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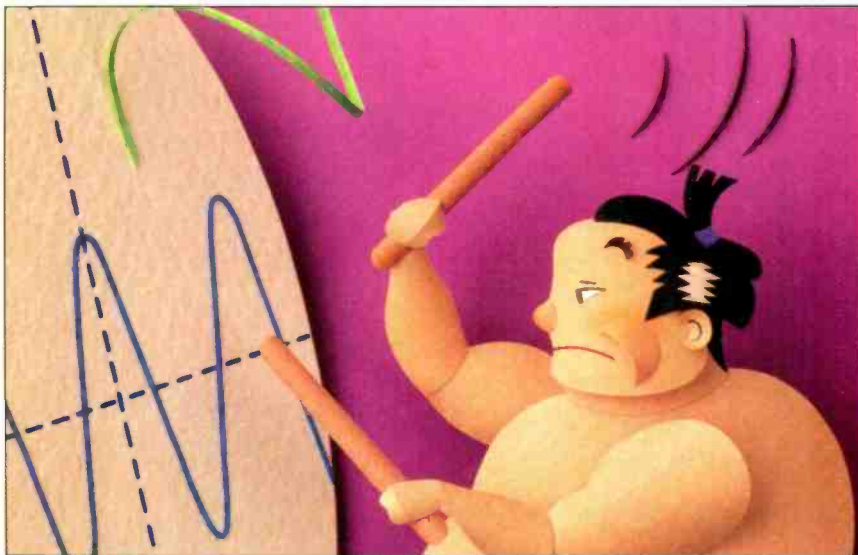
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The Yale Collection, page 52



The biggest audio sensation in recent history just got even bigger.



In 1986, Yamaha's DSP-1 was hailed as the greatest advance in the control of auditory space since stereo.

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Münster	Presence	Hall 5-A & B	Stadium-A & B
Church	Surround 1	Opera House - A & B	Presence-A & B
Jazz Club	Surround 2	Cathedral	Surround-A & B
Rock Concert	Dolby Surround	Church	Movie Theater 1 - A & B
		Jazz Club 1-A & B	Movie Theater 2 - A & B
		Jazz Club 2-A & B	Dolby Surround
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Memory for 16 additional user programs		Memory for 20 additional user programs	

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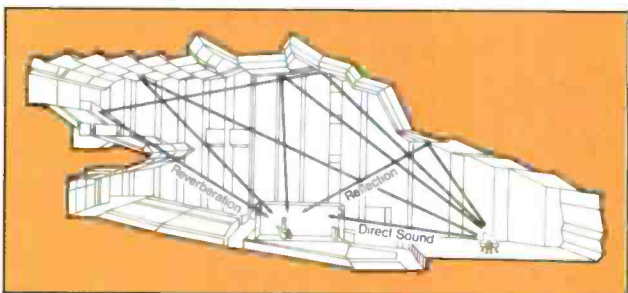
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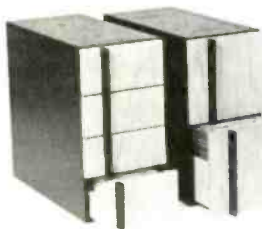
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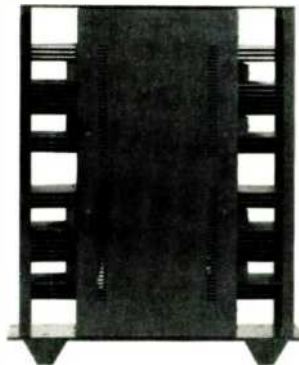
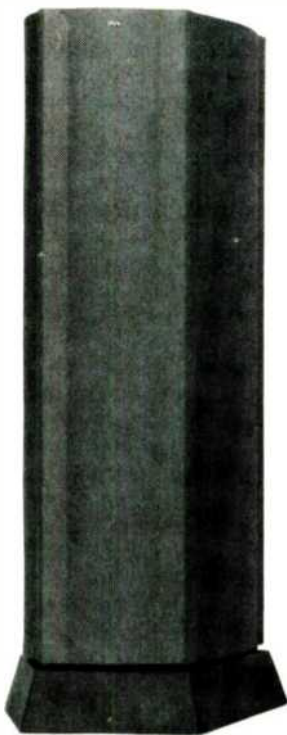
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End of the Domain

Dear Editor:

I was sorry to see Ken Pohlmann's "Digital Domain" column come to an end (August 1988). I had read it faithfully from its very first appearance, when he boldly proclaimed that digital audio was the pinnacle achievement we'd been waiting for—or words to that effect. That statement did raise my hackles a bit, but I've kept reading and listening ever since! Of course, Pohlmann has other plans now, but I hope an emphasis on digital technology will be retained in *Audio*.

Pohlmann provided the foundations on which many of us came to understand what was happening in CD players, PCM video recorders, and other digital implementations. His "Digital Domain" column frequently found its way into my university lectures or into the outside readings I assigned students in my classes on analog and digital electronics.

I tend to agree that digital audio is, overall, the best thing that has happened in sound since the vinyl record. I am anxiously waiting for R-DAT recorders to come down in price. I'll be the first on my block to own one! And to Ken Pohlmann, sincere thanks for many stimulating and informative columns in *Audio*.

Edwin A. Karlow
Chairman, Dept. of Physics
Loma Linda University
Riverside, Cal.

Informal History, Formal Appreciation

Dear Editor:

I wish to thank you for your article, "An Informal History of Solid-State Amps," which appeared in the June 1988 issue. As a C.E.T. who repairs stereo equipment and sees the actual components daily, I enjoy articles which really explain circuit design. Perhaps in the future you could include an article explaining the circuit differences between the "generations" of CD players.

Ross Rabuck
Anaheim, Cal.

Amplifying History

Dear Editor:

I read with great interest author John Bishop's article, "An Informal History of

Car Amps" (May 1988). However, I must disagree with his statement that no tuner/cassette car deck utilizing true preamp-level outputs existed in the late '70s.

In July of 1979, I became the proud owner of an Alpine 7307 tuner/cassette deck augmented by a Model 3002 power amp. The 7307 did indeed have true preamp-level outputs! Speakers couldn't be driven from this unit (no speaker output terminals were provided), as it was specifically designed to drive an external power amp, such as the 3002.

Larry Hurst
Salt Lake City, Utah

Author's Reply: The Alpine 7307 was indeed an early indicator of the direction head units would take in the 1980s. It was, however, still a wonderful candidate for the signal-tapping procedure mentioned in my article. In fact, I produced a technical bulletin at AudioMobile describing a modification and preamplifier-bypass procedure for improving the performance of the 7307. The tape section's frequency response was limited at the low end to about 100 Hz by an undersized coupling capacitor at the Dolby IC's output buffer. Replacing the 1- μ F cap with a 10- μ F cap improved response down to the 30-Hz region. This output buffer stage could then directly drive an outboard preamp with a line-level signal having flatter response and lower noise and distortion than the inboard preamp section. A later-generation 7307 incorporated the capacitor of larger value after about 1980-81. Alpine was indeed an innovator in the world of car-stereo head units in the early 1980s.

There were, of course, other exceptions to my "late '70s" scenario. As early as 1976, the Nakamichi/ADS 2002 system used a preamp-output Nakamichi 250 tape player with Dolby B noise reduction and standard and chrome tape equalization. (ADS's contribution was a self-powered loudspeaker system.) Concord also had a number of in-dash cassette/tuners with preamp output before Alpine of America came on the scene. And AudioMobile marketed its short-lived Model ST770 cassette/tuner in 1978 and '79.—*John R. Bishop*

Amplifier Classics and Classes

Dear Editor:

Just about every year, in recent years, I decide not to renew my subscription to *Audio*. Then along comes an article like "An Informal History of Solid-State Amps" (June 1988), and I'm good for another 12 months. The survey was excellent, if too abbreviated. Perhaps Sweeney and Mantz might have discussed the influence of IC-operational amplifier design on the input and gain stages of audio power amps.

As one who has built various kinds of audio amps and preamps over the years—starting in 1950 with vacuum tube types and continuing through what the authors term the classic era of transistor designs (Meyer, Bongiorno, et al.)—I have drawn some conclusions about design versus audible qualities. These may be of special interest to that neglected, and possibly negligible, class of *Audio* readers who are inclined toward the "low end," out of necessity, opinion, or just old-fashioned thriftiness.

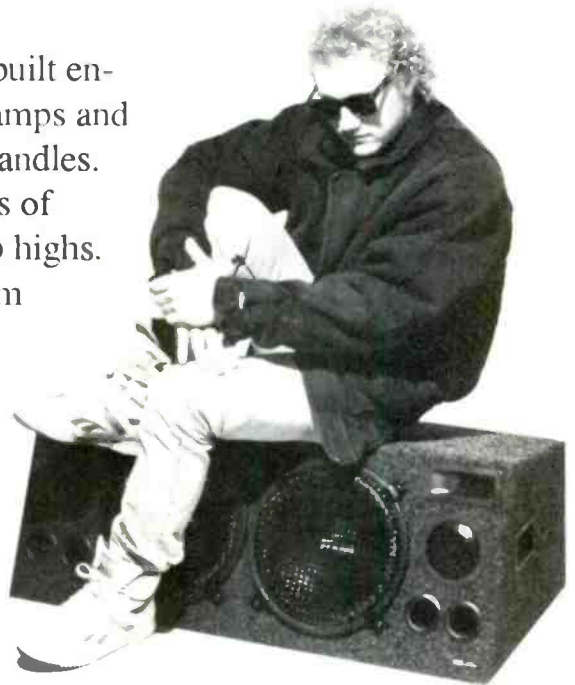
Second-generation amplifiers, as defined by Sweeney and Mantz, were a marked improvement over the first. But for my ears, the "classic" full complementary design did not add anything in sound quality to what might be called a refinement of the second generation—complementary output, single-ended driver, and single-differential input. There was no cascading, but the second stage had an active, constant-current load and the input had an active, constant-current source. (As far as I know, that was a Daniel Meyer design, possibly adapted from then-current IC op-amp configurations.) Of course, amplifier configurations can be compared only if they use the same power supply and, consequently, have the same output rating. This is almost impossible to do with commercial examples, because, invariably, the manufacturer provides his more deluxe and complicated circuitry with more power output.

As for the qualities of later-generation amps, I have no direct knowledge, but I do have an opinion that applies to all amplifiers: More power means that greater flexibility in the selection of speakers is possible, and that is an advantage. Every other improvement



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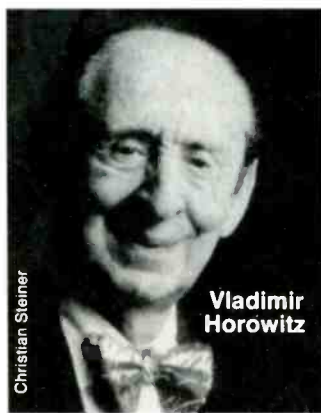
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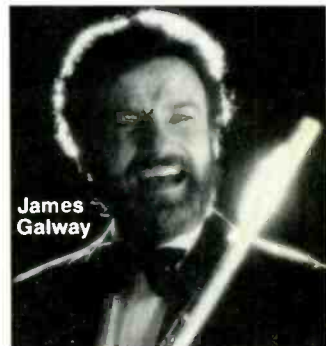
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To get the most improvement for your money, buy better speakers, phono cartridges, and CD players rather than new amps and preamps.

is of doubtful advantage if one's present amp has little or no crossover distortion, low THD (perhaps less than 0.1%), and a full-power bandwidth that covers the range from 20 Hz to 20 kHz. In addition, the amplifier should show no trace of instability with any value of capacitive loading up to 1 or 2 μ F.

I never compared Class-A and Class-AB transistor amplifiers, but I have increased output bias in a Class-AB amp to the point of thermal runaway. This provided Class-A bias up to a couple of watts of output, which is adequate for listening to string trios played on fairly efficient loudspeakers.

No difference in sound quality was observed.

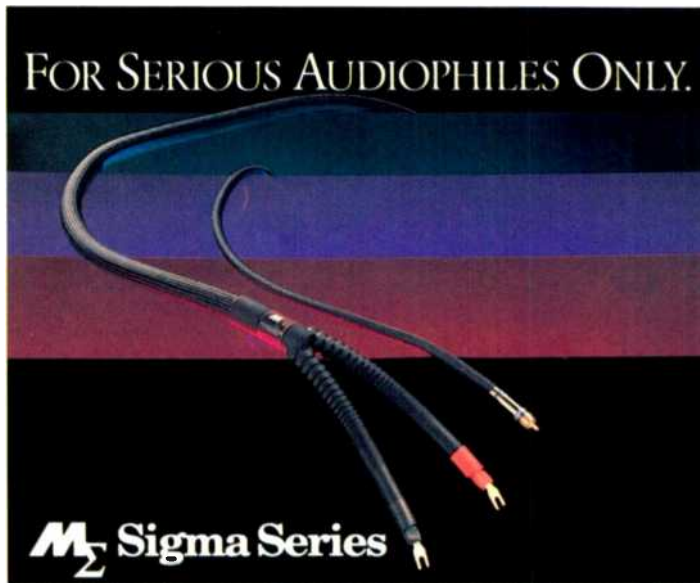
There are some amplifier changes that could make a difference detectable to us low enders (and have for me). The easy one first: Get an accurately compensated phono preamp if your present one deviates from RIAA specs by more than, say, 1 dB in the range from 30 Hz to 15 kHz. Current amps in all but the lowest price class probably meet this criterion, but some older models may not. The second change may not be as easy: Eliminate all speaker crossover networks and provide each woofer, midrange, and tweeter with its own amplifier (properly filtered at the input). This change is most practical, not to mention cost efficient, if you build your own speaker system and your own amplifiers. Some commercial speakers also allow the possibility of bi-, tri-, or multi-amping.

This is old advice to be sure, but it bears repeating: You will get the most improved sound for your money by buying better quality speakers and phono cartridges (or a CD player) rather than new and better amps or preamps. Until you win the grand prize in your state's lottery, keep that 50-watt/channel Radio Shack receiver of any post-1970 generation and put your bucks where they will do the most good. However, because of your limited amplifier power, you should purchase quality speakers of moderate to high efficiency. They doubtless exist. Then, when time and your talents (or the lottery) have made you the kind of upscale consumer advertisers love, consider that \$1,000 amp. Chances are great that it will make your system sound better to you. Furthermore, you will now be able to participate confidently in learned discussions concerning the influence of oxygen in your wire and cable and Teflon in your capacitors. Enjoy!

Lawrence Wallcave
Santa Rosa, Cal.

Editor's Notes

- Because Bert Whyte is recuperating from minor surgery, "Behind the Scenes" does not appear this month.
- In the December 1988 "What's New," we stated that an Eclipse car stereo does not have auto-reverse; the Model ECE-101 does have it.



Good things come to those who wait.

These days, serious audiophiles searching for the right high-performance cable face a long, difficult road. Each manufacturer has their own story. And it takes time to sort out all the different designs before deciding which cable to buy.

When Monster Cable decided to enter this market, we took the opportunity to examine the various technologies. Pick out their strengths. Identify their weaknesses. And design an extraordinary series of cables that deliver unprecedented performance for the serious audiophile.

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The M2Sigma Series is Monster's latest musical revelation. Representing the ultimate extension of Monster's *Bandwidth Balanced™* technology, the M2Sigma Series delivers the highest level of audio interconnect and speaker cable performance.

In every area of cable performance, we designed for one key objective: a *balance* of sound. To that end, the M2Sigma achieves a balance of such sonic qualities as precise imaging, overall naturalness, three-dimensionality, and a sense of space *without sacrificing any key sound parameters*. Our goals were met. And surpassed.

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Both the M22000 Audio Interconnect and the M22 Speaker Cable incorporate several innovative new technologies.

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the conductors are grouped around our advanced Magnetic Flux Tube™, with a special termination to create a "balanced impedance" throughout the entire audio range.

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M2Sigma's sonic improvements require a new approach to termination technology. Using a massive ground contact crimped with over 20 tons of pressure, we feature a special copper-to-copper, cold-welding process using no solder or other extraneous metal that can cause sonic degradation.

With a more direct hook-up of M2Sigma's conductors, all the subtle nuances and power of your music are transferred to the speakers through an uncompromising connection that ensures absolute accuracy and signal integrity.

Sonic rewards worth the price of admission.

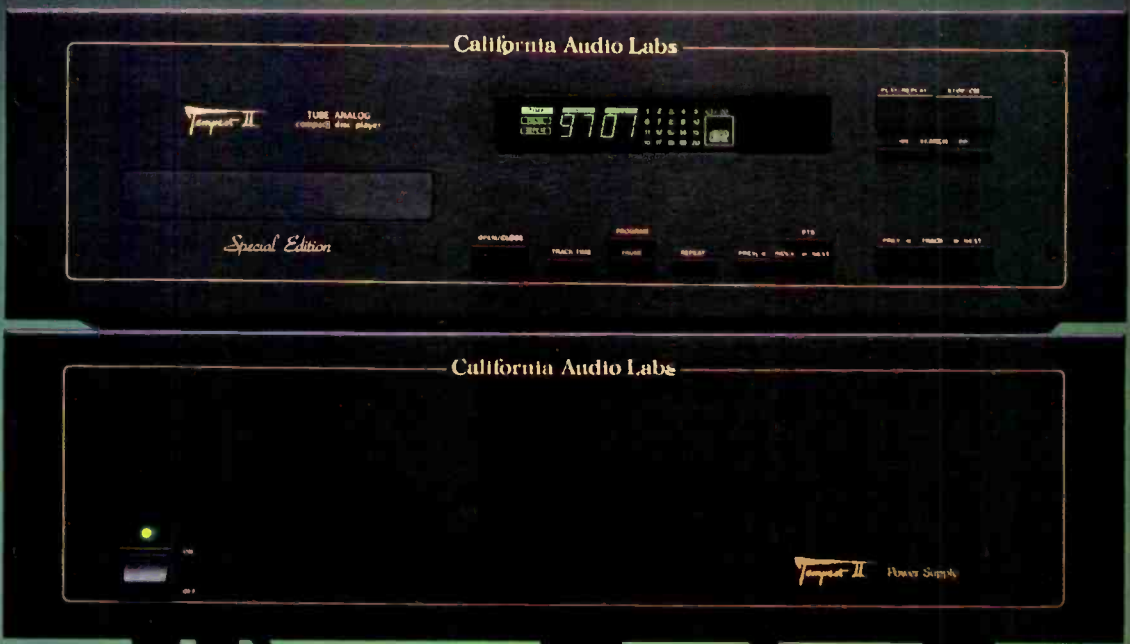
With signal phase integrity now maintained, all the depth, range, and power of your music are reproduced with unequalled accuracy. You'll hear singers and soloists projected to a pinpoint spot in front of your speakers. Instruments and vocals that seem to "float" space. With a realism that breathtakingly captures the essence of the original performance.

Although not inexpensive, the M2Sigma Series represent the highest level of sonic performance money can buy. We invite you to audition these extraordinary cables at a Monster M-Series™ dealer. And prepare yourself for a thoroughly enjoyable musical experience.

