mode over the other modes. The situation was different for Rutter's *Requiem; I Will Lift up Mine Eyes*, performed by The Cambridge Singers and the City of London Sinfonia and conducted by John Rutter (Collegium COLCD 103). The liveness on the CD was readily apparent in the listening—whatever I did. I preferred 30 mS of delay and decided that "Hall" and "Dolby Surround" were both good choices, a matter of personal preference. I did set the center level low since I wanted a cathedral sound quality, not fully realized because of the lack of parameter control.

The Bop Brothers on *Doing the Classics* (Colossus BCD2102) were much more than a noticeable change from the Rutter choral works. When I saw how monaural the vocals were, I tried "Matrix" mode and reduced the surround level. Some effects from the source that appeared in the surround field were interesting in ways, but I found them odd. "Hall" mode with a high center level was the best choice to secure a good combination of voice centering, instrument localization, and room sound. "Hall" mode and very close to the same settings were also best for the Dirty Dozen Brass Band on *My Feet Can't Fail Me Now* (George Wein Collection, CCD 43005). Many pop/rock discs require strong centering and good presence for the vocals. The lack of a center channel can greatly reduce the impact of this type of music. Bruce Springsteen's famous *Born in the U.S.A.* disc (Columbia CK 38653) has good stereo and surround levels. I preferred "Hall" mode and the strong center for the majority of this disc, but some tracks sounded better to me with Dolby Pro-Logic. A couple of the more monaural-like tracks were good in "Matrix" mode, and other listeners might make that choice. The last CD tried was *Legendary Oldies of the 50's and 60's* from Realistic (Radio Shack Cat. No. 51-5009). Both monaural and stereo tracks are on the disc, and the amount of surround varied greatly. I set the center level high to enhance the vocals. I usually used "Matrix" mode for monaural tracks and "Hall" mode most often for the stereo ones.

The SS Three's four-channel input metering was regularly helpful, and its convenience was increased by the automatic switching to volume-setting mode whenever a volume button was pressed. The broad turn-on range of the "+6" volume step was a little distracting, but I always set volumes by listening. I could quickly identify the status indicators in the buttons from my viewing/listening position. The flexibility of the remote control and the automatic balancing eliminated much of the need to go to the front panel to make desired changes. Controls and switches were reliable throughout the testing. It took me some practice to learn exactly how long to hold a volume button down to get it to make a change. Occasionally the front-panel power button needed a second push, but the "Power" button on the remote control never did.

The AudioSource processor was very successful in generating good localizations and smooth sound fields with most movies and videos. Dolby Pro-Logic proved its value regularly. With these sources, the SS Three was close in performance to the reference decoder. For some CDs, the SS Three delivered very satisfying surround sound; for other discs, I wanted to change parameters of the sound field in ways I could not. Particularly for classical music CDs, the reference processor delivered much more in the way of satisfying illusions. For music that I listened to at really high levels, my evaluation system was putting more power into the surround channels than could be delivered by the SS Three's built-in amplifier. For limited needs, however, this amplifier adds value and convenience, and a higher powered amp can always be added later. In the past, Dolby Pro-Logic has been an expensive, attractive feature. The AudioSource processor provides this attraction and others at a very reasonable price.

Howard A. Roberson

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Manufacturer's Specifications

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Coupling to the Ear: Special off-the-ear design.

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For literature, circle No. 94

The Jecklin Float ESC earphones were designed to be used in recording studios by engineers for monitoring the sound as they make original recordings and final mixes. If an engineer hears things that are not right when a recording is first being made, he can fix them. These Jecklin earphones were designed to allow everything in the recording to be heard clearly, both the good and the bad. While most other monitoring earphones use dynamic transducers, Jecklin decided to use electrostatic elements in the Float ESC because of electrostatics' reputation for producing extremely transparent and detailed sound. These characteristics are essential for monitoring during recording, because any problems—such as noise, distortion, hum, tape drop-outs, etc.—must be clearly audible to the engineer.

The Jecklin Float ESC earphones are rather unusual in appearance. They are relatively large and cumbersome but, considering the application for which they were designed, are reasonably comfortable. It is, however, obvious that they are not designed to be used with pocket cassette players by joggers! They weigh over 1 pound, and their size and weight take some getting used to, but this is not hard because one is diverted from their physical aspects by their impressive



sound. The Jecklin Float 'phones are designed to stand away from the ears, so the pinnae of the ears can function as they do when listening to speakers or live sounds. They are called "Float" because they rest lightly on the least sensitive parts of the head, supported on foam pads. These 'phones are not sealed against noise from the outside, but this should not present a problem in a recording studio or a home listening environment.

The Float ESC's electrostatic transducer elements are built into a large, one-piece headband shaped like an inverted "U." The headband is molded in a shape that provides the tension required to hold the earphones in place. A "one size fits all" philosophy is apparent, since the tension cannot be adjusted, but the manufacturer says their research shows that adult heads vary by only about 1.5 to 2 cm (0.6 to 0.8 inch). No one on my listening panel found them to be uncomfortable, so this may not be a problem for most people. Foam strips inside the headband, toward the rear on both sides, keep the headband from falling off when the listener bends forward and hold it in place when the listener's

head moves. The driver elements are covered by acoustically transparent, open-cell foam.

Electrostatic transducers require high voltages to operate, and Jecklin provides this by an interface/power-supply box that must be plugged into an a.c. receptacle. The interface/power supply also acts as an impedance converter, since the electrostatic elements' high impedance must be matched to the low output impedance of your power amplifier. The power-supply box has sockets for two multi-pin earphone connectors and for the input connections which accept the output of the left and right channels of your power amplifier or receiver; it also allows you to switch between the earphones and your loudspeakers. The flat, straight multi-wire cord from the Float ESC to the interface/power supply measured 14 feet long in our sample, so you can place the power supply near your other equipment and still listen at a reasonable distance.

A number of people, most of whom have been members of my listening panel over the years, were asked to audition the Float ESC and write down their comments. I will try to correlate

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An improved version of the widely acclaimed N° 23 amplifier, the N° 23.5 is not the sort of update that merely takes advantage of newer and better parts, or that corrects flaws in the original design. Rather, it incorporates substantial improvements in four areas: self-referencing voltage reference in the power supply regulator amplifier, a new active balanced input stage, an enhanced

current mirror, and differential cascode bootstrapping. If you don't understand this technical jargon, consider that it took a team of engineers using advanced computer-aided design tools over a year to perfect the N° 23.5 and bring it into production. Such sophisticated engineering requires tools and skills seldom found at high-end audio manufacturers, and demands a quest for perfection that is at odds with supplying the mass market.

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N° 23.5

The Jecklin Float 'phones present well-done "live" recordings very realistically, with good vocal articulation and a sense of space.

the subjective comments with some technical measurements that I made.

I measured the acoustical output of the Jecklin Float 'phones with the B & K Head and Torso Simulator (HATS). There was a rise in output at around 115 Hz that can be correlated with such listener comments as, "The bass is full and natural" and "great bass." This indicates that, although the bass output drops off below 115 Hz, the Jecklin Float earphones give the impression of very good bass reproduction; according to the manufacturer, measurements on a real head show about 2/3 octave lower response than is measured on an artificial one.

Jecklin has chosen design parameters which allow the natural resonance of the diaphragm to be underdamped. This is necessary to produce respectable bass output in an earphone that does not have a tight pressure seal between the transducer elements and the ears. It is similar to the engineering trade-off employed by the designers of large electrostatic panel loudspeakers, in which both sides of the diaphragm are open to the air.

Although the measurement using the B & K diffuse-field equalization showed the response between 2 and 7 kHz to be down as much as 5 dB, the listen-

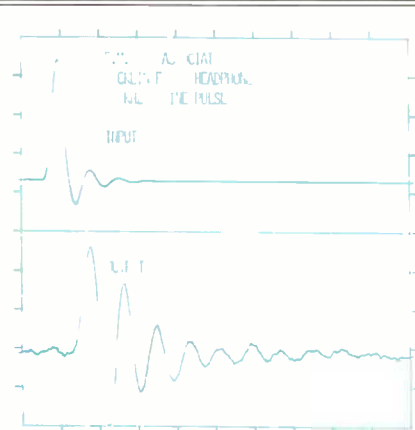


Fig. 1—20-kHz cosine-pulse test.

ing panel rated the midrange sound quality as excellent. They rated the high-frequency sound characteristics as being very good. The Jecklin Float ESC 'phones clearly gave the Stax SR-Lambda Pro reference earphones a run for their money.

The square-wave measurement also indicated very good performance. Some squiggles on the leading edge of the waveform indicated some "ringing" in the high-frequency range. The spectrum of the square wave showed a gradual increase in output from the

19th harmonic (9.5 kHz) to the 25th harmonic (12.5 kHz). This would appear to be caused by a resonance around 11 or 12 kHz, though the manufacturer believes this resonance is masked when the 'phones are on a real head. The response dropped off above 12 kHz, so the ringing can also be attributed to the time delay caused by this natural filter action. Comments from panel members about the high frequencies being bright and sharp can be correlated with this measured resonance. When questioned later about their comments, however, no one said that they considered the sound objectionable.