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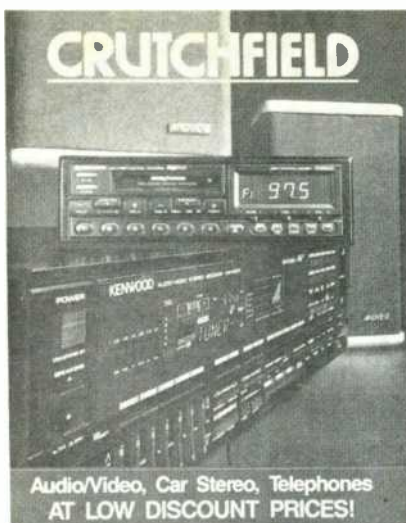
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AUDIOCLINIC

JOSEPH GIOVANELLI

Amplifier Buzz

Q. I have an integrated amp that worked well for quite some time, but now I hear a 60-Hz buzz in the loudspeakers. This noise is unaffected by the setting of the volume control. What needs to be done in order to eliminate this problem?—Gary Kufchak, Downey, Cal.

A. I can think of a couple of reasons why your loudspeakers are producing a noise of the sort you have described. Perhaps the amplifier is working fine but you added a light dimmer or some other household controller; some of these devices put tremendous spikes on the power line. These spikes force their way into the amp and can be heard as the "buzz" you described in your letter. I have not found a cure for this kind of interference, other than to remove its source—the dimmer or whatever.

Perhaps you have moved to a new location which is close to a TV broadcast station, or maybe one has begun operation near your home. This could cause TV signals to enter your amp, either via the power cord or as a result of the speaker leads acting as an antenna. If this is the case, ferrite beads placed either on the power cord or the speaker leads may help remove the noise.

It is also possible that the amplifier's power-supply diodes are becoming leaky or that the capacitors which are often shunted across the diodes—to prevent the very buzz you're experiencing—have broken down. If so, replace the diodes and their capacitors. (No, I don't mean the filter capacitors. I refer to those which are likely to be physically between each diode's cathode and anode.)

Psychoacoustic Perception With Hearing Loss

Q. I have a fairly severe hearing loss, mostly sensorineural, with a slight peak at 2 kHz and a 40-dB threshold drop at 4 kHz, plus another drop of 10 to 15 dB at 8 kHz. I do not yet have any quantization of what "recruitment" is doing to my loss at listening levels.

How can I get theoretical, physiological, and practical information on what this hearing loss means with regards to the psychoacoustic effect at high frequencies? What happens if I try to

compensate by boosting highs?—Ivan E. Cushing, Tyler, Tex.

A. Certainly some or all of the information you are interested in can be obtained from a good medical library.

It is apparent from the knowledge you already have that you have undergone extensive testing. You can probably get some of the answers you seek, and information on where to find the others, from the people who administered the tests.

I'm not at all sure this knowledge will do you much good. If you originally had "normal" hearing, you're in the best position to know how your present level of hearing compares to your previous level, even if the loss was gradual. If not, your request is similar to that of a blind person who asks for an evaluation of how his management of his affairs compares with that of someone who possesses sight.

I have a feeling, therefore, that you'd be well served by saying "Who cares?" rather than delving into something which, when understood, won't affect your hearing anyway. If that sounds cold, I don't mean it to. Believe it or not, I can put myself in your place, to some extent, because I am blind. I have not felt a need to learn all about what I don't have; I find it much better to concentrate on what I do have.

As to determining the effects of adjusting highs, try it. Use an equalizer, which "slices" the spectrum into small pieces, so you can try different portions within your various zones of high-frequency loss. Try both boosting and cutting highs. Only you will know how much difference you perceive. As a backup, ask a friend who has some knowledge of sound what he perceives when you make the changes, then compare notes. With all of this, you still won't have a definitive answer.

There are many makes and models of loudspeakers, and they can sound vastly different, one to the next. Still, each brand has its adherents. If we all perceived sound in the same way, we would doubtless settle on one or two speakers as the ultimate choices. **A**

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

You've invested too much in your audio system, CD's, LP's, and tapes not to hear all that's there.



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"The effect is shattering!"— *Music Technology Magazine*

"Whether you are playing LP's, CD's or tapes, the system comes alive."— *Music & Sound Output Magazine*

"I can't imagine working on another album without BBE."— *Steve Levine, producer of The Beach Boys and BPI Producer of the Year.*

What's the BBE Difference?

It's "like the difference between high-fidelity speakers with and without pillows in front of them." — *Radio World Magazine*

Better Sound Than The Masters

Music Technology Magazine made cassette copies using BBE. It told its readers: "The cassette sound-

ed better than unprocessed masters!"

Actions Speak Louder Than Words

When Michael Jackson tours, members of the Michael Jackson Band make sure BBE gets into the act.

No Artificial Flavoring

Rather than adding artificial elements, BBE restores natural harmonic balances that are present in live performances.

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Technically, BBE restores the proper harmonic structure of sound by compensating for amplitude and phase distortion.

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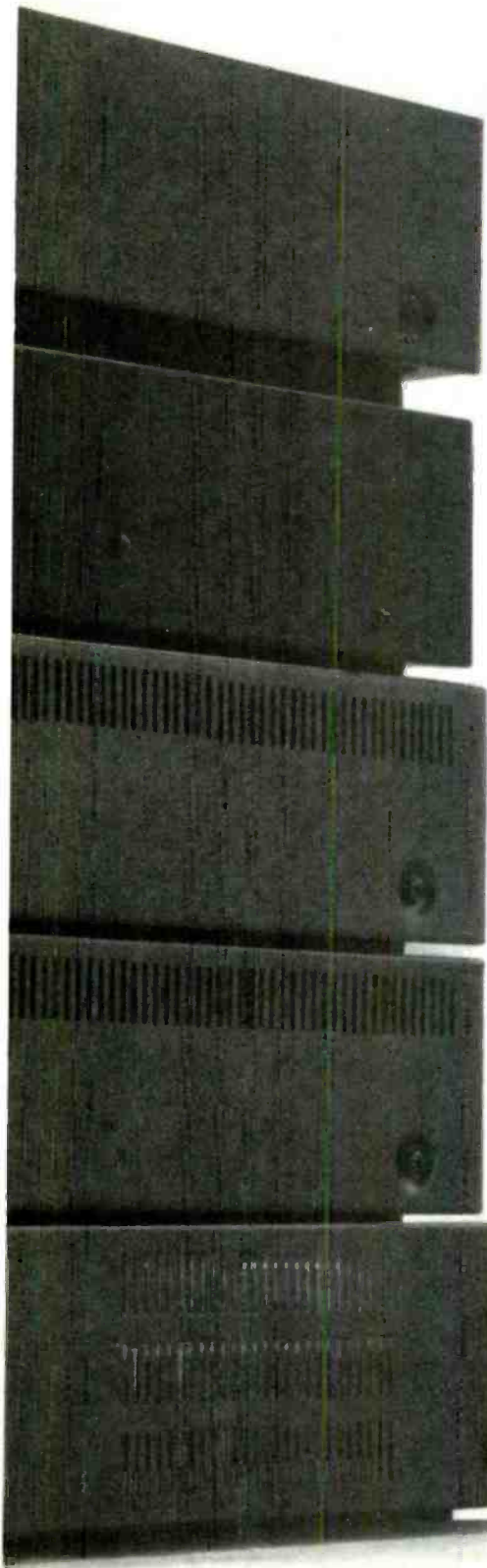
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Power and finesse. They've always been important factors in a serious listening system. Now there's a new way to achieve both without overpowering your budget.

Our new CT-Seven preamplifier/tuner combines a Sonic Holography® preamplifier and Asymmetrical Charge-Coupled FM Detection tuner into one convenient component.

It makes beautiful music with our whole line of Magnetic Field Power amplifiers. Including the new M-4.0t with the same transfer function and power output as Bob Carver's \$17,500-pr. ultra-esoteric Silver Seven monoblock amplifiers.

The CT-Seven as an audiophile preamplifier: Like Carver's fine separate preamplifiers, the CT-Seven is designed as a "straight wire with gain," capable of perfectly passing input signals without adding or subtracting any musical nuances.

It includes a meticulously engineered, ultra-low noise phono stage that flawlessly duplicates the theoretical RIAA equalization curve.

The CT-Seven as a complete sound control center: From the comfort of your listening chair you can choose from six sound sources including dual tape monitors, CD input and video/auxiliary inputs (suitable for video sound or DAT). Unlike most remote volume adjustments which use distortion-inducing electronics, the CT-Seven employs a motorized volume control for smooth control and smoother sound quality. Also included are useful 3-band tone controls, mono switch, loudness equalization and a studio-quality headphone amplifier.



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And you can create it from any stereo record, tape CD or even FM broadcast. With your existing speakers. At the touch of a remote button.

The CT-Seven as a high performance quartz synthesized FM tuner: You've simply never heard FM until you've heard it through the Carver Asymmetrical Charge-Coupled FM Detector circuit. Multipath distortion, interference and distant station noise are dramatically reduced. Weak stations emerge into dramatic clarity. Yet stereo separation, space, depth, and ambience were not only retained, but seemingly enhanced by the lack of background noise.

Choose 8 FM and 8 AM presets by remote control. Scan the broadcast band automatically or manually. With the CT-Seven's ACCD circuit on, you'll discover "new" stations which were previously unlistenable!

The CT-Seven's power partners: Only Carver gives you four high power amplifier choices from 140 watts to 375 watts per channel. Each is perfectly matched to the CT-Seven. And each uses Carver's cool-running Magnetic Field Technology which dispenses with bulky power supplies and power-wasting external heat sinks... yet which is so rugged it's used in the world's largest touring professional sound systems.

Choose from the new "modestly-powered" M-0.5t (140 watts per channel RMS 20-20kHz both channels driven into 8 ohms with less than 0.1% THD), the M-1.0t (200 watts/ch. per channel RMS 20-20kHz both channels driven into 8 ohms with less than 0.15% THD), M-500t (250 watts per channel RMS 20-20kHz both channels driven into 8 ohms with less than 0.15% THD), or the new M-4.0t (375 watts per channel RMS 20-20kHz both channels driven into 8 ohms with less than 0.5% THD).

Hear brains and brawn together at your Carver dealer. Switch the CT-Seven and the most expensive tuner in the room to hear Asymmetrical Charge-Coupled FM Detection work its magic. Put on your favorite CD, press the CT-Seven's Sonic Holography® remote button and feel the sound room "disappear." Turn up the volume to live performance levels and discover the impact of true dynamic headroom.

And then get ready for another pleasant experience when you discover what a super value the CT-Seven and Carver power amplifiers are.

CARVER

How's DAT?

Q. *A recent advertisement for a DAT deck made some interesting claims. Can a DAT recorder really "eliminate background noise and make perfect copies of old phonograph records," as the ad claims? What about noise from worn surfaces of 78-rpm discs?*—Allan Hibsich, Oroville, Cal.

A. My own experience with DAT decks, together with what I have learned from reliable quarters, confirms that a DAT deck provides extremely flat frequency response to about 22 kHz, very high S/N ratio (90 dB or better), extremely low (inaudible) distortion, and extremely little (undetected) wow and flutter.

However, a DAT deck can only reproduce the signal which it is fed, preserving both its good and bad aspects. Therefore, it cannot eliminate or reduce noise already present in the signal. To cope with such noise, you would need a dynamic noise-reduction device—see your local audio dealer.

NR Mismatch

Q. *What kind of results can I expect from tapes recorded with Dolby A NR and played back with Dolby B or C NR, and vice versa?*—Tom Posa III, Lebanon, Conn.

Q. *If I record with Dolby C NR, can I play back with dbx NR, and vice versa?*—Boris Acosta, Los Angeles, Cal.

A. Dolby A, B, and C and dbx noise-reduction systems have in common the fact that they are all compression/expansion systems, with the downward expansion in playback serving to reduce the noise of the tape system. However, they each cover substantially different frequency ranges and differ in the amount of compansion they use. Furthermore, Dolby systems are level-dependent, meaning that the amount of compression in recording and the corresponding expansion in playback varies with the signal level. The dbx NR system is not level-dependent and therefore does not require matching the record and playback levels, as do the Dolby systems.

Dolby A NR divides the entire audio range into four bands and operates separately in each band for maximum effect. Dolby B NR operates essentially from about 500 Hz upward, and Dolby

C NR from about 150 Hz up. Dolby C NR provides about 8 to 10 dB more noise reduction than Dolby B NR. The dbx system achieves even greater noise reduction, about another 10 dB, and operates essentially over the entire audio range.

Because of the above differences, encoding with one system and playing back with another tends to produce substantial anomalies in frequency response. This doesn't necessarily mean the results are unlistenable—that depends on the program material, the listener's tolerance for deviations from flat response, and the ability of the listener's tone controls and/or equalizer to compensate for the anomalies.

In such instances, I always advise listeners to experiment with the various combinations of noise-reduction systems available to them and to learn for themselves. No harm can come to the equipment, and one experiment is worth many words.

In closing, it should be noted that the incompatibility between Dolby B and C NR is sufficiently moderate so that correction via the treble control can often satisfy the ear. If the recording is in Dolby B NR and playback in Dolby C NR, treble boost is called for. If record/playback is from Dolby C to Dolby B NR, treble cut is required.

Head Life

Q. *I am having trouble telling whether or not my cassette deck's heads are worn out. The sound is fine, but there are two lines running through the middle of the pinch roller. How will I know when to replace the heads?*—Dave Marnier Jr., Cedar Rapids, Iowa

A. Usually, with a three-head deck, the first head that needs replacement is the playback head; in the case of a two-head deck, it's the record/playback head. When this happens, the most obvious result is a noticeable drop in treble response.


The lines running through your pinch roller have probably been made by the tape as it sheds its coating. The roller (as well as the capstan and the heads) should be cleaned periodically. The usual rule is to clean them after every eight to 16 hours of play, using a fluid recommended by the deck manufacturer; 91% isopropyl alcohol, generally available in drug stores, is usually con-

sidered a satisfactory fluid. Often, a fluid containing trichlorotrifluoroethane is recommended.

Cons of HX Pro

Q. *I would like to know why some high-quality cassette decks, such as Nakamichi's, do not have Dolby HX Pro?*—Daniel H. Larie, Madison, Wisc.

A. The idea behind HX Pro is that the treble content of the program material behaves like bias, calling for an increase or decrease in oscillator bias as the treble content decreases or increases. The question is whether changes in oscillator bias are of the correct amount from moment to moment. Apparently, Nakamichi and others feel it is not worthwhile to follow the HX Pro approach of sensing the bias effects of the program material and altering oscillator bias correspondingly.

Nakamichi and some other companies have chosen different ways of preserving treble response, instead of using HX Pro. Such approaches include the use of separate high-quality record heads which do not easily saturate, and fine playback heads with very narrow magnetic gaps that provide excellent treble response. Skillfully engineered record and playback electronics with very low noise reduce the need to push recording level to the utmost in order to achieve a satisfactory S/N ratio. Thus, the danger of tape saturation, with consequent treble loss and distortion, is lowered—in other words, headroom is increased. Use of a separate head for playback increases signal output and thereby improves S/N ratio, again reducing the need to push recording level to the utmost. With the use of Dolby NR, particularly Dolby C NR, S/N is greatly improved. Furthermore, the Dolby C NR encoding characteristic limits the amount of treble boost in the extreme treble region, thereby limiting the danger of tape saturation and resultant treble loss. For this reason, treble response at high recording levels tends to be better with Dolby C NR than with Dolby B NR, or even without noise reduction. 

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



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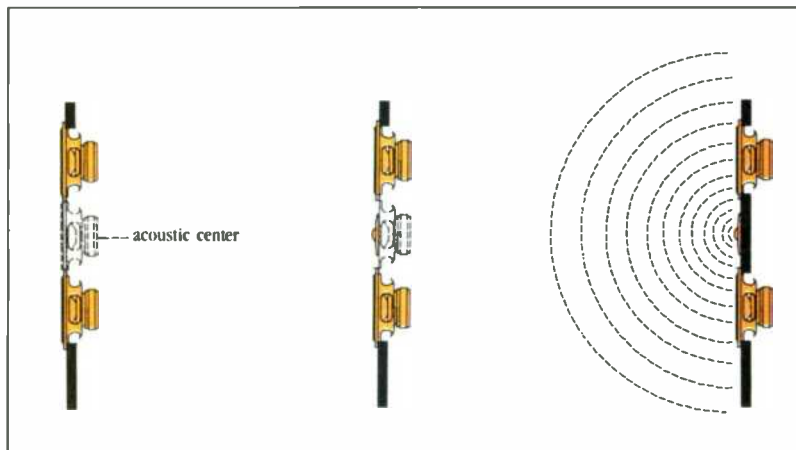
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Where to buy Polk Speakers? For your nearest dealer, see page 120.

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Kenwood CD Changer

Capable of holding six CDs in its magazine, the DP-M107R CD changer features a double-oversampling digital filter. With random programming of up to 32 selections, the DP-M107R also uses the Kenwood Optimum Servo Control, which keeps the three-beam laser pickup on track, and adjusts the servo gain to accommodate deficiencies such as scratches, fingerprints, and dust buildup on CDs. The DP-M107R uses fluorescent displays which monitor playing times and track

information. Manufacturer-rated frequency response is 20 Hz to 20 kHz, ± 1 dB; dynamic range is 95 dB at 1 kHz. Price: \$399. For literature, circle No. 100



Audiophile Car Speaker

The 2.5 satellite system comprises a 1-inch soft-dome tweeter and 5/4-inch polypropylene-cone midrange woofer, plus a matched crossover network. The tweeter uses a neodymium/iron/boron magnet for high power in a small space. The matching 1.5 subwoofer has an 8-inch polypropylene cone, and includes its own crossover network. Frequency response is 65 Hz to 18 kHz for the 1.5 system, and 27 to 90 Hz for the subwoofer, which



crosses in at 90 Hz. Prices: 2.5 system, \$389 per pair; 1.5 subwoofer, \$219 each. For literature, circle No. 101

Nakamichi DAT Recorder

Three units—the Nakamichi 1000 DAT recorder, 1000p digital audio processor, and 1000r remote controller—make up a unique new digital recording system. Recorder and processor units will be sold separately, since the processor can control two recorders and can be used with CD players or other

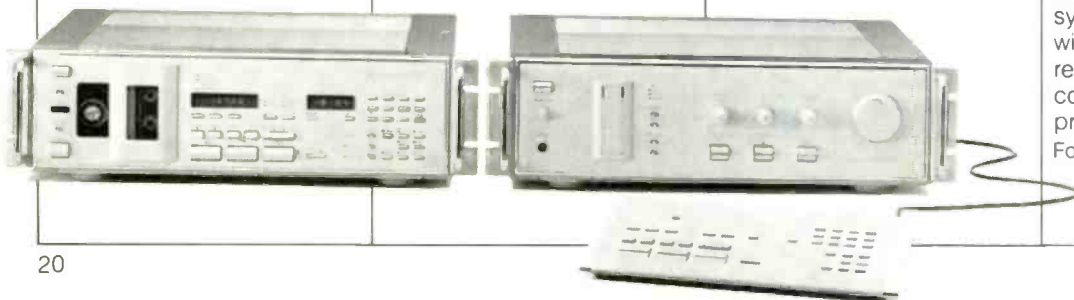
DAT recorders. The recorder unit uses the company's new Fast Access Stationary Tape Guide Transport (F.A.S.T.), probably the first DAT transport not derived from VCR designs. This new mechanism is said to load a DAT cassette in 1.9 S, has a "half-load" position that allows fast winding at 400 times normal tape speed (when search

JBL Car Speaker

Like the rest of JBL's TL series of car speakers, the TL410 is designed as a drop-in replacement and upgrade for factory installations. The coaxial unit mounts a 12-mm, titanium-laminate tweeter in

front of a 4 in. by 10 in., mineral-filled polypropylene woofer cone. Power-handling capacity is 80 watts, and sensitivity is 94 dB SPL at one meter for 2.83-volt input. Price: \$120 per pair. For literature, circle No. 102

functions aren't needed), and, says the company, has a lower data error rate and greater reliability. A four-head drum assembly permits off-the-tape monitoring during recording. The processor allows direct digital-to-digital recording at 44.1 as well as 32 and 48 kHz, even from software carrying the copy-inhibit flag. The unit is designed around modular plug-in boards, for upgrading to any new standards that might arise and to allow the substitution of newer technology in the future. No sample-and-hold circuits are used with either the 20-bit D/A converters (which use eight-times oversampling) or the new self-calibrating A/D converters. A rack-mountable professional version will also be available. Prices: Complete system (with wired or wireless remote), \$10,000; recorder and remote controller, \$5,400; processor, \$4,600. For literature, circle No. 103



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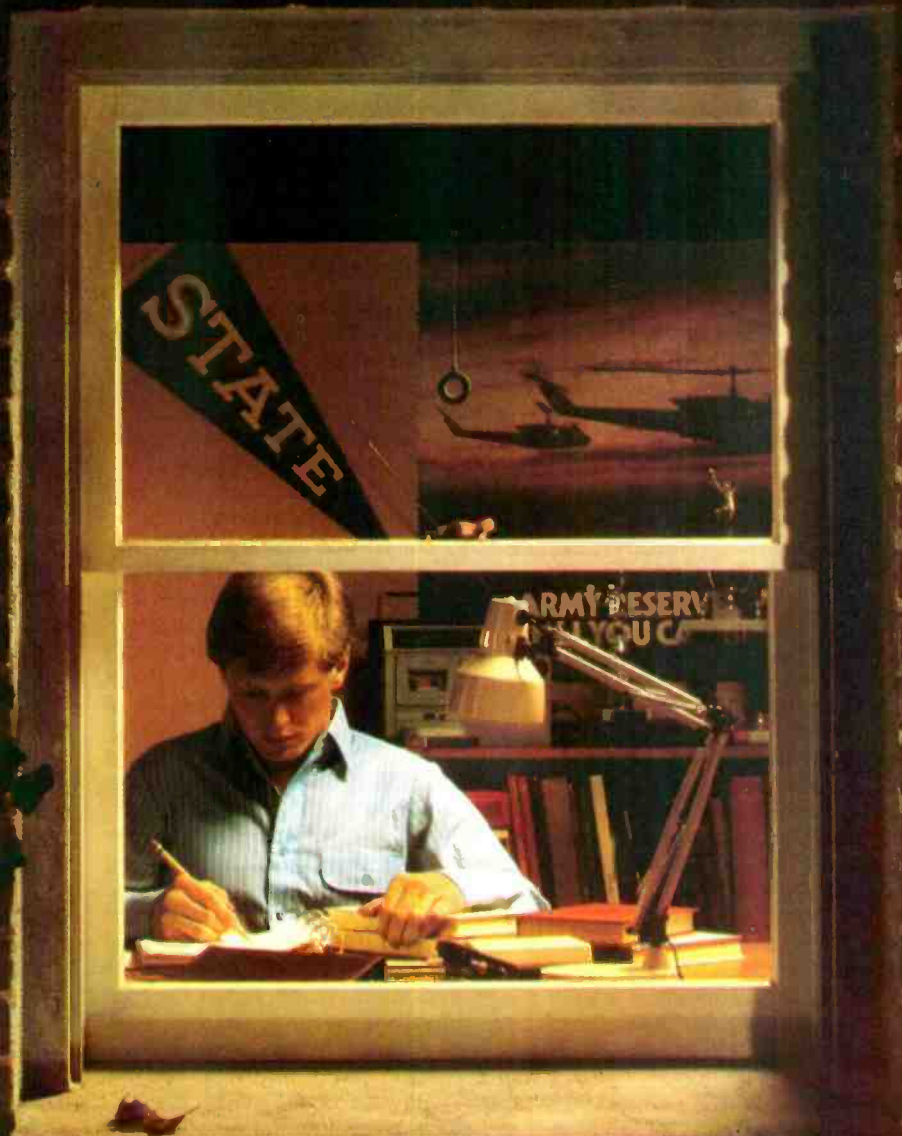
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EDWARD TATNALL CANBY

RING BEARER



It has taken the genius of Richard Wagner and the ingenuity of a CD label called Rodolphe, out of France, to persuade me to do something I have never done before—write about a specific recording in this column. Ivan Berger first wrote about it in "Spectrum" (September 1988). When, in due course, the discs came to me, ostensibly for a classical music review, I took one look, gasped, and said, "I'm not going to review *that!*" Does a mouse review an elephant?

This pint-sized, CD-shaped box, or cardboard container, no more than a couple of inches-plus from front to back, holds *more than 14 hours* of music. It contains all four of the enormous Wagner operas of the "Ring" cycle (*Der Ring des Nibelungen*) in a remarkable historic set of performances dating from 1953, out of the famed Bayreuth Festival, then just restored to earlier glory after the Nazi years and WWII. And the sound, after no less than 35 years, is terrific! In more ways than I can count, this album is a symbolic turning point in the audio art of recorded music.

The payoff (rather literally) is the "double-play" feature, engagingly called *Doppelspieldauer* in German. Instead of 15 CDs, the music is entirely

contained on only seven. It is, of course, mono, and many of us already have decided that what was originally mono should be preserved the same, without the risks of some species of artificial stereo. But why, oh why, didn't somebody think of *this* obvious system! Just use one CD track at a time; play the disc straight through twice.

First out of one speaker, then the other? Evidently in France, it is not usually possible to send one channel into both speakers, and so Rodolphe provides a little switching box with appropriate RCA jacks and the usual cables for hookups in this country. But all of the mid-priced and high-end equipment I know of can dispense with this easily, including two of my current stereo control centers and maybe a dozen, retired, up in the attic. The music is mono, from only one channel, but comes out of both speakers.

Also included in the little box is what, for a moment, looks like another CD container—a fat booklet of the same size that contains the entire German text, word for word, of all four huge operas. (The words, too, were by Richard Wagner, who regularly did his own—who else could match *his* lofty genius? He was, of course, absolutely right, as usual.) And so we have may-

be a hundred pages of dramatic German, spaced out in two columns and replete with stage directions (also by Wagner). Translations? There, at last, we run into a finite limit! There just isn't room, not even for a brief outline of the complex stories. Nor is there anything about the elaborate musical system of *Leitmotifs*—catchy themes, bits of tune, harmonies which stand for hundreds of different concepts and which return throughout all four operas as a superb unifying element.

As a matter of fact, you do not need explanations (though plenty have been laboriously written out and printed). The music tells its own story, makes its own associations in the ceaseless flow of the Wagnerian dramatic style. The more you listen, the easier this gets—you'll even know some of the *Leitmotifs* ahead of time, like the "Ride of the Valkyries" and the "Magic Fire Music." This man was so clever! He doesn't just play these ideas over again; sometimes it is no more than a whiff of sound, a fleeting suggestion; other times he composes whole new music out of them or blows them up to heroic proportions. There are even musical pairs, for opposing ideas, like the inspiring upward-moving brass tones of a C Major chord and its opposite, a yearning, doubt-filled downward string chord of the ninth. Forget the names! Just listen.

I should say quickly that there are other complete recordings of this monster cycle of operas—both later and in stereo. And we have had countless bits and pieces, even whole operas, ever since the electrical 78 brought with it the useful microphone. But somehow this Rodolphe release goes beyond them all, if only in the remarkable circumstances of its format and recording.

As background, a bit about Bayreuth, which may be only a name to you. The Bayreuth tradition is unique because it was in this place that Wagner had his own dream theater built, to house his own operas, after cajoling enough money for the huge expense—mainly out of good King Ludwig II of Bavaria, who also built that white castle in the tourist ads and was a bit dotty. (Ludwig had a mechanical swan built for himself, too, so he could ride over the water à la Lohengrin). Cash

Illustration: Linda Bleck



“Why all Boston Acoustics speakers sound alike. (More or less, that is.)”

Andy Petite, chief designer, Boston Acoustics.

“At Boston Acoustics, live music is our basic reference standard. And since we design each of our speakers to sound musically accurate, all of our systems have a remarkable sonic resemblance.

“Any full-range speaker system, whatever its size, should have good octave-to-octave tonal balance and wide dispersion. We provide these qualities in *all* of our speaker systems—from the A40 bookshelf to the T1000 tower. (From our long experience in listening to many competitive speaker lines, the same can be said of only a few.)

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“How much sound a speaker produces in your listening room also depends on the room's size, the music you listen to, and how loud you play it. Because all Boston Acoustic speaker systems—bookshelf, floor-standing and tower—meet all *our* standards, there's at least one that should meet *your* special requirements and conditions.*

“So when you visit a Boston Acoustics dealer, ask to hear a Boston speaker. *Any* Boston. We can't promise you perfection, but we *will* bring you as close to the music as the state of the art allows.”

*“It certainly helps that we design and build our own speakers—all with the same high quality materials. Further, we manufacture all our speakers to such tight tolerances that any two samples of a given model are virtually identical. And to insure this, we test each completed system—every single one—before it leaves the factory.

“Finally, sonic similarity is especially important with surround-sound systems. An all-Boston system assures the greatest sonic impact.”



The A40 Series II.

Our most popular bookshelf system.

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Combines our finest midrange and tweeter with a new 10-inch long-throw woofer. Suggested retail: \$800 a pair in walnut veneer, \$650 a pair in black woodgrain laminate.

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Soundcraftsmen



Mosfet Power Amplifiers

Pro-Power Four

DESCRIPTION: The New PRO-POWER amplifiers are especially designed for the extended Dynamic Range requirements of today's Compact Disc players and Hi Fi VCRs. The ULTRA HIGH CURRENT design offers you incredibly high power without sacrificing distortion-free performance, superb reliability, and the utmost in sonic purity. These new amplifiers operate flawlessly under all operating conditions. It is well known that most of today's highly regarded loudspeakers exhibit impedance curves which drop to 1 or 2 ohms at some frequencies, and in conventional amplifiers this results in severe clipping and the triggering of protective circuitry. However, our new PRO-POWER Phase Control amplifiers continue to operate even under those extremely low impedance conditions. Current limiting had been eliminated entirely by the use of the latest POWER MOSFET technology, thus avoiding the sonic degradation typically found when limiting circuitry is employed.

Says Leonard Feldman in his Test Report in AUDIO Magazine, Vol. 71, No. 9:

"...it brought out the best in all of the loudspeaker systems with which I tried it. I sensed an effortlessness about the musical crescendos reproduced from some of my CD spectacles..."

"In my view, you can spend five times as much as what this amp costs, but you won't get a better, more reliable, or more musical unit."

FEATURES: MOSFET amplification stages provide the utmost in sonic purity, rivaling that of vacuum tube amplifiers...Precision-Calibrated LED power meters (0-400 watts at 8 ohms)...Speaker switching for two pair of stereo speakers...

SPECIFICATIONS: CONTINUOUS RMS POWER: 205 watts per channel @ 8 ohms, 20Hz-20kHz, 300 watts per channel @ 4 ohms, 20Hz-20kHz, 450 watts per channel @ 2 ohms, 1kHz...THD—less than 0.05%. 19"Wx5½"Hx12"D, 30 pounds.

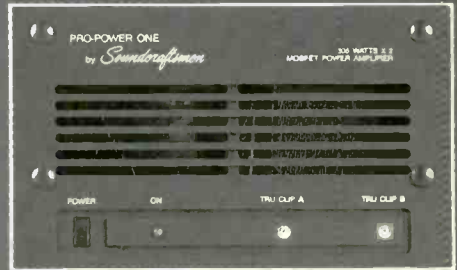
Pro-Power Three

PRO-POWER THREE: If you desire all of the performance features of the highly acclaimed Pro-Power Four without LED power meters, select the Pro-Power Three.

Pro-Power One

PRO-POWER ONE: The NEW PRO-POWER ONE amplifier provides all of the performance features of the PRO-POWER FOUR in a smaller, non-rack-mountable chassis.

PHYSICAL: 8½"Wx5¼"Hx12"D. \$579.00



PRO-POWER FOUR
by Soundcraftsmen



POWER MOSFET POWER AMPLIFIER

TRU CLIP A TRU CLIP B

SPEAKER SYSTEMS

FOR A DEMONSTRATION, VISIT NEAREST DEALER LISTED BELOW

However, many additional Dealers—too numerous to list here—are located throughout the U.S. with many models on display. If no dealer is shown near you, or you encounter any difficulty, please phone us at 714-556-6191, ask for our "Dealer Locator Operator."

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Soundcraftsmen



Pro-Power Ten 2/3/4 Channel

The New Soundcraftsmen PRO-POWER TEN 2/3/4 channel Power Amplifier stands alone, in a class by itself, in power amplifier circles. Designed and manufactured in the USA using State-of-the-Art MOSFET power output stages and our ultra-smart phase control power supply, the PRO-POWER TEN is your best buy in a power amplifier. The MOSFET amplification stages provide superior sonic purity, compared by many to that of vacuum tube amplifiers. Unlike most other supply designs whose supply voltage drops (and hence the amplifier's output capability) when operating at high volume levels

containing dynamic peaks of more than a few milliseconds duration, our smart phase control power supply adjusts its supply voltage to match the demands of the loudspeaker. Helping to maintain this constant supply voltage are ultra high storage capacity filter capacitors and two independent power transformers.

The PRO-POWER TEN front panel features four independent 12-segment LED power output meters (0-800 watts at 8 ohms) and True Clipping indicators for each channel. As in most all Soundcraftsmen components, the new PRO-POWER TEN features a Professional rack-mount panel

Specifications

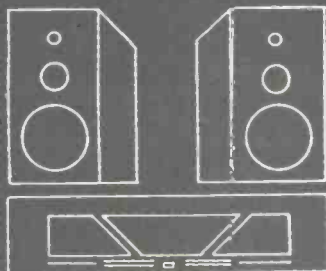
600 WATTS PER CHANNEL @ 8 OHMS, -(2-CHANNEL),
300 WATTS PER CHANNEL @ 4 OHMS, -(4-CHANNEL),

205 watts per channel (4-channel) @ 8 ohms, 20Hz-20kHz, at less than 0.5% THD...IM Distortion: less than 0.05%... Frequency Response: 20Hz-20kHz, ±0.1dB... Signal to Noise Ratio: -105dB... Slew Rate: 50 volts/microsecond... Dimensions: 19" Wx5 1/4" Hx12" D... Weight: 55 pounds

TWO-CHANNEL MODE

600 WATTS PER CHANNEL

When the PRO-POWER TEN is used in this mode it is transformed into the ultimate in high power amplifiers... If your loudspeakers and/or environment require a lot of power, the PRO-POWER TEN is right for you.

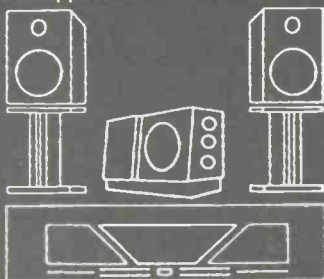


Ultra High Power Systems

Sub-Woofers/Satellite Systems

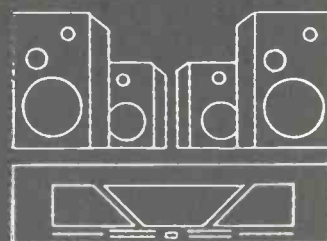
THREE-CHANNEL MODE

Many of the more modern loudspeaker systems have been designed primarily with the total living environment and/or integrated audio-video systems in mind. These systems incorporate a stereo pair of satellite speakers for reproducing the midrange and high frequencies. Since the very low frequencies are non-directional, and hence non-critical to proper stereo imaging, they are reproduced by a single, large sub-woofer. The PRO-POWER TEN in the Three-Channel mode is ideally suited to these applications.

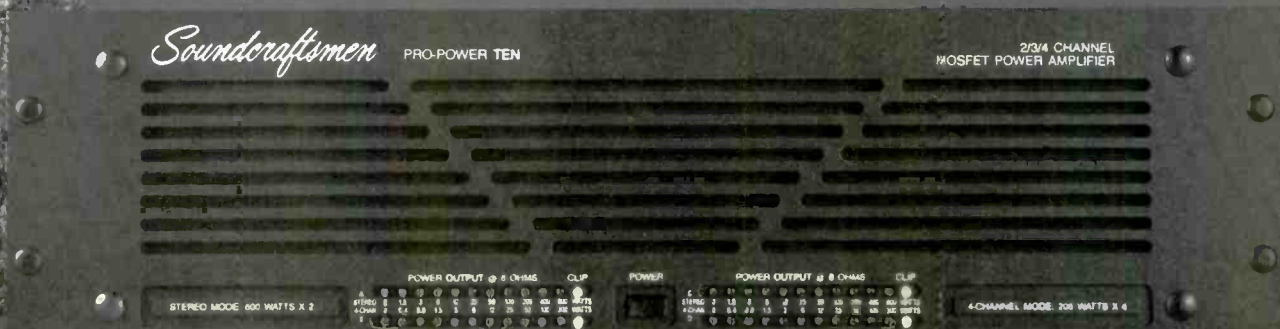


FOUR-CHANNEL MODE

The ultimate in audio/video systems is the Surround Sound system, where the theatre environment is re-created in the home by utilizing front and rear speakers. The PRO-POWER TEN in the Four-Channel mode is the perfect match for these systems. Some higher quality loudspeakers benefit from bi-amplification, i.e. having separate amplifiers for their low frequency and high frequency components. The PRO-POWER TEN in the Four-Channel mode is equally well suited for these types of systems.