The top waveform of Fig. 1 shows the 20-kHz cosine-pulse output of the power amplifier to the Float ESC's interface/power-supply box. There is some interaction between the input and the driving amplifier. The acoustical output of the earphones is shown in the bottom waveform. The ringing is very apparent. Other measurements, made using 3- and 7-kHz cosine pulses, showed less ringing. The resonance at 12 kHz was also corroborated by an FFT magnitude and phase transfer-function measurement I made of the Float 'phones: There was a rise in the magnitude transfer function of around 10 dB at 12.25 kHz. The phase transfer function indicated that the Float exhibits a "minimum phase" condition, which is very good.

The Jecklin Float ESC gives a very realistic presentation of well-done "live" recordings, such as opera, with excellent articulation of the voices and a sense of the acoustical environment. One reason for this is that they don't have the resonant, nasal, or canned sound of most enclosed earphones. They are physically unusual, and it may take some people time to get used to them. This time will pass quickly and enjoyably, because the sonic attributes of these earphones are excellent. If you like to turn up the sound occasionally and would like to have the sound quality provided by a pair of expensive loudspeakers, you should investigate the Jecklin Float ESC earphones. They allow you to hear everything clearly, with very good bass and as loud as you want, while still retaining an aural connection to the outside world.

Edward M. Long

EARPHONE EVALUATION

PARAMETER	RATING	COMMENTS
Overall Sound	Very good	
Bass	Good	"Full and natural"
Midrange	Excellent	"Clear" and "Forward and sharp"
Treble	Very good	"Bright" and "Clear and sharp"
Overall Isolation	Poor	
Bass	Poor	"Low sounds are easy to hear"
Midrange	Poor	"Easy to hear outside conversations, etc."
Treble	Fair	"Easy to hear from the outside"
Comfort	Good	"It takes time to adjust to this unusual design"
Value	Good	

GENERAL COMMENTS: The stereo separation is very pronounced. Surface noise from records and background noise from radio are very apparent. The sound reproduction is excellent. The weight and the effects of the foam against the ears may make long-term listening sessions difficult for some people.

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Whenever I encounter a product designed by famed r.f. engineer Larry Schotz, I know that I won't be disappointed with its performance. This was especially true with the Recoton FM200, a powered, *tunable* indoor FM antenna. Recoton must feel the same way about Schotz, for they've put his picture, a 150-word biography, and a list of his inventions right on the FM200's carton.

As an FM enthusiast myself, and as a former designer of FM circuits, I could not help being a bit envious of Schotz's brilliant idea to construct a tunable powered indoor antenna. All of the indoor FM antennas I'd tested in recent years (including earlier ones from Recoton, Terk, and Parsec, which were also designed by Schotz) were powered, but none had a built-in tuning circuit. By incorporating a tuned r.f. gain stage in this antenna, Schotz effectively provides the user with what amounts to an extra tuned r.f. stage in whatever tuner or receiver he or she attaches the antenna to. The tuned stage in the Recoton FM200 has its good points and also one disadvantage, which I'll get to shortly.

The advantage of a tunable antenna is its ability to improve the selectivity of the system to which it is connected. Most indoor FM antenna advertising stresses "sensitivity" and "gain" when, in fact, sensitivity is rarely a problem in most metropolitan areas these days. The real problem is interference, either from adjacent-channel signals 200 kHz away or alternate-channel signals 400 kHz removed from the frequency of the desired signal. By providing a *tuned* stage rather than broadband gain, the FM200 can actually reduce interference, substantially improving both ad-

jacent-channel and alternate-channel selectivity. In my tests, I estimated the improvement to be between 10 and 20 dB, depending on the initial signal strength of the received signal and the tuner's initial selectivity.

The antenna's negative aspect I mentioned earlier stems from the very thing that makes this antenna different from all the rest—the tuning feature. For listeners who tune to many different FM stations, it can be quite annoying to have to retune the antenna each time the station is changed. Yet, that's exactly what you must do if you want to obtain maximum performance and maximum gain from this antenna. On the other hand, if there is one particular station that you've had difficulty receiving with adequate signal strength and quieting, I know of no FM antenna—short of a properly oriented, multi-element outdoor antenna—that can bring

in that station as well as the Recoton FM200.

As is true of most powered indoor FM antennas, this one is supplied with a separate a.c. adaptor that must be plugged in when using the antenna. If your tuner or receiver has one or more "switched" a.c. convenience outlets, the ideal way to power the antenna is from one of those receptacles. That way, power will be applied to the antenna whenever the tuner or receiver is turned on. The base of the antenna is fitted with four suction cups. Once you've decided where you want to place the antenna, the suction cups will keep it from being knocked over or moved. The circular "loop" that constitutes the antenna element itself can be tilted forward or backward over a total angle of about 90°. It can also be rotated by about the same amount. Controls include one thumbwheel knob



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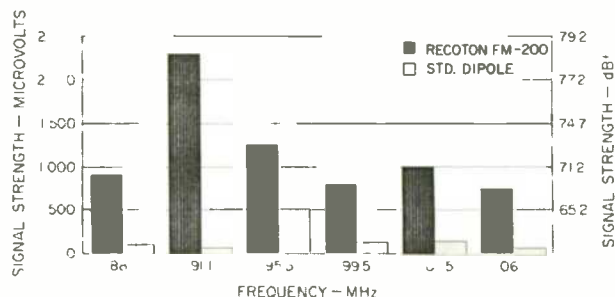
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Powered indoor antennas certainly are not new, even for Larry Schotz, but making a tunable one was truly brilliant.

that adjusts gain (and also turns off power, if signal gain is not needed) and a second thumbwheel knob that tunes the antenna to the desired frequency. You adjust the antenna's tuning knob until you achieve maximum signal strength for a given gain setting. The signal-strength indicator on your tuner or receiver serves as a tuning

orientation of the FM200. In any case, all stations were received at signal strengths well above 65.2 dBf (500 μ V across 75 ohms), the point of full limiting and best S/N. Even at my location, relatively close to many transmitters, a simple dipole would have yielded poorer S/N on at least five of these signals than the FM200 did.

Fig. 1—Comparative performance of Recoton FM200 and standard dipole; see text. Values shown in dBf correspond to multiples of 500 μ V across 75 ohms.



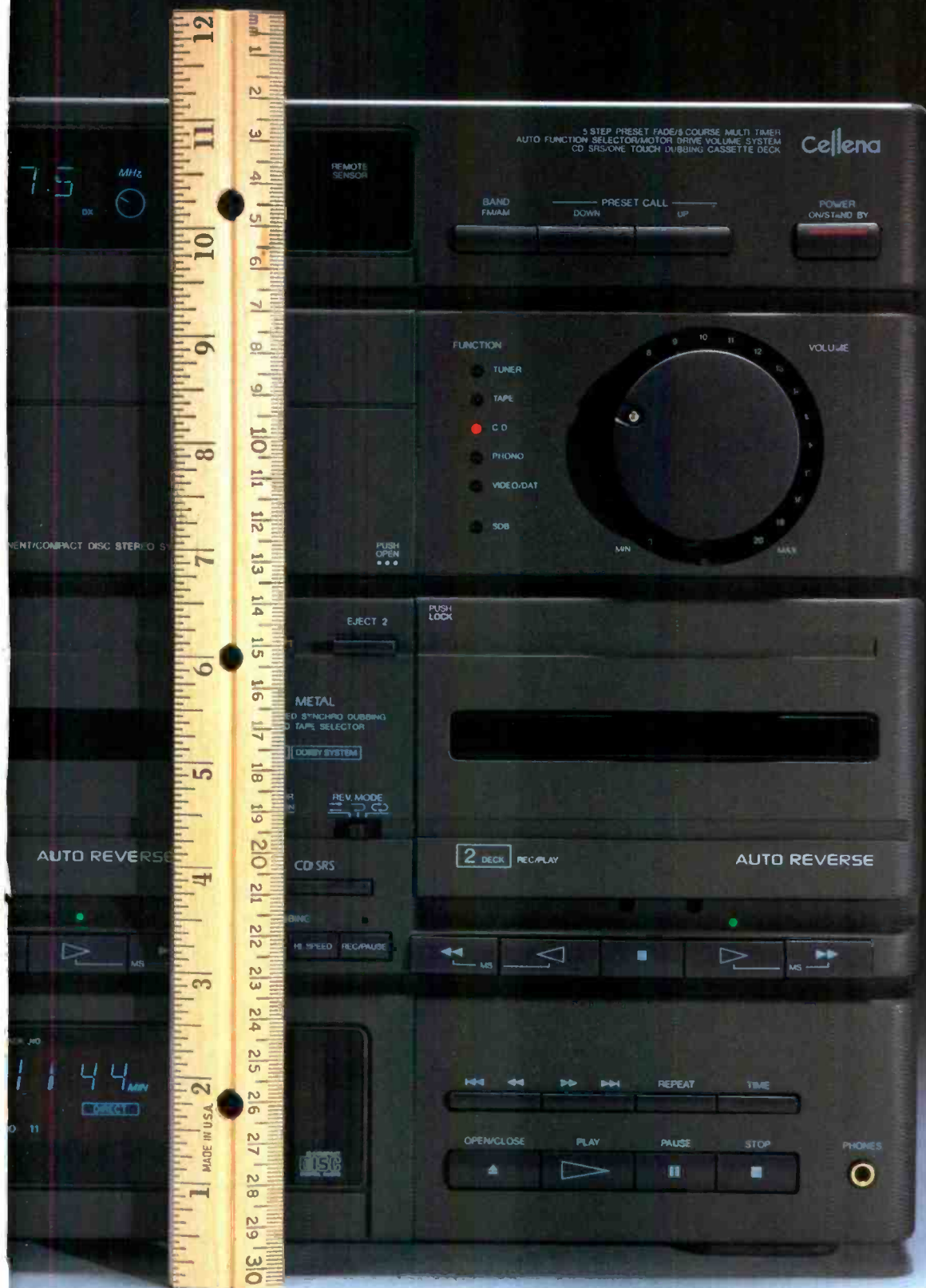
indicator for the FM200 as well; if your tuner or receiver has no such indicator, you will have to rely on your ears to determine when optimum tuning of each signal is achieved.