Surround Sound Systems



CA - EMERYVILLE: MAYBRUNS • FRESNO: VALLEY STEREO • MODESTO: PARADYME • REDFORD: LARSON'S STEREO • SACRAMENTO: PARADYME • SAN CARLOS: HERMARY'S • SAN DIEGO: PACIFIC SIGHT & SOUND • SAN FRANCISCO: MAYBRUN • SANTA ROSA: GOLDEN EAR
 CO - COLORADO SPRINGS: THE SOUND SHOP • DENVER: PISTOL STEREO • FORT COLLINS: AUDIO JUNCTION
 FL - ALTAMONTE SPRINGS: BOSS AUDIO VIDEO • BOCA RATON: VERN'S ELECTRONICS • BRADENTON: AUDIO WORKSHOP • LAKELAND: THE SOUND FACTORY • MERRITT ISLAND: ISLAND AUDIO WORKS • ORLANDO: SOUND EFFECTS THE ELECTRONIC SHOP • SARASOTA: AUDIO WORKSHOP • WEST PALM BEACH: ELECTRONIC CONNECTION
 GA - AUGUSTA: STEREO SHOP • ATLANTA: STEREO DESIGNS
 IA - IOWA CITY: HAWKEYE AUDIO
 ID - TWIN FALLS: THE SOUND COMPANY
 IL - ALGONQUIN: TEAM ELECTRONICS • AURORA: STEREO SYSTEMS • BURNHAM: DIGITAL TV/AUDIO • CHICAGO: AUDIO ENTERPRISES MILL S RECORDING PRO MUSICA • CHICAGO HEIGHTS: AUDIO ENTERPRISES • GURNEE: OPUS RECORDING • JOLIET: STEREO SYSTEMS • KANKAKEE: BARRETT'S • MORRIS: BARRETT'S • MORTON GROVE: THE MEDIA ROOM • MURPHYSBORO: SABIN AUDIO • MAPERVILLE: STEREO SYSTEMS • PEORIA: SOUND OF PEORIA • ROCKFORD: ABSOLUTE AUDIO • STERLING: STERLING ELECTRONICS • WESTMONT: SOUNDS DELUXE
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Richard Wagner's "Ring" cycle of four operas on seven CDs is a symbolic turning point in the art of recorded music.

pledges also came from such distant outposts as America. The operas, all four, were complete by the early 1870s, and the theater opened in 1876 with the first complete performances of the entire cycle (as we have the 1953 cycle on this recording in the very same hall). That effort almost busted the place, which closed for six years, but old Richard, the persistent, was not to be stopped that easily. The Festival was started up again and ran erratically, more or less every two years, with time out for wars, to the present day—well over a hundred years. Where else can you find anything in music like that? Even more, the whole thing remained under Wagner family direction, first his wife, Cosima, then on to son and grandson, for much of that long century and onward. This 1953 production was directed (and inspired, I might say) by the grandson, Wieland Wagner.

Bayreuth, then, is a sort of musical pilgrimage spot, beyond all other festivals, with an aura that has brought every musician who is anybody to the place to show his very best, or hers. The 1953 production was under Clemens Krauss, one of the finest, and is surely the best he could give. The cast of singers of that year includes, among dozens, plenty of well-known names, some of them still at their best then (and not as good in later recordings), names you might have heard, such as Astrid Varnay, Regina Resnik, Hans Hotter, Wolfgang Windgassen, Ramon Vinay—what is generally called a stellar cast if, as always, not perfection. (Who can agree on perfection? Certainly not opera fans!)

But beyond this is an intensity which is the subject of what might be a mere publicity blurb in the album booklet if it weren't so well illustrated in the performance. After the WWII catastrophe, when the Nazis had turned Richard Wagner into the pompous creature of their thousand-year Reich, Wieland Wagner (the liner notes say) wanted to restore what he felt was the real drama, the intense excitement, and, yes, the passion of these operas as of the pre-Nazi years. It is that very excitement, amplified by the close-up recording techniques of the 1950s, which makes this an overpowering 14 hours of reproduced music! We have

never heard such a thing on record before CD—complete, with so few breaks that the tension of the live performance, in all its unbroken pressure, is *there*—if you can listen.

How do they do it? How can a mere earthly tenor or bass or soprano, depending on sheer breath power, produce such heroic volumes of sound, excruciating high notes, eye-flashing and teeth-grating consonants, astonishingly controlled sobs and groans, on-pitch yells and shouts—for hours without a break? Talk about the Olympics—what about this? Who but old Richard could know ahead of time, on paper, in his head, that it was indeed possible, given the impetus? Possible in his time, still possible today. And now we get to hear it, all of it, in the closest proximity—only a few feet from each singer, it seems, as you listen. And in such gorgeously recorded sound! How did we do it?

The thing you must understand, in this audio challenge to the home/consumer listener, is that Wagner is hypnotic. He cannily depended on an utterly captive audience and on time—outrageous, wearing lengths of it—to reduce you to a sort of will-less human pulp. It is not easy for anyone; it can be extremely unpleasant—even, as I say, an outrageous, buffeting, shocking experience—to sit in a crowded theater through these endless hours of never-ceasing, soul-grabbing sound. Sheer, exalted torture.

It is easier at home. Technically, you are not captive at all. Just flip a switch, and all is serene. And quiet. So easy. Perhaps you'd rather put on some nice, gentle background music? Comfort for the ears as well as the body? Your choice, friends. Take it or leave it. And yet, there *is* the challenge. Should you miss a big human experience—frustrating, demanding, hopelessly noisy, and outrageously long (everything in Wagner is outrageous)—but nonetheless *real*?

I should know. I have never been to Bayreuth, but, in the 1930s, I sat "live" at the Met through various big Wagner operas. It was a time of very high performance levels, with such as Kirsten Flagstad and Lauritz Melchior. One opera at a time, of course. But I got the feeling. It was awful. And sometimes funny. I, too, was reduced to a pulp, a

....remarkable!



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Wagner cannily depended on an utterly captivated audience, and on time, to reduce you to a sort of will-less human pulp.

sort of rubbery plasma, though I fought this fiercely. In the middle acts, I simply could not stay awake; in self-defense, I slept. *Too much!* Too long! But do you think I did not absorb? Richard had me just as securely as ever. Half-way through the final act, I would wake up with a jolt and find myself in a state


of total trance—without benefit, thanks, of LSD or other enticement. I would stagger out of the theater, my knees like jelly, my mind in a daze. In a good Wagner performance, there is *no* way to avoid this.

On the other hand, there were those moments of amusement. It was the era

of the great, big opera singer (isn't it still?), and both Flagstad and Melchior were very large. I will not forget the absurd sight of big Melchior climbing laboriously up onto some sort of wobbly table to get at the great sword he had to pull out of a fake oak tree, his enormous legs pale and putty-colored in the traditional high-above-the-knee tights! Some hero. It was all in the voice. With Flagstad, once, it was almost tragedy. In another opera, she stood majestically high on a fake mountain, stage left, and sang for maybe a half-hour—then began to topple. Phew, the audience groaned aloud, but the great lady righted herself and did not fall.

Flagstad was perfect for Wagner, a visually awesome statue of a woman—so long as she was motionless. In Wagner, the music is full of passion—both from the orchestra and the singers—but visible motion is snail-like, if there is motion at all. Most of that was prescribed (again) by Wagner himself—a gesture here, a step to the right a half-hour later. Maybe I exaggerate but not by much. It is visually static, no matter how gorgeous the sets, and when there is drama, it tends to be clumsy. Rhine maidens swimming in the Rhine? *And* singing! Just try *that* for yourself.

All of which points back to the new total experience, Wagner complete and in the home—or the car. But please don't try it in your car. Dangerous. Or incomprehensible. Or both. If you are caught up in the long hypnosis (say, on a cross-continent jaunt), you may find yourself gradually submitting to a very hazardous illusion. You are not on Interstate 80; you see the Rhine ahead of you, glittering and mysterious—and on top of that telephone pole which you are about to hit are three Valkyries in armor with horns on their heads. And I don't mean auto horns. Stay away from car Wagner.

At home, in the favorite listening seat, it is a different story. You now have a bit of background which you might not have had before, the "ETC" part of "Audio ETC." Next month, I'll fill in the audio part and give you thoughts on the challenge to our whole way of listening at home which this 14-hour recording sets up, as no recording has before. *Heil Wagner!* 

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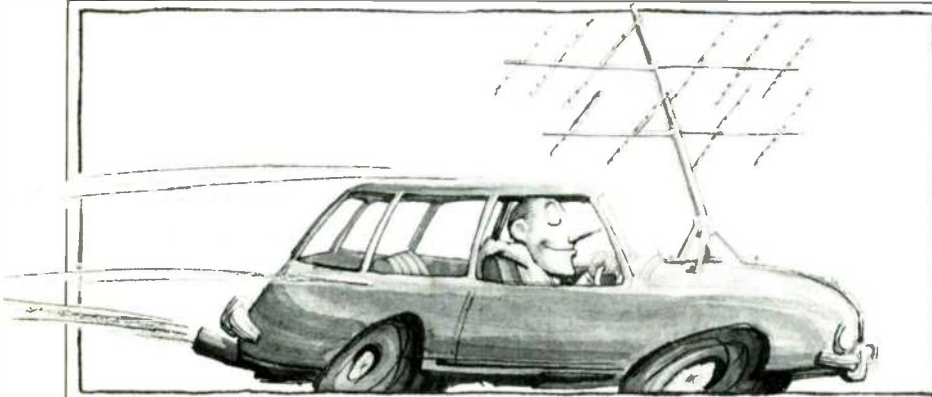
AERIAL TACTICS

advantages, but, in my experience, create more wind noise.

Power antennas are more expensive; they're also harder to install because their motors take up space. (On some models, the motor is a separate unit, to make installation easier.) If your head unit has an antenna power switch—most do, these days—it can automatically raise the antenna when you turn the radio on and lower it when you shut off the sound or park. You'll still need to remember to switch off your radio when going through a car wash, however. Owners of head units without such switches can add a manual switch to the dashboard. If you hook the switch to a line that's controlled by your ignition switch, the antenna will go down when you park.

Amplified "rubber ducky" antennas are rugged and unobtrusive, although a bit funny looking, to my eyes. The antenna portion of a rubber ducky does not pick up signals as strongly as a full, quarter-wave (30-inch) whip, but its amplifier portion makes up the missing gain. In theory, this setup should deliver slightly noisier signals than a conventional whip, but in practice, I have not found that to be the case.

The reason today's antennas are about 30 inches long is that they're optimized for FM frequencies: Longer antennas were used in the AM-only days. It would be nice if a dual-length powered antenna could be made, especially if the head unit could select the proper length as you switched between bands. I'm not holding my breath until it comes along, though.



And So's Your Antenna

Choosing the best AM/FM antenna for your car may depend as much on your car and lifestyle as on your reception requirements. If your car has an antenna built into its windshield or uses its rear defroster grid as an antenna, you already know their advantages and disadvantages: The antenna is neat and unobtrusive, is safe from car-wash brushes and vandals, and cannot contribute wind noise. The catch is that it's least effective at an antenna's main function: Picking up radio signals. Actually, window antennas can be quite effective—until you turn a corner or go 'round a bend and the antenna no longer faces the station you're listening to.

Of the antennas you can add yourself, the least expensive, most reliable type is the fixed rod. Its mounting depth is insignificant, which makes it easy to mount when there isn't much room beneath the desired mounting surface. If sufficiently stiff, it should be reasonably safe in car washes (at least the Ford antenna I

once had on my Fiat withstood the brushes and rollers well), but it will still be subject to vandalism if you park where that's a problem.

Manual telescopic antennas cost a little more, but they can be tucked down out of harm's way. (If you fear vandalism, get the kind whose mast needs a simple key to release.) The catch here is that you must remember to push it down when parking or before entering a car wash (telescopic types break very easily). You also have to raise it again before driving off. It can be infuriating to discover your antenna is still down when you're halfway between freeway exits and want a traffic report. It's easier to remember these things if your antenna is mounted close to the driver's door. Antennas which telescope down into the left front door pillar (common on Hondas) are ideal because they're easy to reach and hard to overlook. And since they're up on the roof, they also tend to get a better signal. Telescopic antennas mounted on the outside of the windshield pillar have the same

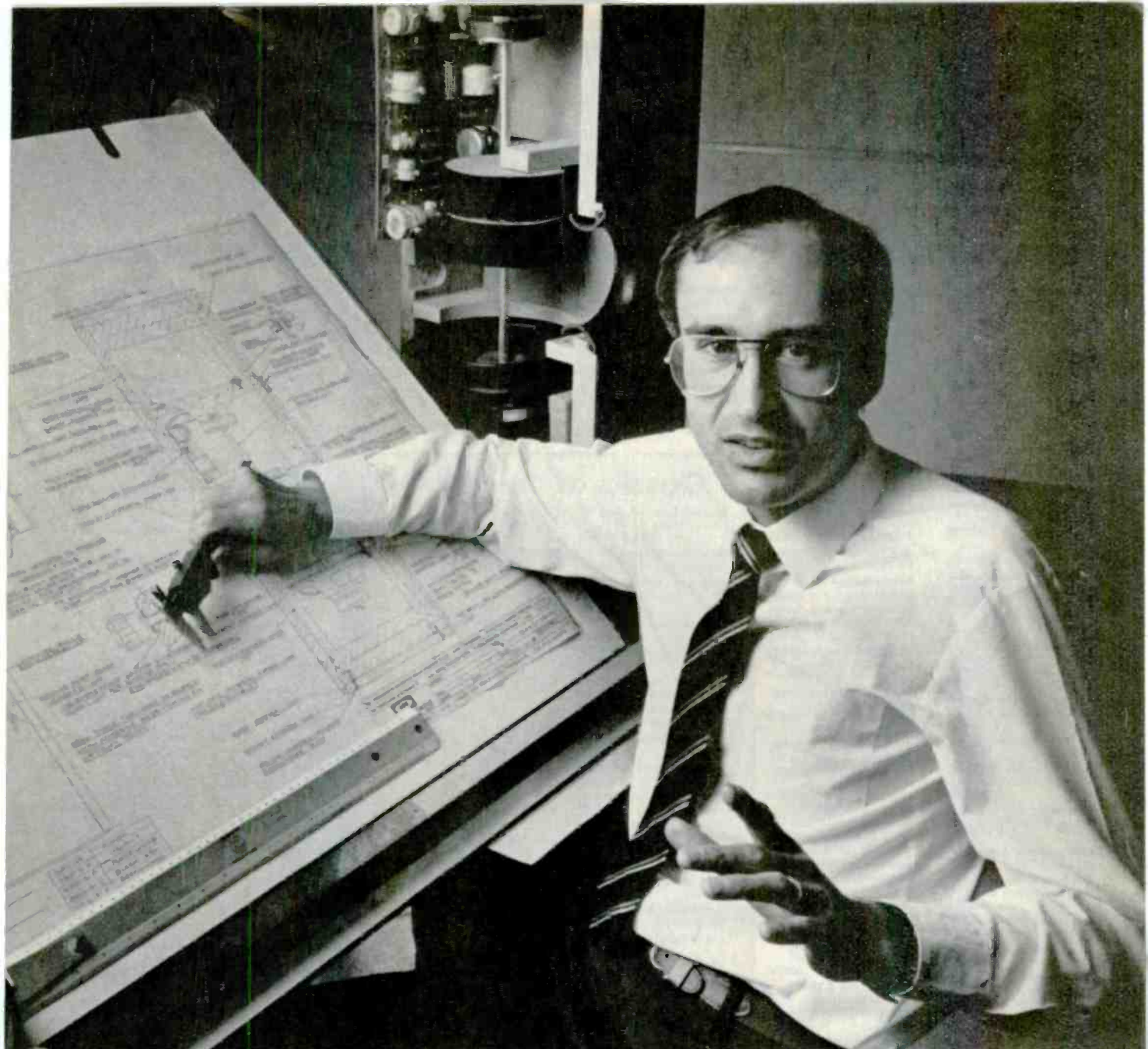
Flashers

Remember the flashing-light accessories sold for stereos back in the '60s and '70s? As the system played, the lights would flash in time to the music. The brightness of the flash varied with the signal amplitude; often, different lights flashed for different portions of the spectrum (usually red was for bass, as I recall). With pop music, the lights would flash along with the beat. I haven't seen a home system with flashing lights in a



decade or so, but not too long ago, I saw two cars with similar flasher systems. One car had its flasher mounted in a hood scoop, the other had it mounted in the grille. In both locations, the displays looked attractive and weren't visible inside the car to distract the driver. The only catch was that the drivers felt compelled to play their stereos fairly loud, with the car windows open, so people on the street would know what beat the lights were flashing to.

Illustrations: Bridget Starr Taylor



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—Mike Gough, KEF CHIEF DEVELOPMENT ENGINEER

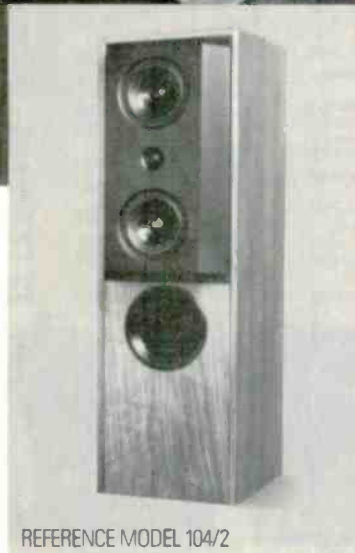
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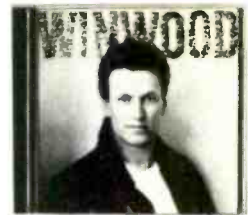


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The greatest music is on CD—and here's your chance to pick eight favorites listed in this ad. As a special introductory offer to the CBS Compact Disc Club, you can select any eight CDs for 1¢. All you do is fill in and mail the application—we'll send you eight CDs and bill you 1¢, plus shipping and handling. You simply agree to buy six more CDs (at regular Club prices) in the next three years—and you may then cancel your membership anytime after doing so.

How the Club works. About every four weeks (13 times a year) you'll receive the Club's music magazine, which describes the Selection of the Month for your musical interest... plus many exciting alternates. In addition, up to six times a year, you may receive offers of Special Selections, usually at a discount off regular Club prices, for a total of up to 19 buying opportunities.

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Note: we reserve the right to reject any application or cancel any membership. These offers not available in APO, FPO, Alaska, Hawaii, Puerto Rico; write for details of alternative offer. Canadian residents serviced from Toronto. Applicable sales tax added to all orders. *Classical members serviced by the CBS Classical Club.

Alarms shouldn't just howl when a car is broken into. They should growl a quiet but meaningful warning as soon as the car is touched.

Alarming News

Car alarms respond to many stimuli, including shaking and vibration. This has special significance to residents of the Los Angeles area, who have discovered that earthquakes can set off alarms. Californians who've learned to sleep through quakes and aftershocks may now sometimes find themselves awakened by the shrieking of several alarms on their block.

No, but Whine a Few Bars And I'll Try to Fix It

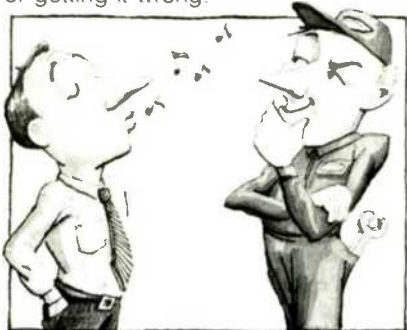
Sooner or later, you're going to have a noise problem in your car's stereo system. The more you can tell your installer about it when you bring it in for service, the better your chances of getting it fixed right the first time. So here are some questions to ask yourself, and answer for the installer, when the time comes:

What kind of noise is it—a pop, a hum, a whine, a buzz...? Does it vary with engine speed?

Under what conditions does it appear—all the time? Only when the engine's running? When something else (such as the wiper motor) is on? Only when you actuate specific switches? Only when it's rainy? Cold? Hot? Dry?

When did it become audible—when you got your system? Since then? Had you made any changes to the car at about that time?

It's not enough to mention these details when you bring in the car for stereo service. Write them down legibly (type, if possible) and give the guy at the service desk a copy to attach to the service order. That way, you don't have to worry about his failing to write down your information, or getting it wrong.



Making Cars Growl and Yowl

I wasn't able to get the alarm installed in our new car before the sound system went in, so I decided to wait until the sound system was finished. After all, the car spends most of its time in a garage, and I take the radio out when I park in the street. But one night I left the car out, and someone broke in. I had the radio, but he got the amps. Now I'm having the alarm done first, and the stereo afterward.

Information à la Carte

The messages pre-printed on conventional car-stereo displays only become visible when illuminated, but even when they're off, they take up space. As the number of functions the display must indicate increases, the display grows bigger, crowding the panel—yet the individual messages grow smaller nonetheless.

One way out was shown by Blaupunkt's Berlin head unit (May 1988). Its display has a few fixed messages, but its main areas are programmable, like computer displays (which, as a matter of fact, they are). With this system, only the information you need at any given moment is displayed. Consequently, the desired information can be in big, readable characters while the head unit's actual display panel remains fairly small.

The break-in also set me musing about two features that aren't available on present-day alarms, but should be. First, there should be a warning mode. Whenever the alarm is set, the car should growl quietly but firmly at anyone who touches it. The growl shouldn't be loud enough to bother the neighborhood—it should just remind anyone right next to the car that an alarm is on duty.

Second, there should be interior sirens and strobe lights so powerful that anyone not deaf and blind would flee the noise and glare at once—but this feature could have an interesting twist. Although many installers have used interior alarms for years, others fear that they could accidentally go off while the car is on the road, thus startling the driver and causing accidents. Hence my twist: Power to the interior warning system would come through a locking plug which would have to be removed and shifted to the car's ignition circuit before the car could run. The rest of the alarm system would still operate, even if a thief somehow got the plug unlocked and out.

Meanwhile, even before my alarm gets installed, I'm going to make up signs that say:

RADIO: NO.
ALARM: YES!

The system is also easily adaptable to different applications. European versions of the Berlin, for example, display messages that mean nothing to me—they are probably for broadcast services not available in the U.S. They could also be foreign-language equivalents of English terms, but I doubt that: In a German magazine, I noted a Berlin display reading "Tape" instead of the German "Band."

The Berlin was the first car stereo with this system that I can recall using, yet I felt there was something oddly familiar about its operation when I first encountered it. Then, when I started using a hand computer with a small display (the Psion), I suddenly understood my sense of *déjà vu*: The display was a clever adaptation of the "menu" concept I'd grown familiar with on computers.



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ON A CAR, THE
PRICE SHOULDN'T
BE THE ONLY THING
THAT SOUNDS
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The Aston Martin is an incredibly well engineered car. It's also incredibly expensive. But the wrong car stereo can make even a \$180,000 car like the Aston Martin sound a lot less expensive. That's why we developed the Technics CQ-R 9550.

Even though it doesn't take up more space than conventional car stereos, it's got plenty more to offer.

This remarkable sound system is one of the most impressive convertibles on the road today. It has almost no knobs or switches. Instead, it has the most revolutionary control panel ever to come down the pike. Three convertible faces, all in one panel. Each with a different function and a different color. What's more, the

only time you may lay a finger on it is when you turn it on. Because it comes with a wireless remote.

You can also preset up to 24 of your favorite stations on its tuner. Or program our tape player. And with the optional CD changer, you have the luxury of programming an easy day's listening for a hard day's drive.



Optional CD Changer

If you're interested in owning a car stereo like this down the road, come into your Technics car audio dealer today. After all, it may be quite a while before you drive a car like an Aston

Martin. But in the meantime you can drive something that sounds as good.



Technics
The science of sound

Enter No. 42 on Reader Service Card

NAK 'EM DEAD



DAT with a Difference

At an international press conference in Tokyo during the second week of November, Nakamichi announced its 1000 Digital Audio Recording System, which consists of the 1000 DAT recorder and the 1000p digital audio processor that can control two recorders. A remote controller, the 1000r, available in both wired and wireless versions, is also included in the basic ensemble. Modular plug-in circuit boards make it possible to match professional levels and interfaces and to expand and update the system, which can record at 32, 44.1, and 48 kHz, including direct digital input.

The Nakamichi 1000 system includes a number of firsts. The rotary drum has four heads, allowing simultaneous monitoring during recording. Stationary tape guides are used for unprecedented tape-to-head

alignment. The unique link-arm mechanism reduces start-up delay to playback. A half-load position winds tape at 400 times normal speed—twice as fast as normal DAT mechanisms. A high-precision, 20-bit D/A converter provides exceptional resolution, linearity, and dynamic range. Upper and lower bit groups are handled by separate, low-glitch, 16-bit converter ICs. The D/A converters are fully calibrated, with unmatched precision. Special ROMs carry compensation data for the specific, individual converter ICs, and bit errors are fully compensated. The unusual glitch-cancellation circuitry introduces timed, opposing pulses to cancel such problems completely. The result is vastly improved linearity and low distortion across the entire dynamic range. The D/A conversion is brought to the theoretical limits of 20-bit performance.

A demonstration was made to a select group of listeners, playing back the recordings of a previously heard concert. There had been simultaneous recording with the Nakamichi 1000 system as well as a Sony PCM-1630 processor and DMR-4000 recorder. With both recorders, some differences were noted between the amplified sound of the playback and the original live sound. I felt that the Nakamichi system delivered details and a clarity in the sound that were missing in the other playback.

Both consumer and professional versions of the Nakamichi 1000 Digital Audio Recording System are expected to be available in March. The retail prices for both versions are projected to be \$10,000 for the complete system, including the remote controller. The recorder and controller together are expected to cost \$5,400, the processor unit an additional \$4,600, making the system's total cost \$10,000. These prices are obviously very high, but so was the quality of the sound.

Direct recording at 44.1 kHz stands as a possible challenge to positions taken by the recording industry. However, the investment required for the Nakamichi system will certainly keep consumer CD copying to a minimum, to say nothing about the cost of DAT cassettes.

Howard A. Roberson

Taking the Stand

The RIAA has vowed to sue the first company that brings its home DAT recorders into this country, and has committed a million dollars to the necessary legal fees. The EIA has pledged an equal amount to support whatever company gets sued—but only in the form of matching funds. That means a company sued by the RIAA would still have to ante up half its legal fees, while no RIAA member company would be assessed any comparable amount.

In my opinion (and I'm not a lawyer), the RIAA has no hope of winning such a suit, and knows it. But they don't have to win. They're in the position of the hard-boiled hero who

faces six advancing thugs with just three bullets in his gun. "Okay," the hero snarls, "I know I can only get the first three of you, and then you're gonna get me. But which of you wants to be one of those three?"

If I were the lawyer for a company being sued, I'd hope the RIAA



brought in as witnesses the same big guns they produced to testify in favor of the Copy-Code bill before Congress. If necessary, I'd subpoena them myself. Then I'd lead each through the following set of questions: *In your opinion, does DAT pose a threat to the recording industry? On what basis have you formed this opinion? In your fight against DAT, did you not give the following testimony before Congress? Was it under oath? On what basis did you form the opinions you expressed to Congress? Is it not a fact that everything you said to Congress was later disproved in scientific tests by the Bureau of Standards? So why should we believe you now?*



Even when life was slower, good news always travelled fast.

The better the news, the more people want to share it with others. Here's some we wanted to share with you.

The SA-11 Line Control Amplifier

"This new SA-11 is probably the most beautiful sounding line section in the galaxy... The SA-11 is so naturally musical, so transparent, and so effortless that one is immediately seduced into simply enjoying the music."
—International Audio Review

The SA-5 Preamplifier

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—Hi Fi Heretic

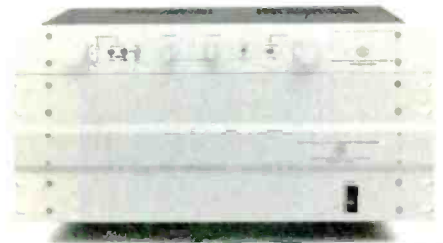
The SA-20 Power Amplifier

The vastness and delicacy of the SA-20's sound were breathtaking... the Counterpoint reached beyond to something like reality."
—High Performance Review

—High Performance Review



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SA-5 and SA-20



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"They Were Designed To Play Music This They Do Very Well, In At A Bargain Price... It's Hard To Ima

It has always been true that placement in the listening room has a profound effect on the sound of any loudspeaker, regardless of its inherent qualities. Cambridge SoundWorks has confronted this fact and created Ensemble,™ a speaker system that can provide in your home, the superb sound once reserved for the best conventional speakers under laboratory conditions. And because we market it directly, Ensemble costs far less than previous all-out designs. Perhaps best of all, it virtually disappears in your listening room.



Henry Kloss, creator of the dominant speaker models of the '50s (Acoustic Research), '60s (KLH), and '70s (Advent), brings you Ensemble, a genuinely new kind of speaker system for the '90s, available factory direct from Cambridge SoundWorks.

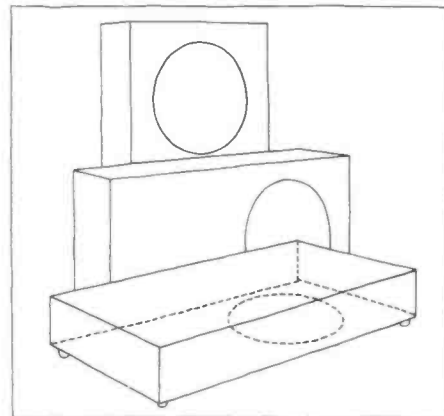
The best sound comes in four small packages.

Ensemble consists of four speaker units. Two compact low-frequency speakers reproduce the deep bass, while two small satellite units reproduce the rest of the music. Separating the low bass on both channels from the rest of the range makes it possible to reproduce just the right energy in each part of the musical spectrum without turning your listening room into a stereo showroom. With clumsy conventional systems, you can either strive for that balance by letting loudspeakers dominate your room, or sacrifice it for less conspicuous speaker placement.

Your listening room works with Ensemble, not against it.

Room acoustics emphasize and de-emphasize various parts of the musical

Unlike satellite systems which use a single large subwoofer, Ensemble features separate compact bass units for each stereo channel. They fit more gracefully into your living environment, and help minimize the effects of the listening room's standing waves.



Because low frequencies are non-directional, Ensemble's bass units can be installed horizontally, vertically, facing upwards, or facing downwards.

range, depending upon where the speaker is placed in the room. If you put a conventional speaker where the room can help the low bass, it may hinder the upper ranges, or vice-versa.

Ensemble, on the other hand, *takes advantage* of your room's acoustics. You put the best bass, whether or not that location is good for the high frequencies (and it usually



-And Make It Sound Like Music. A Most Unobtrusive Way, Engine Going Wrong With Ensemble.”

Julian Hirsch
Stereo Review, Sept. '88

isn't for any speaker). Then you put the satellites where they provide a well-defined stereo "stage."

The ear can't tell where bass sounds come from, which is why Ensemble's bass units can be tucked out of the way—on the

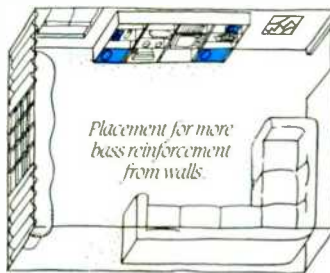
in gunmetal gray Nextel, a suede-like finish highly resistant to scratching. We even gold-plate all connectors to prevent corrosion. But perhaps an even bigger difference between Ensemble and other speakers is how we sell it...

Call 1-800-AKA-HIFI*
(1-800-252-4434)

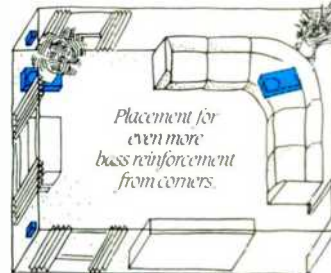
Our toll-free number will connect you to a Cambridge SoundWorks audio expert. He or she will answer all your questions from



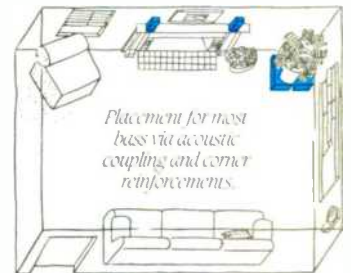
Placement for least bass reinforcement.



Placement for more bass reinforcement from walls.



Placement for even more bass reinforcement from corners.



Placement for most bass via acoustic coupling and corner reinforcements.

You can put Ensemble's low-frequency units exactly where they should go for superb bass. You can't do this with conventional speakers because you have to be concerned about the upper frequencies coming from the same enclosures as the lows.

floor, atop bookshelves, or under furniture. The satellites can be hung directly on the wall, or placed unobtrusively on window-sills or shelves (among other possibilities). The result is extraordinary: There are no bulky speaker boxes to dominate your living space, yet Ensemble reproduces the satisfying deep bass that no mini speakers can.

Not all the differences between Ensemble and other speaker systems are as obvious as our two subwoofers.

Unlike three-piece satellite systems that may appear similar, Ensemble's four-piece design doesn't cut any corners. We use premium quality components for maximum power handling, individual crossovers that allow several wiring options and cabinets ruggedly constructed for proper acoustical performance. The low-frequency units use the classic acoustic suspension design, and are finished in black laminate. The satellites are finished

The best showroom of all: your living room.

Choosing a loudspeaker after a brief listen at a dealer's showroom is like deciding on a car after one quick trip around the block. Therefore we make it possible to audition Ensemble right in your own home. In fact, Ensemble is sold *only* by Cambridge SoundWorks directly from the factory.

That only makes sense. You get to match Ensemble specifically to your listening room in a way no other system permits. You get to listen for hours without a salesman hovering nearby. And if after 30 days of all that you're not happy, you can return Ensemble for a full refund (we'll even reimburse the original UPS shipping charges in the continental U.S.).

You also get to save.

At only \$499—complete with all hardware, 100' of speaker cable, and free ongoing assistance—Ensemble

costs hundreds of dollars less than it would in a retail store.

What Henry Kloss tells his friends:

Every time I came out with a new speaker at AR, KLH, or Advent, my friends would ask me, "Henry, is it worth the extra money for me to trade up?" And every time I would answer, "No, what you've already got is still good enough."

But today, with the introduction of Ensemble, I tell them, "Perhaps now is the time to give your old speakers to the children."

why (or why not) to buy Ensemble to those you may have about related equipment. Your audio expert will take your order (you can use Visa, MasterCard or American Express), and arrange surface shipment via UPS (\$7 to \$25 anywhere in the continental U.S.). You should have Ensemble within one week. And your Cambridge SoundWorks audio expert will continue as your personal contact with us, to answer questions which might come up after you've begun to enjoy Ensemble at home. We think you'll like this new way of doing business.

*In Canada, call 1-800-525-4434. Audio experts are on duty Mon.-Fri., 9AM-10PM, Sat., Sun., 9AM-6PM Eastern Time. Fax # (617) 552-9229.

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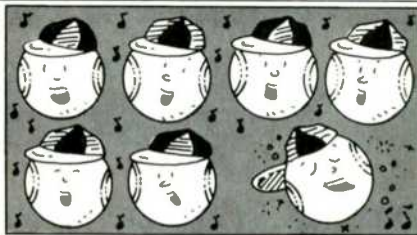
*Plus freight. Call and ask.

Suite 104F

Victor once licensed its records for use only on Victor machines, which in turn were for use only with Victor recordings.

Crippled Play

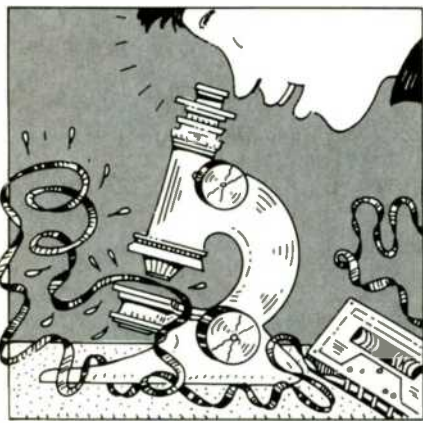
Back when the Dodgers were in Brooklyn, they formed a musical group to raise their cultural image. The group disbanded, however, after its first concert, a performance of Beethoven's "Choral" symphony. All went well through the first three



movements, which were purely orchestral. But in the fourth, which gives the symphony its name, the group realized that two soloists had failed to show up, and the guy who sang the low part was very drunk. It was a tense moment: Bottom of the "Ninth," two out, and the bass was loaded.

Particle Progress

Under the microscope, older gamma ferric oxide particles used in recording tape show tiny pores, which reduce the magnetic energy each particle can hold. According to TDK, the particles used in their new AR-series Type I tapes are nonporous. This translates into greater magnetic energy per particle, more uniform magnetic properties, and greater particle-packing densities. As a result, low-frequency MOL is +6.5 dB at 315 Hz, the same as TDK's latest metal MA-X tape. High-frequency MOL is -6.0 dB at 10 kHz, and bias noise is -56 dB, according to the company. In other words, if you ask TDK whether recording is better without pores, they'll answer "No sweat!"



All Around Your Ears

How do you listen to surround sound through headphones? Through four-channel headphones, naturally. During the first surround boom, back in the '70s, several companies made such models, the best of which worked more than passably well. Now, they may be making a comeback—JVC, at least, is making a pair, Model HA-SU7.

Extinguished Royalty

Controversy over home digital copying of software only reached audio four years ago or so, when Japanese manufacturers announced plans to settle on a DAT Standard. In computing, though, it dates back to the first widespread dissemination of home computers, circa 1977. Much computer software carries long copyright notices and warnings against unauthorized duplication—and so did phonograph records, once upon a time. To show how little things have changed, computer authority George Morrow recently reprinted the following notice, from an old 78-rpm record sleeve, in his column, "The Technology Show," in the September 12, 1988 issue of *InfoWorld*:

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SPECIAL ADVERTISING SUPPLEMENT

Audio

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A DECADE OF**



**DIGITAL
RECORDING**

It seems almost too good to be true. In the past year alone, nearly 160 million compact discs and 4½ million compact disc players were sold throughout the United States. In fact, in just 6 years, the digital audio compact disc format has become the most successful new introduction in high fidelity history. Yet this achievement pales in

modulation (PCM) digital processor by Sony that set the stage for the digital revolution to follow.

The next step in this revolution occurred in 1981, when the rather bulky and expensive first-generation

by this event, including a special issue of *Audio* (which became the first American publication to test and evaluate this unprecedented new product). Yet by March, 1983, when the first player was officially introduced for sale in the United States, only a mere half-dozen hardware manufacturers were prepared to follow CD co-developers Sony and Philips into the marketplace.



PCM-1/VCR

comparison to the fact that even the most ardent music enthusiast had not experienced the sound of digital audio until less than a decade ago.

Moreover, it was only in the late 1970s that American consumers had their first opportunity to purchase digital audio processors and enjoy the benefit of digital music reproduction. For although digital technology was already being utilized in professional recording studios, it was the introduction of a consumer pulse code

processors gave way to a new generation of 16-bit linear designs. In addition to being more portable and affordable products, these Sony F1 format models were the first to employ dedicated, large scale integrated digital-to-analog (D/A) converters—the same type of circuitry necessary to realize the most significant new industry development of all.

The October, 1982 introduction of the Digital Audio Compact Disc was the culmination to all of these efforts. One can remember the incredible excitement that was generated

Perhaps even more startling was that only a handful of music labels were ready to make a commitment to the Compact Disc format at that time. In fact, if it were not for these labels' efforts, it's doubtful that there would have been the necessary software support with which to launch this new product.