The bar graph of Fig. 1 shows the signal strengths of a sampling of stations in my listening area as received by a standard, stretched-out, half-wave dipole antenna mounted on an outside wall of my lab, facing most of my local FM stations, compared to the signal strengths received by the Recoton FM200. As indicated on the graph, for each frequency shown, the tuning control on the FM200 was adjusted for highest signal strength, while its adjustable element was also oriented for maximum gain. The fixed dipole antenna used for comparison purposes was not reoriented for each of the signal frequencies. That may not seem completely fair, but if you think about it, few users of fixed "wire" dipoles bother to reorient them for each station they wish to receive. (Few, in fact, even bother to stretch them out for their full length and tack them up on a wall so they won't curl up on the floor behind the tuner!)

Note that for the signal received at 91.1 MHz, gain over a simple passive dipole was somewhat higher than 30 dB! The smallest improvement of the FM200 over passive-dipole performance was at 95.5 MHz, but I suspect that this may have been due to improv-

My conclusions about selectivity were confirmed when I hooked up the FM200 to my reference tuner. (The antenna has a 75-ohm shielded output, and a matching transformer is supplied for use with tuners having only 300-ohm inputs.) In the past, I have been able to pick up 54 stations with my outdoor antenna. The FM200, mounted indoors and at an elevation of no more than 6 feet above the terrain, picked up the same number of stations, but with one important difference: All 54 were usable, whereas with my passive outdoor antenna, at least six of the stations received were unusable because of adjacent-channel interference that could not be eliminated even by reorienting the outdoor antenna. The listening tests took far longer than they would have with a broadband antenna simply because, as stated earlier, I had to readjust the tuning knob on the FM200 for each signal received. Nevertheless, the antenna design is another remarkable achievement that combines Schotz's engineering talents with the excellent industrial design talents of the people at Recoton. The retail price of \$69.99 makes this antenna a real bargain for anyone who wants improved FM reception and either can't install a good directional outdoor antenna or has found that even that type of antenna doesn't solve the kinds of interference problems I've discussed.

Leonard Feldman



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introduction to the new mini systems

Striving to re-create the "live" musical experience in every room of the house is the goal of every stereo enthusiast. For the truest sound, only the finest full-size components will do. But what about the music lover who demands great audio everywhere? Enter the "mini" or "bookshelf" system, a new generation of down-sized components that offer state-of-the-art sound in very small packages... for sound systems that can easily fit in a home, office, dorm room or anywhere else there's a need for great music.

Today's mini systems are actually marvels of electronic miniaturization. By using unique chassis designs, advanced digital circuitry and cutting-edge speaker technology, engineers are able to build systems that deliver all of the drama and dynamic range recorded music has to offer. Not only can they handle compact discs but audiocassettes as well—America's two favorite music formats. And they "handle" them with the quality that has taken quantum leaps over the past few years. Forget "The Ghost of Boomboxes Past!"

Bookshelf systems are increasingly popular because they are "one-stop" shopping at its best. In this swiftly changing society, to be able to find a fit-anywhere system in a reasonably-priced package is a joy. They are also simplicity itself to hook up. And since all of the components are from the same

manufacturer, they can communicate with each other with ease, making it much simpler to make tapes from CDs for the car or portable cassette player. Also making modern life easier are remote controls that let you make a wide variety of adjustments from your chair.

Adding to the new "mini advantage" is their sleek, contemporary design. They not only sound good but look the part too. Most systems have a modular style, which allows you to stack the components or place them side-by-side to fit your special space and design requirements. On the following pages, you'll find a guide to the exciting new world of "Little Audio Dynamite!"



YAMAHA YST-99CD

maximum minis

"The reason mini systems have taken off is simple," said Ken Furst. "They let people get high-performance sound from advanced components that don't take up a lot of room. Places that were once 'off limits' for high-quality listening because of space limitations now can have their own top-notch audio. The systems have gotten so small, consumers are only limited by their imaginations as to where to put them." Furst, a long-time industry observer and Marketing VP for Denon, points to his company's hot-selling D-2005 Personal Component System as an example of a "maximum mini." The four components consist of a 40 watt-per-channel amplifier, a tuner/timer, a high-quality 6-disc changer and a horizontal load autoreverse cassette deck. The entire system with speakers has a suggested retail of \$1,500.

Dan Dattilo says Sharp's new CD-C900 "will change the way people look at small audio systems." The company's Audio Marketing Manager says the new mini not only has a 40 watt-per-channel amplifier, it has a 70-watt powered sub-woofer to add real bottom to bass. The CD-C900 (\$1,249) features a 6-disc changer, an autoreverse cassette deck, CD Synchro Dubbing for easy taping and a tuner with 30 presets. Special features include a 5-mode preprogrammed equalizer, a 4-mode Sound Expander to alter acoustics and a 63-key unified remote control.

Kenwood is one of the compact system leaders and their two new editions give several big reasons why. The UD-90 and UD-70 not only have sleek styling, they also have advanced features that fit the 21st century look. Both have Audio Intelligence (AI) circuitry which samples the musical content and automatically sets the optimum sonic levels for great listening. The top-of-the-line UD-90 (\$1,399) can also act as the centerpiece of a Home Theater. It has a Dolby Pro Logic decoder for great at home cinema sound. The UD-90 even has a Digital Sound Processor (DSP) that can turn your room into any of six different venues. Both the UD-90 and UD-70 (\$1,199) have 1-bit CD players, dual autoreverse decks, timers, easy tape dubbing and 40 watt-per-channel amps.

Panasonic also has a sophisticated mini. In keeping with its video leadership position, its SC-CH10 Lifestyle Component System (\$1,050)



DENON D-2005 Personal Component System



SHARP CD-C900



KENWOOD UD-90



PANASONIC SC-CH10 Lifestyle Component System

offers Dolby Pro Logic for a superior home movie experience.

Other top manufacturers that offer sophisticated bookshelf systems with Home Theater features include Aiwa, JVC and Sansui. These companies have a wide variety of mini systems with their best incorporating Dolby Surround or Pro Logic. Aiwa's NSX-D9 (\$1,200) is rated 45 wpc front, 15 rear when in the Dolby Surround mode.

JVC's MX-90 Compact Component System (\$1,200) has six built-in amps to handle two front speakers, a subwoofer, and two rear Surround speakers. Along with Dolby Surround with digital delay, it has DSP and digital parametric EQ with 6 programmed equalizations and one you can set yourself. JVC is also on the cutting edge of the new "micro" systems. The width of the chassis is slightly more than the dimensions of a CD jewel box! The UX-1 (\$599) uses Active Hyper-Bass circuitry to pump a big sound from a small system.

Sansui's MC-X9AV (\$1,599) offers eight surround settings—including Dolby Pro Logic, DSP and variable digital delay. This versatile mini delivers 30 watts-per-channel for the front speakers, 15 for the rear channel and 40 watts for the subwoofer.

Buyers will find no shortage of bookshelf systems when they walk into a dealer showroom. Sony offers a wide variety at different prices with the MHC-3600 (\$1,200) the top-of-the-line. This attractive mini uses a Bi-Amplified speaker system for better efficiency and minimal distortion. Pioneer also has a full line of minis, ranging from the CCS-530 (\$1,150) to the CCS-330 (\$725). The CCS-530 has a 6-disc changer with 1-bit DAC and an 8x oversampling digital filter for excellent sound performance. Onkyo's PCS-05 also stands out from the pack because of its dramatic cosmetics and sound quality. The PCS-05 has a 1-bit CD player, a dual cassette deck with Dolby B/C/HX Pro and a tuner/amplifier rated at 45 watts-per-channel. Yamaha's YST-NC1 (\$799) and YST-99CD (\$399) have Active Servo Technology (AST) to get top sound from small speakers. Proton's new attractive mini system is the AI-3200 (\$799). Fisher's new DCS-M44 (\$899) has completely separate components, is rated 22 watts-per-channel and has a 7 band equalizer. Sherwood's 1000 Series of minis uses the new Tri-Power Bass Servo amplifier for superior sound quality.

Today's bookshelf systems simply deliver great sound. They are the maximum minis.



JVC UX-1 Micro Component System



SONY MHC-3600



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CHICAGO CENTENNIAL



A gallery of CSO music directors, counterclockwise from upper left: Theodore Thomas, Désiré Defauw, Artur Rodzinski, Rafael Kubelik, Fritz Reiner, Jean Martinon, Sir Georg Solti, and Daniel Barenboim.



Chicago Symphony Orchestra: The First 100 Years. Various performers and conductors with the CSO.

Chicago Symphony Orchestra, 12 CDs; AAD/ADD; approximately 14 hours. (Available from CSO Fulfillment Center, 847 West Jackson Blvd., Fifth Floor, Chicago, Ill. 60607.)

For its 100th anniversary season, the Chicago Symphony Orchestra has issued what may be one of the most important documents in American orchestral history. *The Chicago Symphony Orchestra: The First 100 Years* is a 12-CD retrospective of the CSO's sound from 1916 through 1988. Culled from live broadcast recordings (mostly made by WFMT in Orchestra Hall), as well as from out-of-print commercial sources, the set is remarkable for such landmarks as the only recorded version of Leopold Stokowski's taut and unflinching interpretation of Shostakovich's Symphony No. 10. But it is equally remarkable for the loving care that has gone into the transfers and restorations (how refreshing to hear NoNoise tastefully applied) and for the detailed documentation: Every entry has a recording date and place and, where applicable, matrix number. I suspect much of the credit for the quality of this set goes to CSO Execu-

tive Director Henry Fogel, whose informed enthusiasm for the recording art should set an example for orchestra administrators everywhere.

By and large, the collection is organized by music directors, among them Frederick Stock, Fritz Reiner, and Rafael Kubelik. Such Ravinia Festival directors as James Levine, Seiji Ozawa, and István Kertész are also represented, as is principal guest Claudio Abbado and longtime affiliates Leonard Slatkin and Erich Leinsdorf.

The set begins with Stock, the CSO's second music director, who had firmly established the orchestra's big, full-bodied sound by 1926, as is evidenced here in that year's recording of Dvořák's orchestration of Brahms' Hungarian Dances, Nos. 17 to 21. (Like most of the entries, it's not been previously issued.) Stock also leads an extraordinarily rich and Germanic sounding Brahms Symphony No. 3, recorded in 1940 in New York's Liederkranz or Carnegie Halls.

Allowances must be made, of course, for the age of the recordings and for the fact that most were made live and many were compressed for broadcasting. The sound on Désiré Defauw's 1947 interpretation of Strauss' "Death and Transfiguration," for instance, has little depth or dimen-

sion; extraneous noise comes and goes. But the performance is alive, vital, completely involving.

Similarly, the only extant recording of Josef Hofmann playing Beethoven's Fifth Piano Concerto is seriously marred, but the pianist's eccentric personality is so vivid, his interpretation so romantically broad, that this 1940 document of an era gone by is well worth hearing.

A relatively brisk, tightly played Mendelssohn "Scottish" Symphony from 1947 shows that Artur Rodzinski cultivated a lighter orchestral sound than his predecessors. But four years later, Rafael Kubelik was again eliciting marvelously full-blown textures on the Mussorgsky/Ravel "Pictures at an Exhibition," the first single-microphone Mercury Living Presence recording ever made and, like Kubelik's 1953 Hindemith "Symphonic Metamorphosis," not yet reissued on CD by Philips. "Pictures" jumps out of the speakers with a ferociously huge and, indeed, present sound, made all the more so by the orchestra's crisp brass and percussion playing.

Another high point is Kertész's 1968 interpretation of Bartók's suite from *The Miraculous Mandarin*, the most biting, bone-rattling interpretation these ears have ever heard and certainly the fast-

Cyprien Katsaris shows us how prodigiously skillful Franz Liszt really was at getting across Beethoven's symphonic message.

est closing tempo ever so expertly articulated. James Levine's 1979 Ravinia recording of Mahler's "Veni, Creator Spiritus" from Symphony No. 8 is one of several magnificent showpieces for the CSO chorus.

A highly compressed 1963 live television recording of a somewhat cut-and-dried Brahms "Academic Festival" Overture provides a rare recorded glimpse of Paul Hindemith as a conductor. Fritz Reiner's 1958 Prokofiev Fifth Symphony is also rare, not only because it's his only recorded interpretation, but because the orchestra sounds so uncharacteristically insecure. The unusual match of Reiner with American repertoire is found in the 1958 world premiere performance of Copland's suite from *The Tender Land*, for which one must forgive the dreadful sound in the name of historical significance.

Reiner's 1954 Dances of Galánta, by Kodály, is marvelous, full of confident swagger and hot-blooded portamento. Jean Martinon's 1966 recording of Mahler's 10th Symphony, in its (rare) entirety, is taut and intense. Never self-important, the first movement is taken at a slightly quicker tempo than what we're accustomed to, but the string sound is warm and full, the brass majestic and precise.

No small part of the refulgence and tonal solidity of these recordings is due to the acoustics of Orchestra Hall, considered one of the finest recording rooms in the country until 1966, when a balcony renovation (to put in additional seats) apparently tarnished its resonant riches.

From its sound, Stokowski's Shostakovich 10th Symphony, recorded in March of that year, got in under the wire. Like Kertész's *Mandarin*, it is surely one of the most thrilling, tightly played interpretations on record—all the more amazing when you consider that Stokowski was about to turn 84 years old. The composer's second movement depiction of Stalin is positively hair-raising.

Sadly, a decade later the orchestra's string sound begins to thin out and its bass solidity diminish, characteristics first noticeable here in a 1977 Brahms Piano Concerto No. 2 led by Carlo Maria Giulini. Current Music Director Daniel Barenboim is the highly expressive if occasionally clangorous soloist; the

performance is also notable for cellist Frank Miller's lovely solo in the third movement.

Barenboim leads the newest entry, from 1988, the only extant recording of Shulamit Ran's Concerto for Orchestra; Sir Georg Solti, Barenboim's immediate predecessor, conducts the world premiere of Lutoslawski's Symphony No. 3, an economical, masterfully played musical statement with dramatic brass voicings. A year later, John Corigliano's comparatively lightweight "Tournaments" Overture is thoughtfully realized.

There is much, much more. As the promotion goes, there are 12 CDs, 14 hours of music, 49 performances, 20 conductors. At \$175 (plus \$5 postage), this set is a bargain for the wealth of repertoire, the historic array of styles and interpretations, and the sheer virtuosity of the playing. This is, after all, one of the finest orchestras in the world. *Susan Elliott*

Beethoven/Liszt: Symphony No. 5 (piano); "Eroica" Variations, Op. 35. Cyprien Katsaris, piano. Teldec 44921, CD; DDD; 60:34.

Beethoven and Liszt! What a combination. We must remember that in the bravura 19th century, few listeners got to hear a symphony "live," and thus the market for piano transcriptions, both great and small, was a big one—especially for the touring pianist. This was the means by which the gist of big music could be brought to larger audiences in a highly dramatic form; most of them had never heard the original and never would.

Liszt, for his own prodigious performances, made dozens of such transcriptions and in a Lisztian manner that might be thought questionable today, when millions know the music. Cyprien Katsaris, however, shows us how prodigiously skillful the old pianist was at getting the symphony's "message"



Cyprien Katsaris



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across on a single and non-sustaining instrument. Just to listen to the tricks of his trade is an experience. Though he seems at times to rewrite Beethoven for new and strange pianistic effects, the sense and feeling of the Fifth Symphony is superbly transferred. An old pro in every way, Liszt.

The printed music, both Beethoven's and that of Liszt, does not tell all. Katsaris is a fiery pianist, easily up to all that Liszt asks him to do, which is saying plenty. Few pianists dare tackle such music. Yet I was a bit shocked by the fanatically furious opening movement with the V-for-Victory theme (or as it used to be, Fate Knocking at the Door), taken at a speed I could hardly believe. There was purpose in it, however, beyond mere show; the contrasts with the succeeding movements were grand. By the end, I was entirely sold and indeed heard many new fragments of Beethoven thinking not always audible in the symphonic form. Katsaris' performance of the "Eroica"

Variations—also neatly tied to the symphony by Beethoven himself—was both original and wonderfully perceptive if quite unlike earlier and more "classic" performances. This is one of Beethoven's absolutely top works, and Katsaris is fully up to its physical and mental demands.

An extra note. As I listened, I said to myself: That's got to be a European (Hamburg) Steinway! Just the sound of it. Recently it has dawned on me that this instrument, utterly unlike the American Steinway, is as close as one gets to the piano of the mid-19th century, still retaining that almost clanky sound of high notes under stress and their smooth whisper in pianissimo that was familiar to Beethoven, Schumann, and Liszt himself. It also has a harder, less mellow bass than the U.S. Steinway, and more color. No offense intended to either of these instruments—the two Steinways simply reflect two eras in their overlapping virtues.