Therefore *Audio* would like to join the music industry in congratulating these visionary



PCM-F1/PORTABLE VCR



CDP-101

labels who today are celebrating a decade of digital recording. We are pleased to commemorate these companies, since they remain among the companies that continue to lead the music industry, both in the development of new artists and exciting music product.

CBS RECORDS

was founded in 1887 by two English inventors and is considered by many to be the "grand old man" of the recording industry. Originally known as the Columbia Phonograph Company, the label has evolved over the years into one of the most diversified music manufacturers in the world. In fact, during the past century, no other record

company has made more recordings of more artists in more fields of music. Now a division of Sony Corporation, the outlook for CBS looks brighter than ever.

GRP RECORDS

was founded in 1983 by award-winning composer/pianist Dave Grusin and producer/engineer Larry Rosen as a company dedicated to contemporary jazz music. To date, all of their nearly 75 compact disc titles have been done direct-to-digital, with GRP now offering both cassettes and LPs produced from the same digital masters. GRP is also a pioneer in the new Digital Audio Tape (DAT) cassette and has been among the most active supporters of this new format.

TELARC INTERNATIONAL

recently celebrated its 10 year anniversary in digital audio by expanding its repertoire to include new titles of both pop and jazz recordings. However Telarc's greatest fame remains its all-digital classical catalog,

with over 130 titles released to date. Led by award-winning producer Robert Woods and engineer Jack Renner, Telarc has become America's largest independent classical label and is planning many exciting projects for the future.

And speaking of the future... what more appropriate way for *Audio* to honor these leading



AUDIO CD-3

music labels than to include their music as part of our first 'Audio CD-3 Sampler'. This special 3-inch compact disc has been issued to commemorate the historic "decade of digital" event and, like the Compact Disc itself, will prove to be an exciting new way of introducing great music to a new generation of *Audio* readers.

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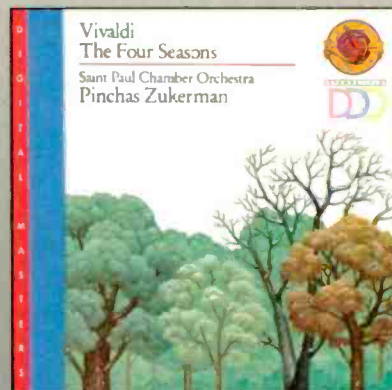
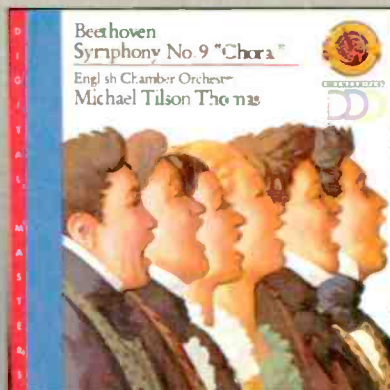
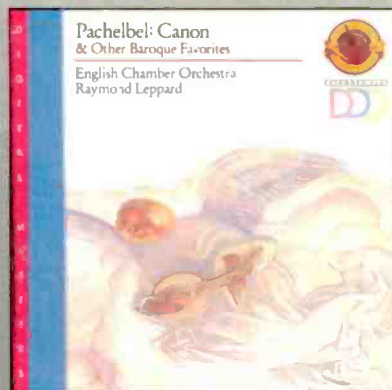
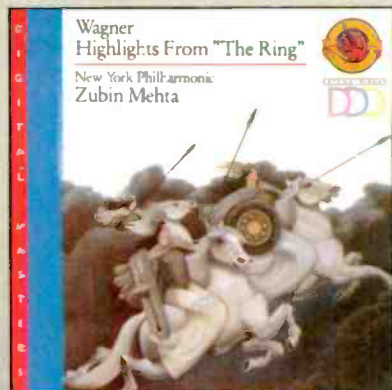
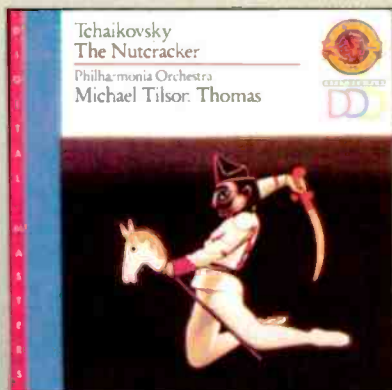
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- SAOE** - "Paradise" (Remix) / "Super Bien Total"
- BOSTON** - "More Than A Feeling" / "Foreplay/Long Time"
- GEORGE MICHAEL** - "I Want Your Sex" (Rhythm Lust 1) / "I Want Your Sex" (Rhythm 2 Brass In Love)
- WILLIE NELSON** - "Always On My Mind" / "Blue Eyes Crying In The Rain"
- PINK FLOYD** - "Another Brick In The Wall" (Part II) / "One Of My Turns"
- BRUCE SPRINGSTEEN** - "Cover Me" / "Pink Cadillac"

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The initials GRP should be familiar to any astute observer of the worldwide record scene. Film composer, arranger, conductor and keyboardist Dave Grusin, and producer/studio engineer Larry Rosen first formed Grusin/Rosen Productions in 1976 as a forerunner of GRP Records. Together they have virtually defined the sound of a new generation of sophisticated, jazz-oriented, popular music by combining musical artistry with state-of-the-art recording technology.

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The Firebird. Testing the concert hall sound throughout the world since 1978.

by Jack Renner, Chairman, Telarc International Corporation



The Firebird (CD-80039)

Every Telarc recording project begins with setting up a control room, a critical component in producing an accurate sounding master tape. It is absolutely essential to create a monitor situation in which a fair judgement can be made of the sound delivered to the master tape. At Telarc, this is an especially important process since we create a "mixed to two track" tape during the sessions which when edited

for musical integrity becomes the finished master. We prefer this method because it is musically and sonically more accurate, than the approach used by many classical record companies, using multi-track tape recorders and "fixing it in the mix" at a later date.

At Telarc we record a full orchestra, with as few as three microphones, whose placement is so sensitive that a small difference of a few inches can make a vast difference in the finished sound.

Given the difficulty of recording our way, the importance of an accurate monitor setup becomes immediately apparent. The potential trap in all of this is that if the engineer is not *totally* familiar with the sound of the monitors at the start of the session, the temptation (and unfortunately the practice with some recording engineers) is to start moving microphones around until the monitor system sounds right. This is the classic case of the tail wagging the dog!

Since we set up makeshift control rooms at every recording location, my goal is to adjust the sound of these different rooms through careful speaker placement and judicious use of acoustical materials so that the sound in all the rooms has some consistency. That is not to say that it is possible to make all the rooms sound alike. The important factor is to adjust them so that the number of anomalies in the sound is minimized. Once that point is reached, I spend whatever additional time is necessary to familiarize myself with remaining flaws, a bass boost, high-end roll-off, or whatever, so that I can mentally compensate during the recording. This minimizes the "surprises" when we return to our home studio and evaluate the master tapes.

To achieve as much consistency as possible, from one location to another, I use the same recording — CD-80039, *The Firebird*. It has the required characteristics to quickly show me where the problems are: deep bass, extended highs, fine detail, excellent focus, a sense of "air" around the sound, good left-right and front-to-back imaging, and *wide* dynamic range. Although I find the entire recording useful, the following spots are especially valuable:

Opening Very deep bass produced by string basses playing in their lowest register, accompanied by a deep bass drum roll. You should *feel* the weight but be able to clearly hear the bass line. You have a definite sense of string basses on the right which is helped by the "creaking" of the low C extension on some instruments.

00:29 Trombones enter, located at approximately two o'clock.

00:45 Several things begin to happen: bassoons enter slightly right of center, violins start to emerge between left and left-center, clarinets in center, harp left-center and behind violins and muted trumpets right.

01:37 Flute enters slightly left of center and about halfway back in soundstage.

01:45 Oboe enters center, in same perspective as flutes.

02:02 Repeated figure in violas, slightly right of center. It is common in many listening rooms that have a standing wave between 100-200 Hz for this passage to have a plummy or bloated quality. If so, it is necessary to reduce this frequency buildup in the listening room.

02:17 Clarinet-bassoon passage. Same comments about bloated sound as previous spot.

02:25 Soft bass drum strokes. You should feel the weight, size, depth and *slight* attack of the beater.

02:36 First entrance of piano. Should be to left and rear of soundstage, farther back than harp.

02:46 - 03:00 This section tells a great deal about the left-right spread and the quality of the string sound. Violas enter first right of center, then violins left and left-center, then cello right. There should be a very natural spread with no bunching in the center, plenty of air around the sound with a nice mix of presence in order to hear the detail of all the lines of each section.

03:00 - 04:23 Should be good detail from all sections, with a great sense of placement as mentioned in previous examples. This is a good passage to let things settle in and for the feeling of the orchestra to emerge.

06:38 Bass pizzicatos on right — the first note should have plenty of depth and pitch. A good test of bass response.

07:45 - 07:55 Full strings — violins should have a nice "sheen," with no stridence. Entire passage should have nice sense of air around the sound.

08:40 Horn solo against sustained strings and winds. Horn should not have bloated character.

09:06 The first real power-handling test. This sudden loud attack should be handled with ease with a balanced sound from the bass drum to the piccolo.

09:08 Horns and tuba should have great clarity and pitch center with no bloated quality, especially the tuba.

09:37 Xylophone at left rear should have sharp transients on attack and sound should have great sense of space around it.

09:37 - 10:50 Great check for detail from all sections of orchestra. Pizzicato strings should be pointed with sense of section, not just individual strings; xylophone should be crisp with sharp transients and plenty of air around the sound; all the interplay between various sections should be well defined.

12:34 - 12:48 Another great section to test low bass response and power handling. The deep bass drum strokes should "move a lot of air" in the listening room. You should hear each attack clearly and still easily hear the "frantic" moving lines over the bass drum.

13:10 - 13:12 This crescendo is a real power eater and a good test of the listening room's (lack of) ringing. The sustained woodwinds that emerge out of this crescendo should have no hint of being covered by any blurring from the end of the crescendo.

13:16 - 13:18 Good front-to-back perspective test. Harp should be slightly in back of strings, piano should sound farther back than harp.

13:53 One of the most useful spots. The bassoon solo should sound even in all registers with no sense of bloating.

17:25 Another great section to check low frequency buildup. Horn solo should not sound bloated in any register.

19:36 - end Big bass drum whacks will *really* tax power handling and frequency response, especially the last one at 20:30 which includes a mighty cymbal crash as well. This should be very tight and have the feeling of great power, depth, and sharp transients.

I hope this information will be helpful and enable you to become more familiar with *your* playback system.

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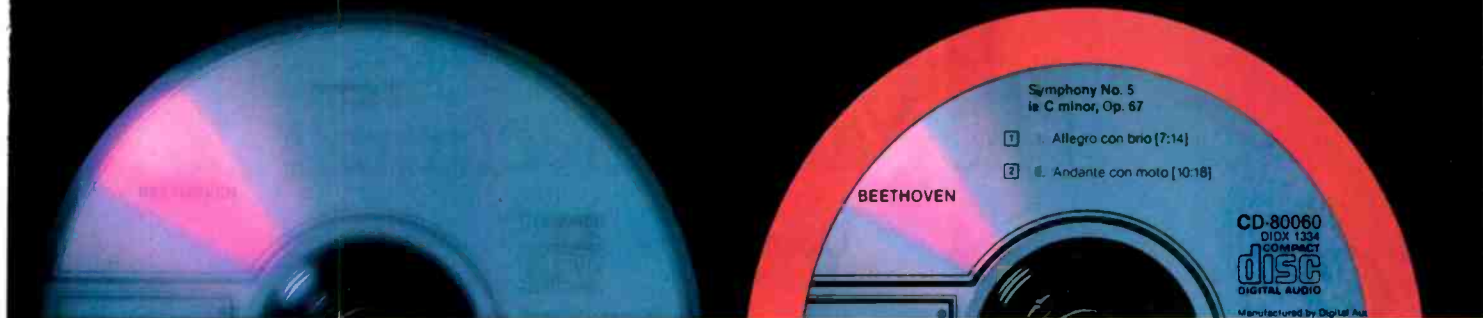
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Enduring Instruments

Treasures from The Yale Collection

David Lander

Given Yale University's traditionally high standards, it's no surprise that restoring a harpsichord their way is highly exacting. So much so, in fact, that materials required include quills cut from a crow's primary flight feathers (five to six of which grow on each wing) and bristles from the Siberian boar. Since this particular boar's habitat is China, procuring the latter proved complicated as recently as a decade ago. Happily, the problem has eased along with Sino-American tensions, according to Richard Rephann, director of the Yale University Collection of Musical Instruments.

The Yale Collection began with a group of 40 pieces, primarily keyboard instruments, donated in 1900 by Moritz Steinert, a music dealer and piano manufacturer residing in the University's home city of New Haven, Connecticut. To date the collection from that time would be a mistake, however, since the treasures accumulated by this Bavarian-born collector languished in an inhospitable upstairs rotunda of Yale's Woolsey Hall for more than half a century.

While a grand total of 27 people came to view the instruments during the course of one year, Yale records do attest to their popularity with the local pigeon population. The birds entered year after year through the building's dome, and the results were what one would expect. Thus, the human visitor who inscribed "dust, dust, dust" in the

guest book may very well have been guilty of an understatement.

In 1960, the collection of Belle Skinner, a textile heiress from Holyoke, Massachusetts, was acquired by Yale. Skinner had purchased several pieces from Moritz Steinert, and the 89 instruments she had assembled during her lifetime also emphasized keyboards. The same year, the University assigned the collection, which was by then under the guidance of a curator, a two-story Romanesque building of its own.

The University's collection leaped several more measures forward in 1962, when New Jersey financier Hugh W Long bought the collection of violin dealer Emil Herrmann and donated it to Yale. Rephann calls this group of 59

instruments a "study collection," explaining that it was shaped to showcase examples of important schools of instrument making rather than to spotlight valuable individual examples.

When Rephann assumed the curator's chair in 1966, the Yale Collection was generally perceived as one consisting of harpsichords, and he set out to broaden its scope. A substantial number of wind instruments has since been added, and American-made objects now play a prominent part. In all, the suite of 250 to 300 instruments owned by Yale in the mid-



PHOTOGRAPHY: ROBERT LEWIS



Kits

Kits (left), tiny fiddles that first appeared in the 19th century, were used by dancing masters who carried them in their pockets—hence the French appellation, *pochette*. Kits were made in two varieties, with the most common having narrow, elongated bodies while the rarer kits resembled miniature violins with long necks. These little instruments were frequently adorned with elaborate decoration, and even the plainest kits are visually charming.

Bass Horn and Serpent

Sometimes called a Russian bassoon, this snake-headed bass horn (top) is neither Russian nor played with a reed. Its body is similar to that of a bassoon, but, like the trumpet, the bass horn is lip vibrated. It is actually a 19th-century variant of an earlier wooden instrument known as the serpent because of its curvilinear shape (bottom). The snake's head adorning the bass horn shown here was a feature of some, but by no means all, such instruments, and it was very likely intended as an allusion to the instrument's ancestry.

Deutsche Shalmei

This double-reed instrument (top right) is from the hand of Richard Haka, a late-17th century craftsman who worked in Amsterdam. Of a genre known as the Deutsche Shalmei, it belongs to an instrument group introduced to Europe from the Middle East in about the 12th century. While its place in the music of

its time remains uncertain, the loud, raucous sound it was meant to produce suggests military applications.



Keyed Bugle and Keyed Cornet

During the 19th century, the addition of keys, and later valves, to brass instruments endowed them with a degree of flexibility unavailable in their 18th-century counterparts. Keyed bugles, such as the copper-bodied, brass-trimmed model shown here (bottom left), were

eventually replaced by the valved cornet (bottom right), which produced a more desirable tone. Both these instruments were manufactured in New England by Graves & Co.; the bugle was built around 1840 and the cornet some 15 years later.

1960s has grown to an ensemble of more than 800.

The Yale instrument repository exists primarily to serve the University's music curriculum, although it is open to the public. The collection concentrates on the Western art music tradition, beginning in 1550 and reaching into the present century. Primitive instruments, those primarily of interest to anthropologists, are excluded (a collection of these can be found in Yale's Peabody Museum, a few blocks away).

Although smaller than some, the Yale Collection compensates for lack of size with quality. Exceptional pieces include the only Stradivarius violin in the world that still wears its original varnish, as well as the oldest bowed string instrument in the United States, a bass viola da gamba by Venetian maker Giovanni Battista Ciciliano dating from the mid-16th century. The collection also houses two harpsichords and a piano by Pascal Taskin, who is considered the most important builder of harpsichords in France and, therefore, many would argue, the world. Only 12 of Taskin's instruments are known to exist.



Rephann says he could easily name another hundred standouts in the collection. Their importance may be determined by rarity, condition, the significance of the maker, or the chronological place a particular piece holds in Rephann's production sequence. Previous ownership by prominent persons affects value in some fields of collecting, but Yale's curator does not feel it has any bearing on the objects in his charge. While it was recently proven that Richard Wagner once owned a piano now in the Yale Collection, its director merely shrugs at this fact.