Edward Tatnall Canby

Soler: Fandango; Sonatas for Harpsichord. David Schrader, harpsichord. Cedille CDR 90000 004, CD; DDD; 73:51.

One of the grand accomplishments of the classical CD—even beyond the LP—is the affordable experience of listening first-hand to composers relegated to some tiny corner of fame by past habit. Soler! Anyone who knows the harpsichord sonatas of D. Scarlatti has heard of Soler, a sort of Scarlatti shadow somewhere in the background—just an imitator. How many of us ever get further? In reality, Soler, a real Spaniard (Scarlatti was a transplanted Italian), was a generation younger and indeed did carry on the unique and somewhat isolated Spanish keyboard tradition, wonderfully unlike any other European music of the time and, as we now see it, a major force in 18th-century baroque music.

This excellent survey, early to late, is an eye-opener. Padre Antonio Francis-

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Lydia Mordkovitch and the Ulster Orchestra, led by Vernon Handley, go beyond standard repertoire with Moeran's violin concerto.

co Javier José Soler y Ramos was a lot more than a Scarlatti imitator, though the similarity in the style of the short, earlier one-movement sonatas is entirely clear and perfectly open. For one thing, Soler had a remarkable ear for harmony and frequent and pleasing modulations, to a degree that is well ahead of his time and, one might almost suggest sententiously, a forerunner of Richard Wagner. But Soler is all baroque bubbly richness and rhythm, a legacy from the past as well. In the longer late sonatas, now in several movements, we suddenly hear the *gal-lant* sound, out of the Bach sons and Haydn, as though some musical emissary had crossed the Pyrenees into Spain with the good news! Soler adapted quickly, but his earlier works are his best, I'd say.

David Schrader plays a somewhat twangy American-made harpsichord (twangy in spite of set-back mikes) with a single keyboard, but this was the instrumental type used by both

Scarlatti and Soler. Caution reminds me that Italian and perhaps Spanish harpsichords were in fact twangier, more jangly, than the full-bottomed northern instruments.

This is an all-American venture into the depths of 18th-century Spain. The instrument, the performer, and the record label are based in Chicago. David Schrader is a fleet and vigorous player, easily matched to music that is extremely demanding both in finger technique and in rhythm and color. The recording (allowing for the twang) is excellent. *Edward Tatnall Canby*

Moeran: Violin Concerto. Ulster Orchestra; Vernon Handley, conductor; Lydia Mordkovitch, violin. **Chandos CHAN 8807.**

For those who would like to venture beyond the standard repertoire for violin concertos, this tuneful, folk music-inspired piece by underappreciated British composer E. J. Moeran is quite rewarding. Lydia Mordkovitch's clean-

lined violin, ably supported by Vernon Handley and the Ulster Orchestra, makes gorgeous music in the flattering acoustics of Ulster Hall. The pastorate-like "Lonely Waters" and "Whythorne's Shadow" are nice fillers. *Bert Whyte*

Telemann: Seliges Erwägen (Passion Oratorio). Freiburg Vocal Ensemble, L'Arpa Festante Munich, and vocal soloists; Wolfgang Schäfer, director. **Amati SRR 8905/2.**

Those who enjoy the big baroque choral works, notably the two Bach Passions, will find this a fascinating parallel, out of the same tradition. Telemann, like Bach, was a church cantor (Hamburg) who provided music for the events of the church year. In this Passion, the chorus sings only the hymns (chorales), but the rest is much as in Bach, with recitatives and arias for the solo voices in superb baroque orchestrations. Beautifully performed, less dramatic, more contemplative than Bach. *Edward Tatnall Canby*



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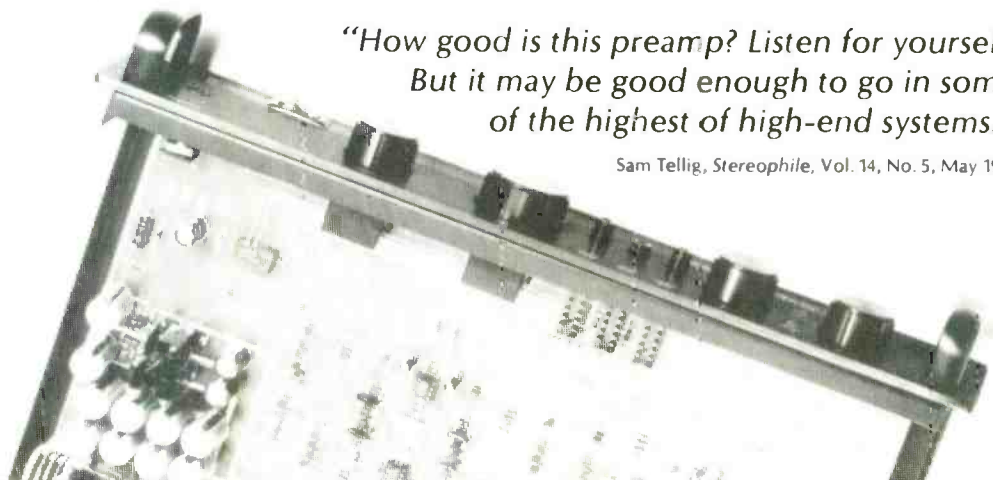
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Sam Tellig, *Stereophile*, Vol. 14, No. 5, May 1991



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MARK-ING TIME



On Every Street: Dire Straits
Warner Bros. 9 26680-2, CD; AAD;
60:22.

Sound: A Performance: B

Tension and mystery—a tightly stretched nexus of pulsing rhythms, swirling solo flights, and obliquely probing, often bittersweet lyrics—seem to be Mark Knopfler's obsession on Dire Straits' first album in six years.

Unlike the commercially and artistically mega-successful *Brothers in Arms*, this album mostly eschews wry/poignant commentary for sprawling sonic explorations. It's not exactly formless but filled with neo-improvisations thick in ethereal textures and tinged with Knopfler's continuously growing fascination with Nashville—organ-like fugues played by some Phantom of the Grand Ol' Opry. If you take songs like "Money for Nothing" and "Brothers in Arms" as the band's most recent poles of musical expression, *On Every Street* works almost entirely in the latter groove.

Much of the music's tension comes from Neil Dorfsman's curious mix. "Calling Elvis," the opening song, begins with a pumping energy that gradually builds under the ironic lyrics to a shimmering, distorted guitar break—flashy, yet hovering just back from the foreground—before veering into a long coda that wanders toward some far

horizon, guided along a path defined by the cry of distant steel guitars. This pattern is often repeated, from the funky country rock of "When It Comes to You" and the smoky country jazz of "Fade to Black" to the dobro-laden, movie-soundtrack sparseness of "You and Your Friend," creating a music that implies more than it explicitly says and is never quite what you might expect. Knopfler's guitar playing is fluid, expressive, subtly inventive, and, like the musical structures it serves, almost meditative.

Knopfler's lyrics seem at times to mirror the uncentered focus of his music, relying on shifting points of view that require hard work to decipher. While there are several country-influenced lonesome love songs, other tracks—like the detective-story title cut, as well as "Heavy Fuel" (an anthem to substance abuse that almost cops the "Money for Nothing" riff) and the dripping irony cast in the voice of a follower of a TV evangelist in "Ticket to Heaven" (strings by George Martin)—aren't exactly crystal-clear, formulaic pop tunes.

On Every Street certainly won't be mistaken as being by anyone other than Dire Straits, and it's by no means a failure, but it does leave one with an uneasy feeling that this is more a creative pause than a bold new direction.
Michael Wright

From Strength to Strength: Peter Himmelman

Epic EK 47073, CD; AAD; 57:48.

Sound: A Performance: A

Going against the grain of popular sound styles, Peter Himmelman has made a stripped-down album that presents his songs very straightforwardly. Some are played very simply and acoustically, while others have a full rock band. No drum machines or sequencers here, only "real" instruments such as Hammond organ, piano, and violin plus subtle percussion accents. The result is a genuinely organic sound, splendidly performed. The album's song sequence positions the acoustic numbers against the electric ones so that all the songs receive fair spotlighting, and the album gains a valuable dynamic.

But the focus remains squarely on Himmelman and his songs. These are songs with lyrics that reach and probe, with haunting melodies that keep coming back to me long after I've finished listening to the album. Often I feel the influence of fellow Minnesotan Bob Dylan in the riddles these songs pose and the liveliness of the performances. That Dylan is Peter's father-in-law has zilch to do with it. Himmelman's songs ooze a mystery that recalls *Highway 61 Revisited* and *Blonde on Blonde* without sounding very much like either. It's in the raw feel.



Peter Himmelman



The Golden Palominos

come out of the New York Tri-State area in the past 10 years, but certainly one of the best. *Jon & Sally Tiven*

Drunk with Passion: The Golden Palominos

Charisma 91745-2, CD; AAD; 49:04.