Rephann is, in fact, far more proud of the restorations undertaken during his tenure. In the opinion of many experts, several of Yale's keyboard instruments, including a half-dozen harpsichords, a couple of pianos, and an organ, have been renovated with a

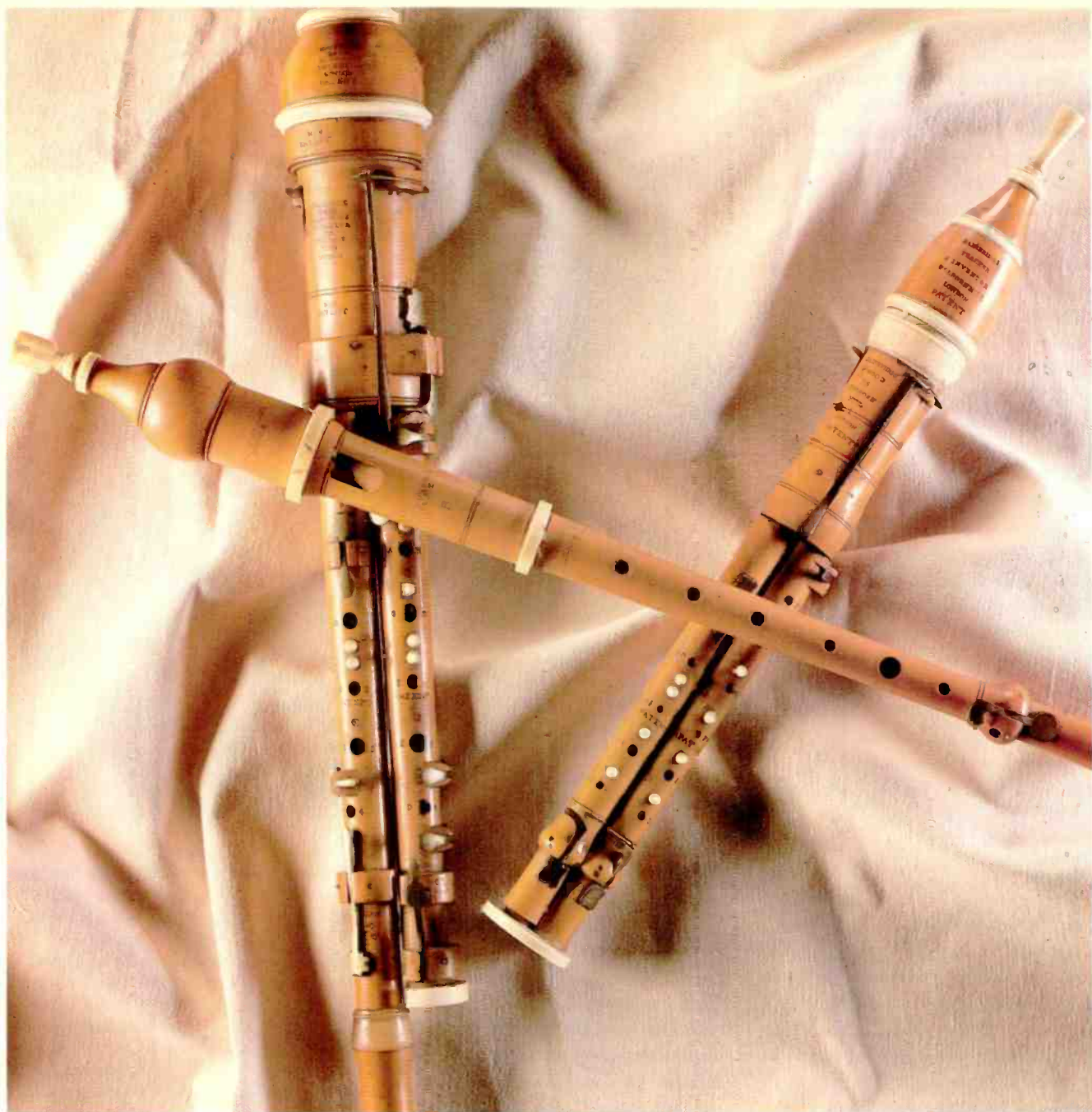
degree of care and historical fidelity unmatched anywhere.

If restoration were simply a matter of bringing instruments suffering from benign neglect back to playing condition, the job would be far simpler. Rephann explains. But the biggest problems often involve undoing alterations previously inflicted in the name of progress. With harpsichords, the "renovations" may include the installation of plectra (the tiny components that pluck the strings) made of Delrin. Slabs of plywood sometimes replace vintage bottoms, and modern steel piano wire may be used in lieu of original iron strings. Such wire was not designed for any harpsichord's original pitch (invariably lower than that favored today), and it encourages tuning to contemporary standards. This, in turn, imposes excessive stress on both the frame and the soundboard.

The director of Yale's Collection of Musical Instruments can wax eloquent

Taskin Harpsichord

In the early part of this century, the fact that a harpsichord was built by a noted maker such as Pascal Taskin was of little interest. Antiquarians of the time altered the one shown here to make it appear to have been the property of Voltaire's mistress, Mme. du Chatelet (a respected scientist as well as the famous philosopher's paramour). The original lid was replaced with another into which were set painted panels; one of these allegedly pictured the lady's chateau. Since Mme. du Chatelet's liaison with Voltaire occurred before this harpsichord was even built, the maker's inscription was also revised—from "Fait Par [made by] Pascal Taskin 1770" to "Refait [rebuilt] Par Pascal Taskin 1770."



on how important crow quills and boar bristles are to harpsichords—the latter were used for the minuscule springs that return the tongues in which the plectra are mounted to playing position. Rephann is also quick to stress the advantage of animal glues, which are water soluble and allow repairs to be undone if necessary. If all this sounds a bit academic, it should be emphasized that theory deliquesces into a tide of sheer pleasure when Richard Rephann, himself a harpsichordist, sits down to play one of the restored instruments in the Yale Collection. The

tone is simply lovely, warm and rich to the point of opulence.

Though Yale prefers to maintain its instruments in playing condition, not every piece is a candidate for restoration. Work is only begun after determining that an instrument is likely to regain its original voice—or something very close to it. Even after restoration, instruments continue to age. The stewards of the Yale Collection attempt to slow this inevitable process with various countermeasures, most notably meticulous climate control. The

Flageolets

The flageolet is a 19th-century instrument that was probably designed for amateurs. Because it employs a wind cap between its mouthpiece and body, it doesn't require that the player control air flow as carefully as does the recorder, a first cousin to this woodwind. The most common flageolets were single-barrelled instruments, but some, called double flageolets, consisted of a pair of tubes tuned a third apart. These allowed a single performer to play in two-part harmony. (Here, the single-barrelled flageolet is on top of two doubles.)

Lute

After falling out of fashion in other European nations during the late 17th century, the lute remained popular in Germany during the time of J. S. Bach. In fact, Bach's lute suites were probably composed for an instrument like this one, constructed by Sebastian Schell of Nuremberg in 1726. Typical of instruments of its period and origin, this lute (top) includes two chanterelles or single treble strings, and it is strung in 13 courses (a course is a string or pair of strings designed for separate tuning).

Experimental Cello

Dating from 1828, this cello (bottom) is an experimental design by Johann Georg Stauffer of Vienna. Its visual appeal is enhanced by the symmetry resulting from the identical widths of the upper and lower body segments (technically known as bouts). Stauffer is also believed to have invented the arpeggione, a hybrid instrument which is a cross between the cello and the viola da gamba and for which Schubert wrote a sonata.



Hurdy-Gurdy

In modern usage, the term hurdy-gurdy refers to a street organ, but, in the 18th century, it indicated a stringed instrument played by means of a crank (below, left). Turning the crank moved a rosin-coated wheel which continually vibrated six strings. Two pairs of outer strings, tuned a fifth apart, sounded an accompanying drone while two middle strings, stopped by a keyboard, played melody. Hurdy-gurdies, which became associated with beggars and the blind, are still in use as folk instruments in Spain and the Balkans.

Tielke Guitar

Joachim Tielke was a German luthier, a maker of plucked and bowed string instruments, and was noted for his lavishly decorated creations. This guitar (below, right), which he built in 1702, is inlaid with silver, ivory, ebony, mother of pearl, and tortoise shell. The high cost of Tielke's instruments put them beyond the reach of the professional musicians of his time, who were anything but well-to-do.





Hass Harpsichord

In the most elaborate restoration ever undertaken on a Yale Collection instrument, two men worked eight months to bring this harpsichord as close to original condition as possible. Constructed by Johannes A. Hass in 1760, it is the only Baroque German harpsichord in North or South America. Its distinctive sound, which is less tonally complex than other harpsichords of the period, may well have been what J. S. Bach had in mind when composing for the keyboard.


instruments are kept in an environment where temperature is held to 68° F and relative humidity to 50%. Water used to humidify the air is deionized to remove mineral elements that Rephann says would settle like fine dust on the instruments, then infiltrate and eventually damage them. Keeping keyboard and string instruments in tune serves to eliminate unnecessary tension on their bodies, and inspection of all the Yale instruments is carried out regularly to reveal any problems before they become serious.

While Rephann holds that the lives of all instruments are shortened by frequent use, several of those in the Yale Collection are carefully and

Tuba

Brass bands, which are actually composed of wind and percussion instruments, were an omnipresent phenomenon in 19th-century America, so when the Yankees marched off to battle the Confederates, instruments such as this tuba led the way. Although the more modern sousaphone features a bell that points forward, the business end of this John F. Stratton tuba, manufactured around 1862, rested on the player's shoulder and was aimed toward the soldiers following behind.

infrequently played. The public is invited to hear them during an annual series of six concerts featuring professional performers. Tickets currently cost \$7.50 each and are available for a token \$2 to members of the collection's Associates Program.

The Yale University Collection of Musical Instruments, located at 15 Hillhouse Avenue in New Haven, is open to the public from 1 to 4 p.m. every Tuesday, Wednesday, and Thursday except during August. Admission is free. For information on membership, concerts, special exhibitions, and publications, write to P.O. Box 2117, New Haven, Conn. 06520. 



Measuring Acoustic Phase



ne audio term often used and seldom properly understood is phase. Quite often when this word is used, the person actually means polarity. On other occasions, I have seen signal delay over the propagation path labelled as phase in a principal learned journal. In another similarly important learned journal, a tutorial article by a distinguished professor recommended teaching university-level engineering students about frequency response, directivity, and distortion measurements relative to the analysis of loudspeakers, but it failed to make any mention of phase. One cannot even find the word "phase" in the indexes of most basic texts on audio and acoustics. Yet phase can affect what we hear.

Indeed, many electronics-oriented engineering students have been taught that phase makes no difference, or is inaudible, at the frequencies commonly of interest to the human ear. It is true that most electronic circuits commonly encountered in hi-fi or sound systems have a minimum phase characteristic, but when one goes over to acoustic phase from electrical phase, the group of knowledgeable individuals familiar with acoustic phase measurements becomes quite small. (Those using Techron's TEF analysis or dual-channel FFTs to make loudspeaker and microphone measurements are an exception.)

Yet I sincerely feel that, had I been shown phase measurements first in my career, I doubt I ever would have bothered with acoustic amplitude measurements. Amplitude was simply what scientists first learned to measure, but it is not necessarily what was *important* to measure or necessarily most relevant to what we hear.

For those readers mathematically inclined, I recommend the referenced articles. They are correct, succinct, and thoughtfully thorough. It is really unfortunate that such a simple thing as phase had its mathematics labelled "complex numbers."

Painless Phase, Minus Math

The acoustic phase measurement can be understood as an observer merely having a different viewing point relative to a given signal. Figure 1 shows the two viewpoints of the analytic signal, called the real and the imaginary parts. As time progresses, the signal goes through 360° over and over again. The number of

Don Davis, who has more than 30 years of experience in the audio field, is a Fellow of the Audio Engineering Society, a member of the Acoustical Society of America, and a senior member of the Institute of Electrical and Electronic Engineers. He is co-owner, with his wife, Carolyn, of Synergetic Audio Concepts or Syn-Aud-Con, as it is more often known. This audio consulting firm conducts seminars on sound-system design, installation, operation, and maintenance techniques. Davis is the co-author (with his wife) of Sound System Engineering and also a contributor to Handbook for Sound Engineers: The New Audio Cyclopedia, which is part of the Howard W. Sams & Co. Audio Library series.

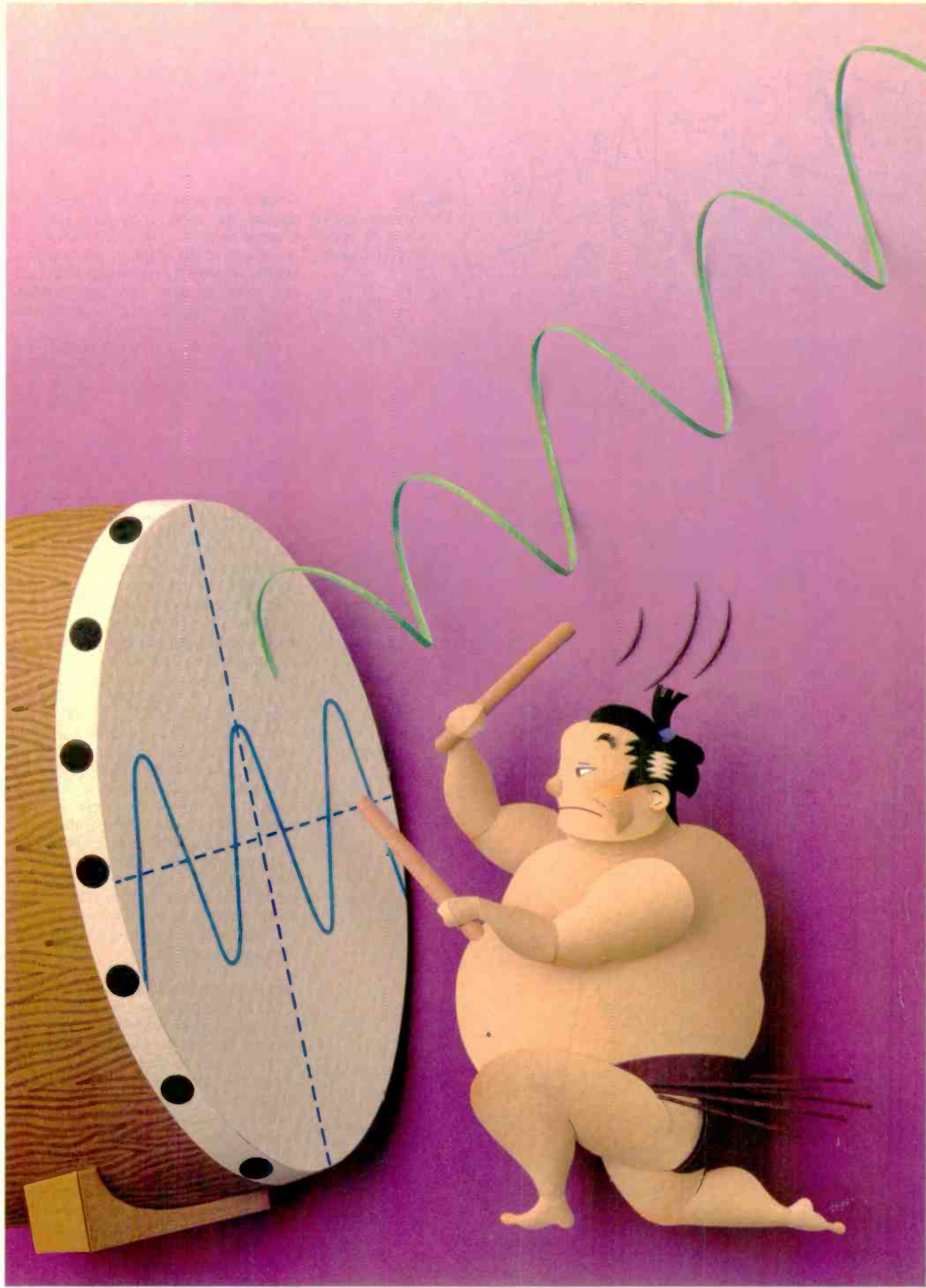


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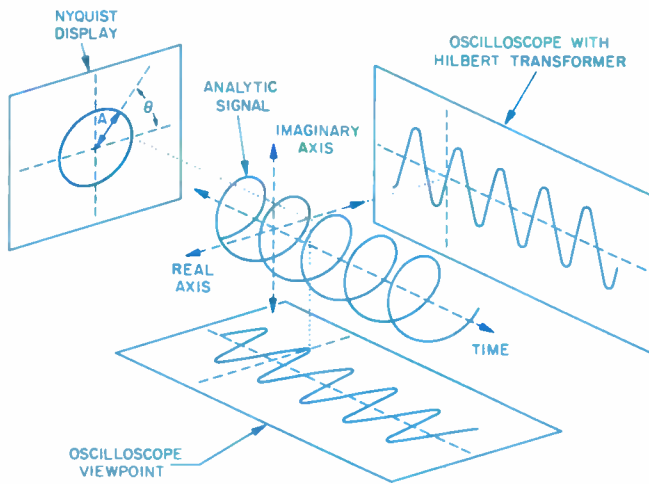


Fig. 1—
The analytic signal shown in its multi-dimensional form.

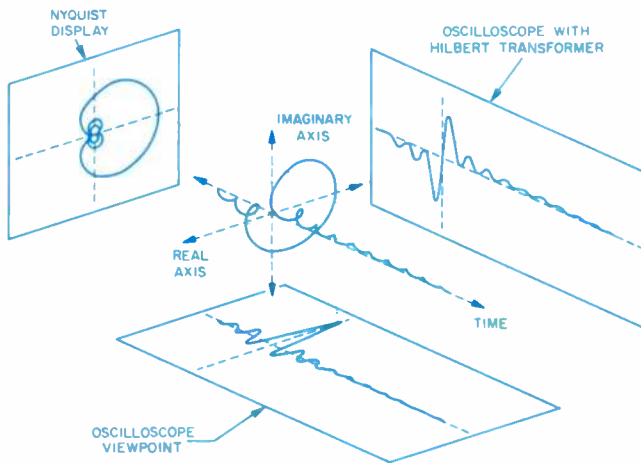


Fig. 2—
The analytic signal of a bandpass filter. Note that when the Nyquist display is at a maximum on the horizontal real axis, the vertical imaginary axis is at a minimum.

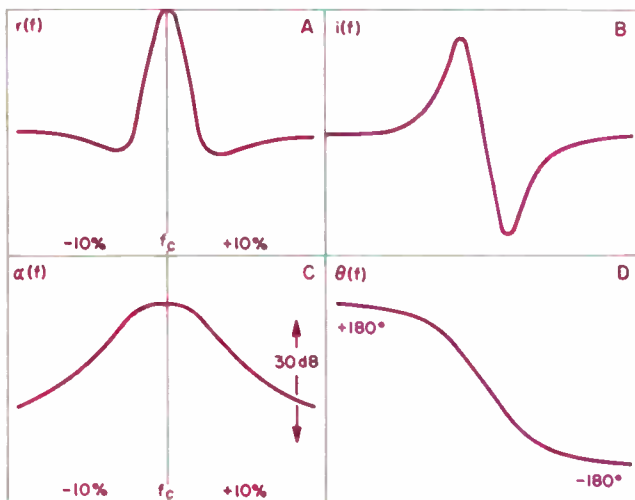


Fig. 3—
Four different frequency responses of the same bandpass filter shown in Fig. 2: Real part (A), imaginary part (B), magnitude (C), and phase (D).

times it revolves 360° in 1 second is called its frequency—its rate of change of phase. Note that when the amplitude of the real part is just crossing the reference line (which, in acoustics, is the ambient atmospheric pressure), the imaginary part is at a peak value, the particle velocity.

What we call the amplitude of the signal is the length of the arrow on the “end view” of the analytic signal. The Greek letter Θ (Theta) indicates the phase angle, which is the fractional part of a complete rotation through which the arrow has rotated, multiplied by 360. If we were to use an oscilloscope, we would see the view labelled “oscilloscope”; if we were to install a Hilbert transformer, one that revolved the phase 90° , we would see the so-called imaginary display on our oscilloscope. If we squared the real part, then squared the imaginary part, summed them, found their square root, and finally took their logarithmic value and multiplied it by 20, we would end up with the magnitude in dB versus the frequency. This is commonly called the “frequency response” but actually is only part of it. If, on the other hand, we took the imaginary part, divided it by the real part, and then found the value whose tangent equalled this ratio, we would have the phase angle for that frequency. Figures 2 and 3 illustrate, for a bandpass filter, what a frequency-by-frequency plot of all the points of the real and imaginary frequencies would look like and then what the computed magnitude and phase would be. (All loudspeakers can be modelled as bandpass filters.)

Minimum Phase Response

Up to this point, we have illustrated the behavior of minimum phase response. By that, we mean that a Hilbert transform of the magnitude response yields the phase response, and vice versa. In fact, one of the quick tests for minimum phase response, without resorting to the more involved “S” plane approach, is to observe that a peak in the magnitude corresponds to the center of a slope in the phase. Further, a peak in the phase results in that frequency being in a center of a slope of the magnitude. (See Fig. 4.)