Sound: B— Performance: B

Anton Fier is a "downtown" N.Y.C. drummer with an established presence in an artsy consortium that includes John Zorn, Arto Lindsay, and Elliott Sharp. Some play homemade instruments that resemble logs with guitar pickups (Sharp). Others jump-cut from an Ennio Morricone movie theme to Metallica-like bashing (Zorn), while others, ever so casually, toss out-of-tune distortion box guitar solos in the middle of delicate sambas (Lindsay).

The Golden Palominos are Anton Fier's personal take on downtown eccentricity. Anchored by a core band of bassist Bill Laswell, guitarist Nicky Skopelitis, vocalist/keyboardist Amanda Kramer, and himself as drummer/producer, Fier is like an alchemist master of ceremonies, pouring Richard Thompson's signature Stratocaster lines into an "Ampex kettle" with Michael Stipe's warble—something he's tried before—and then adding the brilliant Carla Bley on organ as well. Next, Fier asks, why not put Thompson on a

Himmelman's work sounds neither trendy nor fashionable. It has only quality, depth, and sincerity to recommend it, and in the '90s, these are not necessarily tickets to commercial success. Don't let this one get by you—it's a wonderful album. *Michael Tearson*

Blow Up: The Smithereens

Capitol CDP 7-94963 2, CD; ADD; 48:06.

Sound: A— Performance: B+

What started out as a working-class rock 'n' roll quartet, with at best an outside chance of breaking through on alternative radio, has become one of the best East Coast aggregates, outdistancing most of their college radio contemporaries while maintaining their integrity.

Blow Up will possibly alienate some of The Smithereens' early fans, as it is the most pop album they've made. Lead singer/songwriter Pat DiNizio has even gone so far as to collaborate on a song with Diane Warren, best known for supplying Cher, Milli Vanilli, Bon Jovi, and Chicago with Top 40 chart-busters. "Get a Hold of My Heart" is a likable song, yet it's the closest DiNizio comes to an innocuous lyric, while musically it owes too much to other songs. *Blow Up* also features a co-write with Julian Lennon, cameos by Carlene Carter and Steve Berlin, and a tribute to The Zombies called "Anywhere You Are," complete with a knock-off Rod Argent solo.

Producer Ed Stasium does the band justice. As usual, he achieves great

clarity without loss of guts. *Blow Up* is further helped by the fact that in Dennis Diken and Mike Mesaros, The Smithereens have a strong rhythm section that can stand the scrutiny of high-fidelity recording. DiNizio's singing is better than ever, and Jim Babjak's guitars provide the bite that keeps The Smithereens from becoming a pure pop band. There is more textural variety here than on the band's previous two albums, and DiNizio's songs brim with sincerity. Although initially ignored by the New York music industry, The Smithereens have become not only one of the most successful bands to



The Smithereens

Dave Sharp leaves behind the nearly corporate rock of The Alarm for his brave electric/acoustic *Hard Travellin'*.



tune with former Hüsker Dü guitarist Bob Mould?

Those who remember the earlier Stipe-meets-Thompson main event, "Boy (Go!)" (from 1985's *Visions of Excess*), may find their reunion, "Alive and Living Now," a good song but staid in comparison. Thompson doesn't rip the way he did on "Boy (Go!)," and things have a different, less vivid spark this time around. Bob Mould's contribution as co-writer and vocalist, "Dying from the Inside Out," is a raw, somewhat disjointed song with lush Moody Blues-like synthesized strings. And Bob Kidney, singing his "Begin to Return" with Fier adding oceanic keyboard sounds and Skopelitis on electric 12-string, puts in a good, if weird, performance.

Despite the curiosity surrounding Fier's mix-and-match tactics, if there is any single person who emerges as the show stopper here, it's Amanda Kramer. Her voice possesses a lovely and ethereal quality that lends itself perfectly to the songs that showcase

her—the less "groove oriented" songs that rely on Skopelitis' guitars as a foundation in addition to the usual drums and bass. Kramer makes a particularly indelible impression on her self-penned and very aptly titled "The Haunting," and she does more than fill a vacancy left by previous Palomino chanteuse Syd Straw.

Drunk with Passion is yet another excellent Golden Palominos album.

merging creative forces in a way that has become something of a trademark. Songs work, personnel work, what more can we expect? Maybe less reverb on the drums and vocals. Remember, this is *Audio*, and we pay attention to silly things like recording quality.

Michael Bieber

Hard Travellin': Dave Sharp
I.R.S. X2-13090, CD; AAD; 50:27.

Sound: B Performance: B+

Dave Sharp left The Alarm to do this album, and it's quite a turnabout from the nearly corporate rock of his old band. *Hard Travellin'* is a neo-Bob Dylan album that works very well. For credibility, Sharp engaged Bob Johnston, producer of Dylan's *Blonde on Blonde*, *John Wesley Harding*, and *Nashville Skyline*, to helm his project. Al Kooper, who played organ on *Highway 61 Revisited* and *Blonde*, appears here too. Sharp's scratchy voice adds to the ambience as well.

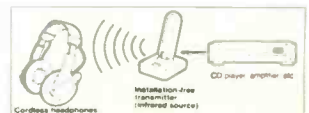
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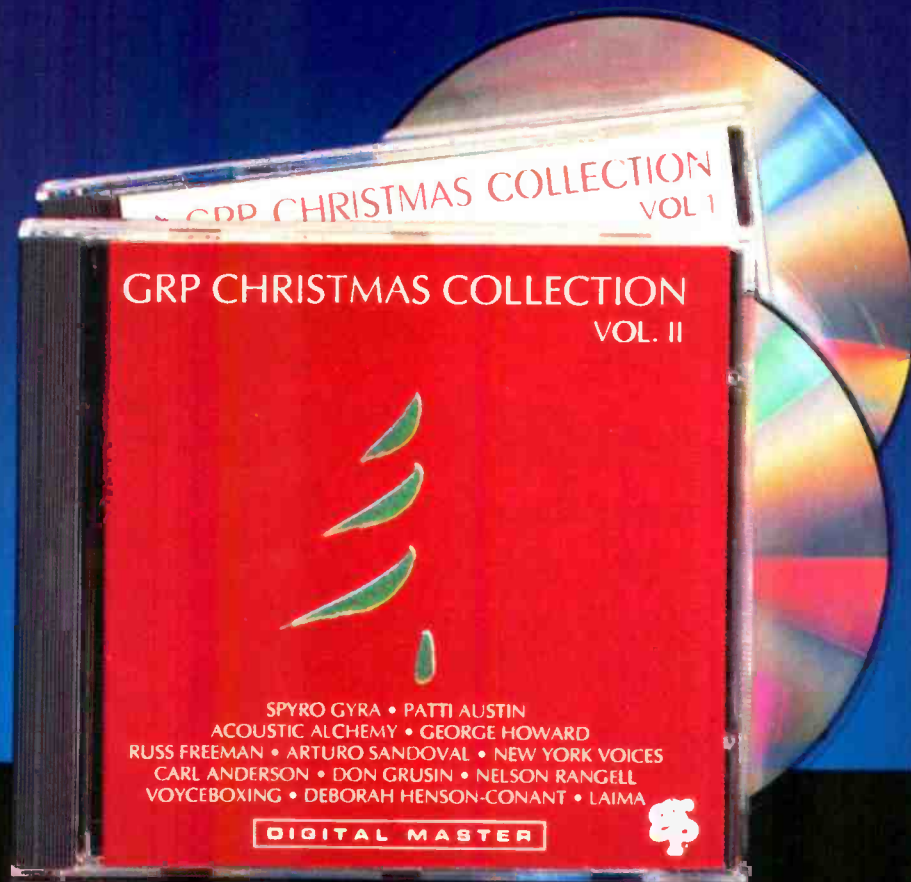
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The Early Years shows that Tom Waits developed his street-gritty vision from the beginning.

The album is divided into electric and acoustic halves. The former has a rollicking, fun feel, "Wonderful World" even sounding like a second cousin to "Subterranean Homesick Blues," with its jam-packed lyrical imagery. The acoustic part is more somber, "Joey the Jone" recalling Dylan's "Hollis

Brown." Sharp has put a lot of heart and conscience into his songs, and it shows in their very real depth.

Hard Travellin' is a brave album that goes against the grain, giving more than one would anticipate. A lyric sheet should have been included.

Michael Tearson

The Early Years: Tom Waits. **Rhino/Bizarre/Straight R2-70557.**

The 13 selections here are Waits' very first recordings, predating his 1973 debut, *Closing Time*, by nearly two years. They include four songs that later appeared on that debut. Tom's voice here is young and smooth, before time severely ravaged it. There's a lot of smoky charm and early flashes of the "sicko" wit that became his stock in trade, as in "I'm Your Late Night Evening Prostitute." Most of all, *Early Years* shows that Waits developed his street-gritty vision from the beginning and has been true to it through all of his bizarre convolutions. But why weren't any musician credits included in the liner notes?

Michael Tearson

Lizzy Lives! (1976-1984): Thin Lizzy. **Grand Slam SLAMC 4** (cassette only).

The relentless, closely harmonized, double-guitar onslaught of Irish rockers Thin Lizzy is recalled in this compilation, a tribute to the band and its now-departed charismatic frontman, Phil Lynott. The focus here is on the aggressive, melodic hard-rock side of Lizzy's personality ("The Boys Are Back in Town" and "Jailbreak"), as opposed to the often more original Celtic themes and rhythms the band also explored (check out *Dedication* on Mercury for those). All the legendary turbo-charged guitarists are heard—Eric Bell, Scott Gorham, Snowy White, Gary Moore, and Brian Robertson—reminders that Thin Lizzy's music is sophisticated, polished, and still very hot even after all these years. Michael Wright

Shut Up and Die Like an Aviator: Steve Earle and The Dukes. **MCA MCAD-10315.**

This 77-minute live recording answers the question "Is Steve Earle's music rock or country?" with a resounding "Both!" Earle rocks hard, yet he and his crack band, The Dukes, are certainly country too. The generous 16-song set includes most of Earle's best material plus covers of Doug Sahm's "She's About a Mover," Jimmie Rodgers' "Blue Yodel #9," and The Rolling Stones' "Dead Flowers." The digital sound is very raw yet appropriate for this raucous live performance.

Michael Tearson



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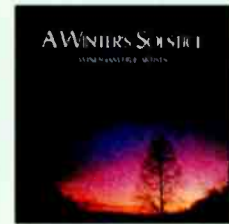
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Pablo 6PACD-4401-2, six CDs; AAD; 7 hours, 40 minutes.

Sound: B Performance: See above

No one has ever exemplified the brilliance of jazz music better than pianist Art Tatum. Born in Toledo, Ohio, on October 13, 1910, he had some formal training but was largely self-taught, using radio broadcasts, piano rolls, and records to access the jazz repertoire that came before him. Although Tatum lived only to his mid-40s, his legacy as an improviser and performer on his chosen instrument has never been matched.

Toward the end of Tatum's career, producer Norman Granz had the good sense to bring him into the studio to record some 200 performances. More than half of these were solo sessions; the balance were with expert sidemen. Originally, Granz released the recordings as individual albums and multi-LP box sets of either the solo or group

sessions. Releasing this monumental document on Compact Disc, however, is cause for celebration and certainly reason to remind ourselves (as if we had forgotten) of Tatum's genius.

The seven discs of *The Complete Pablo Solo Masterpieces* comprise 119 selections, including four previously unreleased takes from a live performance at the Hollywood Bowl. Many of the songs chosen by Tatum are his interpretations of standbys of the American musical theater, standards by Duke Ellington and Thomas "Fats" Waller (said to be one of Tatum's most important influences), tunes from Tin Pan Alley, and Tatum's occasional nod to classical music, such as Dvořák's "Humoresque." All are performed with Tatum's technical wizardry, simultaneously altering melody, harmony, and rhythm. Some compositions, like "Tea for Two," owe their very place in posterity to Tatum's brilliant interpretations. Others, like "Aunt Hagar's Blues," are so astounding in their harmonic permutations that they are likely to leave the listener gasping for breath. Still others, like Tatum's rendition of "The Man I Love," where he explores the musical text of *Porgy and Bess* in a framework of 4½ minutes, are self-contained miniatures of jazz history.

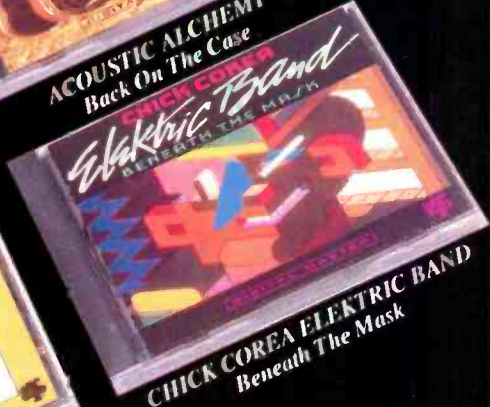
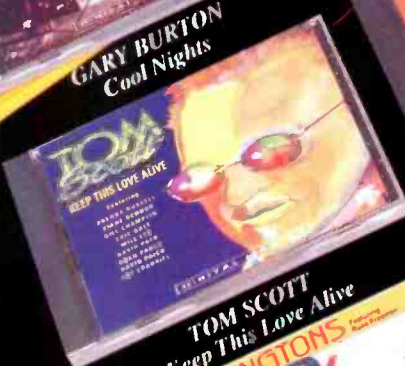
Ballads like "Embraceable You" and "Come Rain or Come Shine" are no less introspective for the speed-of-light arpeggios, the varieties of tempo and emphasis, and the different substituted voicings that Tatum employs. Many observers have commented on his ability to divide and subdivide the beat into infinitesimal fractions of meter, frustrating many a critic who mistakenly believed he had a poor sense of time. In fact, Tatum was always on the mark, but the bar lines and accents would shift just as you would settle into a beat. Tatum's left hand alone, with its coalescence of boogie, stride, and syncopated figures, is the subject of serious study among the more technically minded of the jazz set. Fortunately for the rest of us, Tatum's considerable virtuosity served the idea of simply enjoying the musical experience.

There always existed the danger that Tatum's performance would overpower the efforts of his accompanists. Norman Granz's solution, which he used on the recordings included in *The Complete Pablo Group Masterpieces*, was to employ artists whose own contributions to the jazz legacy were of more than sufficient importance. Lionel Hampton, Ben Webster, Roy Eldridge, Benny Carter, Buddy DeFranco, and Harry "Sweets" Edison take front-line positions, and their solos are woven into the fabric of Tatum's lush inventions with surprising success. It is the individual voices of these artists that ultimately sustain the group.

On one of the 13 previously unreleased takes added to this set by producer Eric Miller, a group rendition of "This Can't Be Love," DeFranco proves that his soul permeates his sound as he swings furiously with Tatum. Webster's justly famous breathy, mature tone glides effortlessly over the intricate patterns and countermelodies that Tatum lays down on Jerome Kern's "All the Things You Are," which is refreshingly realized here as a ballad. When Red Callender's bass enters, the whole mood of the tune is transformed.

This brings to mind the special challenges faced by the sessions' rhythm players, who along with Callender are fellow bassist John Simmons, guitarist Barney Kessel, and drummers Buddy Rich, Louis Bellson, Alvin Stoller, and

THE SHAPE OF MUSIC IN THE 90'S



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Guitarist Henry Kaiser's multi-cultural interests take him to Hawaii, Vietnam, and—on a Captain Beefheart song—Japan, sort of.



the great Pappa Jo Jones. Tatum's work with the legendary Tiny Grimes and Slam Stewart demonstrated early on his willingness to fit "other" voices into the scheme of things, be they melodic or rhythmic. For the most part, the drummers restrict themselves to brushes and light cymbal work. Hampton and Kessel both move effortlessly between rhythmic and melodic textures on their own instruments, responding to the aural cues that Tatum provides.

The monaural recordings that make up both CD sets contain some hiss and bass rumble, though nowhere near enough to bother anyone who understands the importance of these two collections. The digital transfers appear to sound faithful to the originals without evincing much in the way of corrective equalization. If you can't afford both sets right away, buy the *Solo Masterpieces* first. Each set is a lifetime's worth of listening pleasure.

Al Pryor

Hope You Like Our New Direction:

Henry Kaiser

Reckless CD RECK 21, CD; AAD; 77:41.

Sound: A

Performance: A

"Be eclectic," exhorts guitarist Henry Kaiser, "and broaden all your horizons." Take him at his word as you venture into the brave new world of *Hope You Like Our New Direction*, a delightful 78-minute excursion into experimental improvisation and world musics.

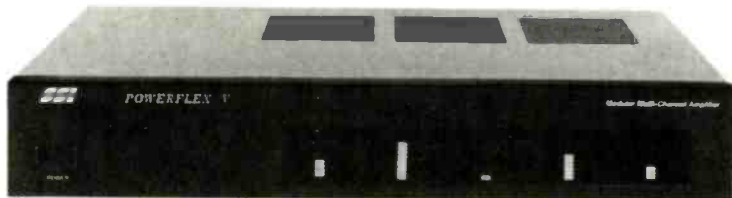
However, as might be gleaned from the hopeful anticipation expressed in

his title, you won't really need a seat belt to enter this music. If you're familiar with Kaiser's previous eccentric work, you won't find a new orientation here, just a refocusing towards accessibility of the wildly different interests he's explored before.

Kaiser's approach to music is highly improvisatory and collaborative. For this set, his imagination ranges over skittering interpretations of pop classics like The Mamas and The Papas' "California Dreamin'" and Buddy Holly's "Love's Made a Fool of You" to the wild Zappa-esque mayhem of "High School Hellcats." Along the way are satires like the atmospheric, string-sweetened "Windham Hell" (that keeps stumbling over its own rhythms), far-out psychedelic effects and speedo guitar on "The Sandman," and even an accompanied recitation of prose on "Prosaic Mosaic" (read by the poet Vernon Edgar). Kaiser's multi-cultural interests take him to Hawaii on "Kanaka Wai Wai" (featuring a duet by

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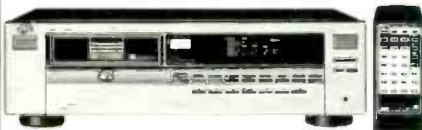
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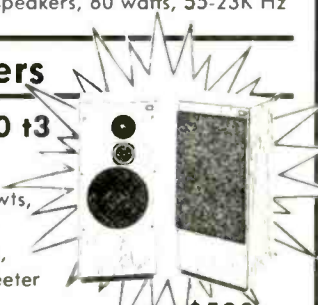
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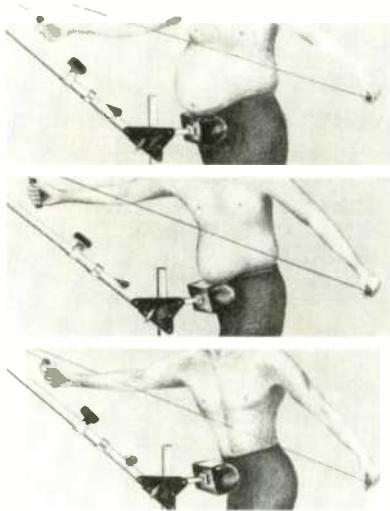
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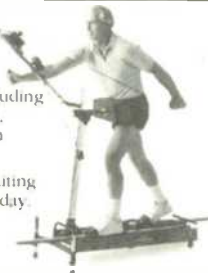
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slack-key legend Raymond Kane and Richard Thompson), Vietnam on "Traditional Medley" (featuring Ngoc Lam on the danh tranh), Korea on "Hurum II" (with guest Sang Won Park on kayagum), and Japan, sort of, on Captain Beefheart's "Japan in a Dishpan," a discordant journey into quasi-koto dissonance. Except for an occasional vocal, most of this music is instrumental. All of it, no matter how free or bold, is skillfully performed.

The wit, intelligence, and eclecticism of *Hope You Like Our New Direction* are refreshing and surprisingly accessible even with its progressive inclinations. An entertaining way to broaden your horizons. *Michael Wright*

Songs of the Nile: Hamza El Din
JVC VID-25007, CD; DDD; 44:35.
(Available from Allegro Imports, 3434 S.E. Milwaukie Ave., Portland, Ore. 97202.)

Sound: A Performance: A -

Polyphony of the Deep Rain Forest/ Music of the Ituri Pygmies
JVC VID-25015, CD; DDD; 51:23.

Sound: A Performance: A

Tom-Tom Arabesque/The Drums of Shell Island
JVC VID-25990, CD; DDD; 58:33.

Sound: B+ Performance: B

Preludes to Ceremonies of the Whirling Dervishes/The Mystic Flutes of the Sufis: The Erguner Brothers
JVC VID-25005, CD; DDD; 72:22.

Sound: A- Performance: B+

The Art of Hukwe Ubi Zawose/Songs Accompanied by Ilimba and Izeze
JVC VID-25011, CD; DDD; 48:44.

Sound: A Performance: A

The Art of Randafison Sylvestre/Songs Accompanied by Valiha and Sodina
JVC VID-25012, CD; DDD; 47:51.

Sound: B+ Performance: B+

Contextualization is the sacred word of the contemporary folklorist (tribe Ph.D.), and it certainly is a concept not without merit. This is particularly true since much of the world's folk music (or maybe even most great music) is and was conceived with a specific social function in mind, rather than the

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"Tom-Tom Arabesque"

Flutes of the Sufis by The Erguner Brothers of Turkey and *The Art of Randalison Sylvestre* from Madagascar— evoke a similar type of bliss. Although neither moves with the undulating rhythmic sense of Hamza El Din, both recordings help to make a case for the consideration of various styles of ethnic musics as a form of chamber music. The Erguner Brothers' music bobs and weaves with a stuttering stop-and-start persistence that's slowly yet inevitably entrancing. Rakoto Frah and Sylvestre combine sounds that seem as divergent as Asian bamboo flute, Andean panpipes, and European harpsichord into a delicate, wistful music.

My favorites thus far, however, are the *Polyphony of the Deep Rain Forest/ Music of the Ituri Pygmies* and *The Art of Hukwe Ubi Zawose*. Both of these are more traditionally African and heavily based on sanza (a type of thumb piano or Lamellophone) rhythms and call-and-response singing. On the Pygmy recording, it seems as if a bunch of people are just sitting around a campfire running through song cycles about bees or elephants or crickets. The sound is so in-your-face that you can virtually hear the stars winking at you. The whoops and clicks and buzzes of the voices and sanzans overlap and vault through choppy, complex patterns until the music is swarming around your head like a cloud. Hukwe Ubi Zawose uses some of the same techniques, as his sanza, violin, and kora ensemble creates overtones that penetrate the soul in the same manner of guitarist James "Blood" Ulmer's harmolodic hoe-downs. Ubi's prayerful, hymn-like vocals further elevate the music into a loping, meditative drone.

The only disappointment, thus far, is the cross beat drums of Shell Island, Senegal on *Tom-Tom Arabesque*. The recording is actually quite good. However, the drumming is directly related to a series of dances, and despite hearing the subtle shadings and changes in timbre, this recording begs for a visual. Considering some misgivings about the lack of information for the non-Japanese reader, the JVC Ethnic Sound Series at least provides an option for those who don't want their world music defined in the cynical terms of "world beat." *Don Palmer*

all-consuming, often levelling, marketplace. But a listener alienated from the time and place (or space, to be Kantian) is often deprived not only of the source and means of production but of the sensual experience that accompanies a music that truly has a reason for existence. Nonetheless, modern technology has brought some very faraway worlds right into our very own living rooms. More important, the JVC Ethnic Sound Series is of such good sound quality that you no longer have to be a budding ethnomusicologist putting up with hissing field recordings. The same cannot be said for the packaging, since almost all the information is in Japanese, sometimes even the song titles.

By providing an English-speaking market with beautiful cover art but lengthy, unreadable booklets, the Ethnic Sound Series imposes on the listener the necessity of hearing this "other world" music as pure sound, which isn't all to the bad. It means that we who assume our multi-cultural badges proudly must listen with all our attendant biases since significance can't follow an unknown function. Either you like it or you don't. Yes, I admit, that's a shame since my handful of these more than three dozen releases appear to be handsomely packaged, even if the soothing Hamza El Din recording, *Songs of the Nile*, identifies him as Egyptian, not Sudanese. Regardless, Hamza El Din's oud, percussion, singing, and handclapping possess a clarity and fluidity that wash over you in tranquil waves. Two other recordings in this series—*Preludes to Ceremonies of the Whirling Dervishes/The Mystic*

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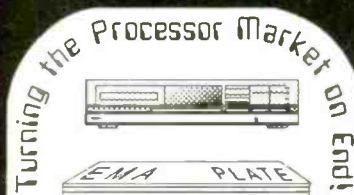
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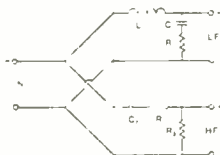


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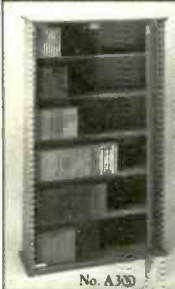
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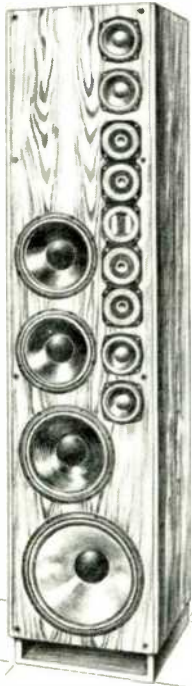
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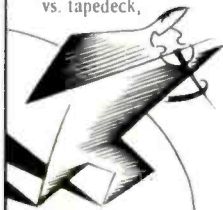


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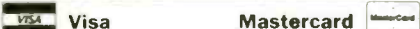
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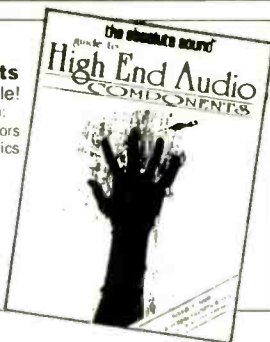
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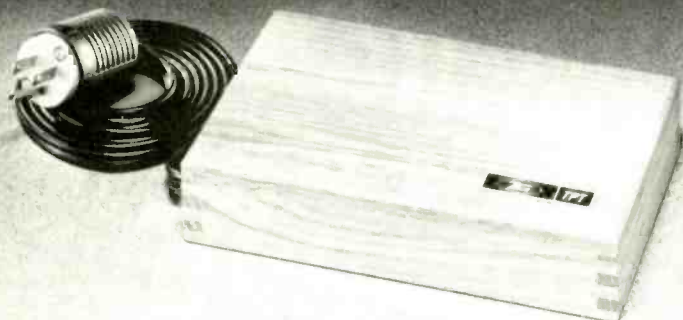
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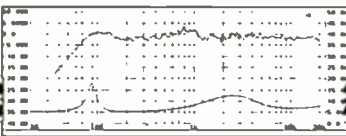
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
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