Why do we care if the response is minimum phase? One excellent reason



Fig. 4—Phase and magnitude plots vs. frequency. The vertical scales are 6 dB/div. for magnitude and 45°/div. for phase.

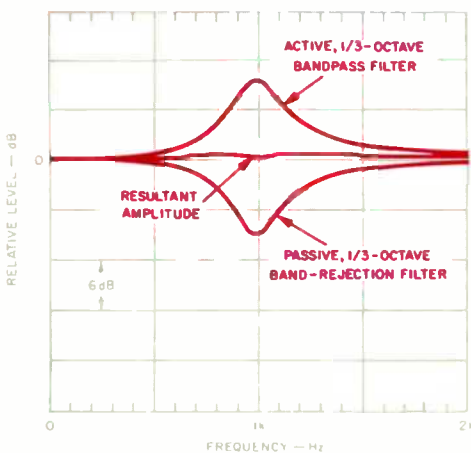


Fig. 5—Magnitude plots for a bandpass filter, a band-rejection filter, and the resultant when both are in the circuit at the same time.

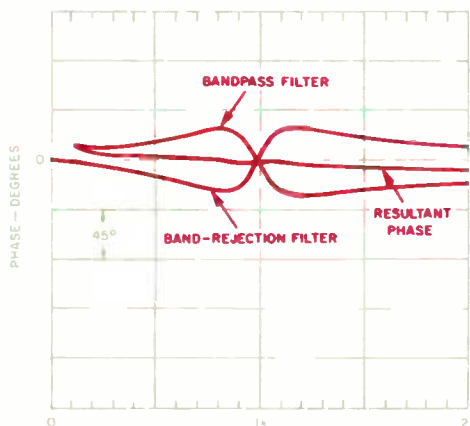


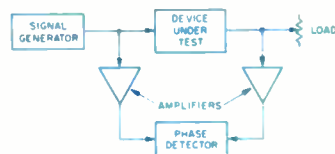
Fig. 6—Phase plots of a bandpass filter, a band-rejection filter, and the resultant when both are in the circuit at the same time.

is that minimum phase filters have uniform phase response for uniform amplitude response. (See Figs. 5 and 6.) Almost everyone has read at some time or another the statement, "I do not use equalizers because they cause phase changes." Of course equalizers do—they would not work if they did not—but the phase change the equalizers cause is a beneficial countering of a detrimental phase change caused by an unwanted bandpass effect in the system.

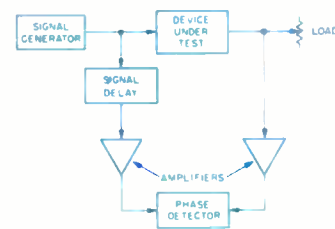
Signal Delay

Figures 7A and 7B show that the primary difference between an electrical and an acoustical phase measurement lies in the need to provide a signal delay in the measurement system. This delay is there mainly to compensate for the propagation path delay $T(\text{path})$ from the loudspeaker through the air to the microphone. A carefully calibrated signal delay allows for measurement of excess delay as well as for $T(\text{excess})$. Phase measurements use $T(\text{arrival})$ as their $T(\text{zero})$, and the phase measurement then becomes the difference between what the analyzer sent and what arrived at $T(\text{arrival})$. Perfection would be a flat response across the spectrum. In high-quality, real-life loudspeakers, we see the phase response first lead, then stay near zero, and finally lag, just as would be the case for a good-quality bandpass filter.

Let's have a look at this delay. Figure 8 shows the phase response of a small 4-inch loudspeaker in an infinite baffle (a totally enclosed box). The delay between the loudspeaker and microphone has been removed, so this is the true phase response. Figure 9 is exactly the same as Fig. 8, but the TEF analyzer's "quick difference" circuitry and software will show only the difference between what we had before and any changes we now introduce. If I move the loudspeaker back a quarter of an inch, Fig. 10 shows the delay as a straight line with a slope to the right. The signal delay is equal to the phase, in radians, divided by the frequency. Because it is a straight line, it is a constant delay at all frequencies. The steeper the slope, the greater the delay. If this measurement were to slope upward, that would indicate that the



ELECTRONIC



ACOUSTIC

Fig. 7A—Test setups for measuring electronic and acoustic phase. Note that acoustic phase measurements require adding a phase-calibrated delay device to the circuit.

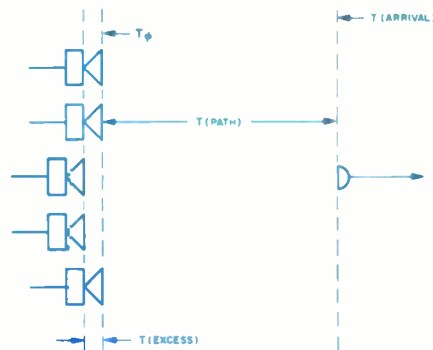


Fig. 7B—The delay circuit shown in Fig. 7A compensates for the delay, $T(\text{path})$, shown here.

loudspeaker was closer to the mike than its original position. As you can see in Fig. 11, signal delay is linear but TEF phase is not. Another important distinction of phase is that it is frequency dependent.

Polarity

Often, we hear someone say, "I am going to phase my loudspeakers," when what he intends to do is make sure both diaphragms move in the same direction at the same time. The correct term for this is polarity. In my experience, Paul Klipsch was one of the very few who knew about this before phase measurements became common practice.

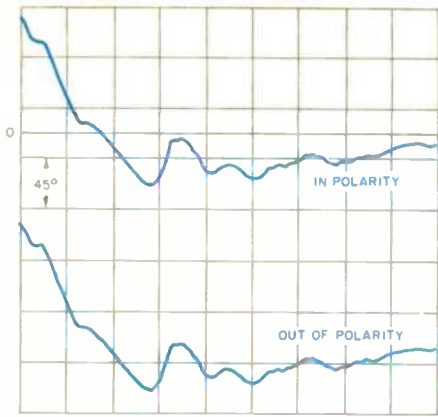


Fig. 8—The phase response of a quality loudspeaker, both in and out of polarity. Note that polarity is not frequency dependent.

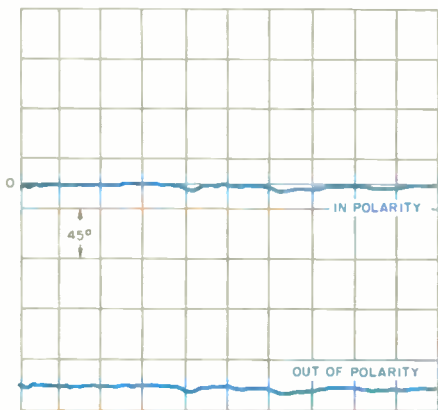


Fig. 9—Same as Fig. 8 but with response normalized by the TEF analyzer's "quick difference" circuitry.

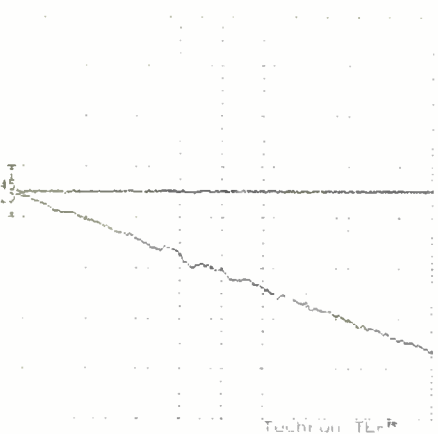


Fig. 10—A signal-delay signature, sometimes mistakenly called phase delay. The slope's steepness shows the amount of delay; its flatness shows that delay is constant at all frequencies.

Again, using the TEF's "differenced curve," let's reverse polarity (Figs. 8 and 9). Note that the phase response is the same curve but displaced 180°; it does not show up as delayed. Thus, a 180° displacement that is uniform indicates a polarity reversal. Looking at the Nyquist plot for both cases (Figs. 12 and 13) reveals quadrant shift. Note particularly the offset from the origin of the plot in Fig. 13. A distinguishing characteristic of polarity is that it is not frequency dependent—every frequency jumped 180°.

Those who would like to listen to phase interference in order to know what it sounds like should try the following simple experiment. Take two small single-cone speakers and place one on top of the other. Have a friend talk over both speakers through a single amplifier with a microphone. Now move one loudspeaker back approximately one foot and listen again. Have your friend move the loudspeakers back into synchronization (sometimes called alignment, though I feel synchronization is more correct) while he is talking through them. What you will hear with devastating clarity is phase interference.

Conclusion

Phase measurements can be much more complex than the concepts presented here. They can be used to locate poles and zeros in the complex plane. It is the highest resolution way to find circuit Q and the natural frequency. Phase measurements of loudspeakers are important, and variations in phase and polarity are audible. It is hoped that this simple discussion of what phase is and is not will prove useful when you next look at a simple amplitude response plot and realize how much information is missing. **A**

References

- Preis, D., "Phase Distortion and Phase Equalization in Audio Signal Processing—A Tutorial Review," *Journal of the Audio Engineering Society*, Nov. 1982.
- Preis, D., "Linear Distortion," *JAES*, June 1976. (This article is an absolute must for those who want to delve deeper into the subject.)
- Luthropp, Dave, "Measure Phase Instead of Amplitude," Hewlett Packard.

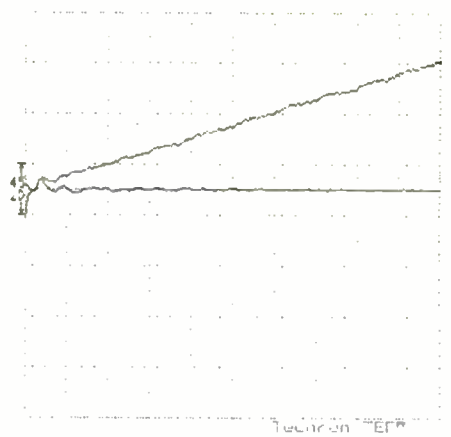


Fig. 11—A signal-advance signature.

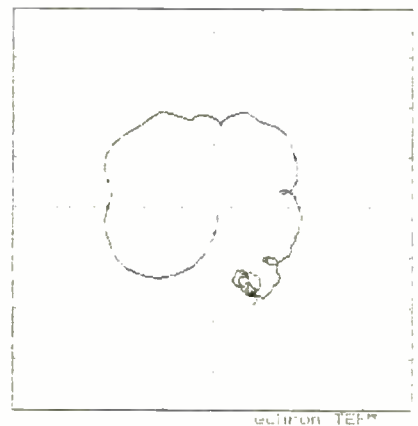


Fig. 12—Nyquist plot of an in-polarity loudspeaker.

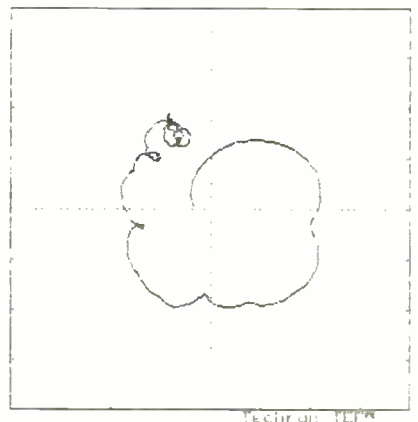


Fig. 13—Nyquist plot of the same speaker but with polarity reversed. Note the plot rotation, or quadrant shift, and the offset of the origin relative to Fig. 12.

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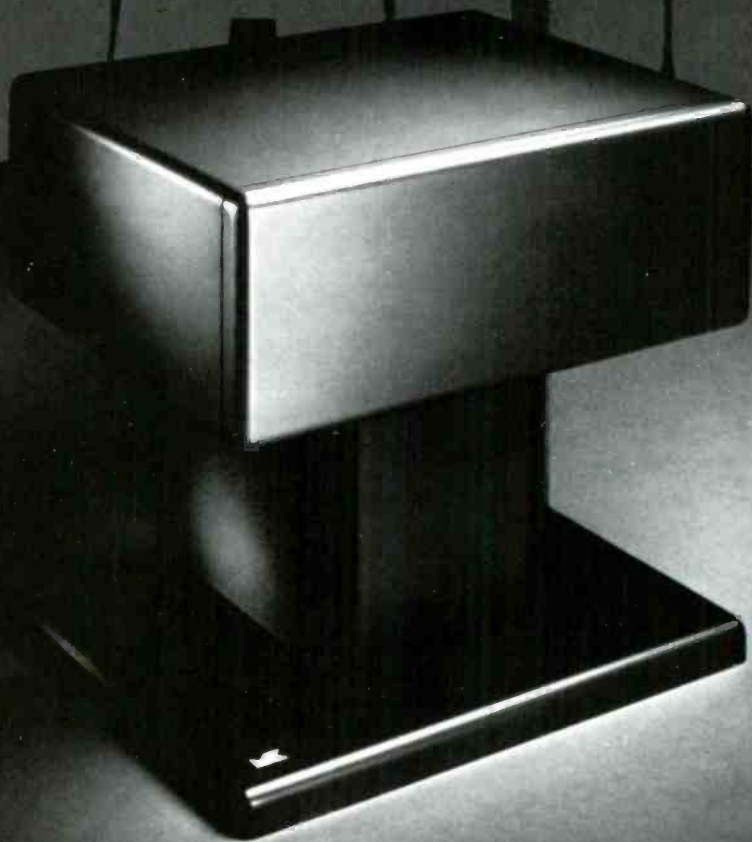
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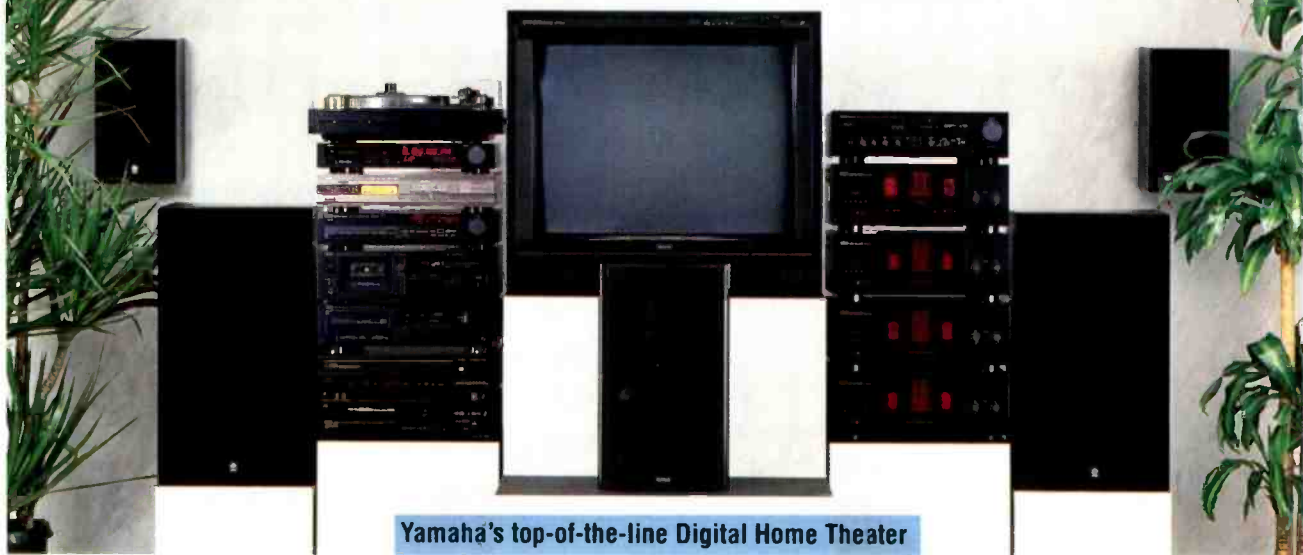
As the video quality has improved, so too has the audio. A confluence of events has made the home viewing experience rival that of your local movie theater. Dolby Surround processing. George Lucas' breakthrough soundtracks. Digital recording with laser playback. VHS and Beta Hi-Fi. Stereo TV. Digital soundfield processing. The ready availability of over a thousand pre-recorded cassettes and laser discs with CD quality sound. And while the present is exciting, the future holds out the promise of even more as High Definition TV makes its way into American homes in the 1990s.

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From top: The first TV, Phillips' 27-inch IDTV, Pioneer's VSX-9300S A/V receiver, Yamaha's DSR-100 Pro Dolby Pro Logic decoder, Technics' SA-R530 A/V receiver and Sony's CCD-V220 camcorder with PCM audio.

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General Sarnoff would be proud. His invention has evolved from a clunky hot box of tubes with an interference-laden black-and-white image to sleek monitor/receivers with integrated circuits that can go beyond the bounds of the current NTSC system and deliver almost lifelike pictures. Television technology of today offers horizontal resolution that is more than a match for the finest video sources including laser discs, Super VHS and ED (Extended Definition) Beta. In fact, it's common to find TVs with horizontal resolution in excess of 500 lines (broadcast TV is 330). Engineers are also incorporating sound systems to match their state-of-the-art pictures. Moving from beyond a totally visual medium, they are advancing audio capabilities with built-in Dolby Surround decoders, powerful amplifiers and higher quality speakers. Forget the days of tinny two-inch speakers, thank you. And the digital revolution has helped attain major breakthroughs in special effects and picture quality including Improved Definition TV (IDTV) which is a preview of the high definition TV that awaits us in the next decade. Fortunately for lovers of top video reproduction, IDTV is here...now.

"IDTV is actually advanced digital processing in the local receiver that improves the final image," remarked Dr. Mark Rochkind, president of Philips Labs in Briarcliff Manor, NY. Philips has two IDTVs (27- and 31-inch Models 27J245 and 31J460) that have won plaudits from experts and, for that matter, everyone who sees them. "The digital circuitry eliminates the line structure so the eye doesn't

see discrete scan lines. Standard TVs deliver roughly 250 scanning lines every 1/60th of a second and then another 250 lines that are slightly displaced in the next 1/60th. With IDTV, 525 lines are scanned every 1/60th of a second for a much more detailed picture. IDTV," Dr. Rochkind added, "is a step toward high definition TV. Much of the signal processing in IDTV will be used in HDTV and the new proposed Philips HDS-NA (High Definition System for North America) high definition system will offer four channels of CD quality audio."

Unfortunately, HDS-NA is not available—nor is any form of HDTV until the FCC makes a final decision on a national

standard several years from now—but high quality IDTVs from Philips and Toshiba are, with Sony, NEC, Hitachi, and Mitsubishi planning to introduce them later this year. Toshiba was the first company to unveil IDTV in 1986 with the 26-inch CZ2697, according to Jeff Mullarkey, the firm's Assistant Vice President of Marketing. "This set used a digital line memory non-interlace double scanning system. Due to advances in computer and IC technology, the new 28-inch CZ2898 frame memory double scanning eliminates jitter and mosaic even more."

In IDTVs, digital circuitry is also used to enhance picture quality via noise reduction systems that analyze fields for inconsistent and irregular picture noise, then boost non-noise signal information for an improved signal-to-noise ratio. This attenuates noise levels in chrominance (color) and luminance (black-and-white) signals. Sony plans to use a new base band comb filter to eliminate cross color and cross picture phenomena. Philips uses an on-board computer program (Median Filter Algorithm) to increase vertical resolution 40% and a digital field comb filter to increase horizontal resolution to 525 lines.

The new IDTVs are truly cutting edge and a far cry from plain vanilla 19-inch sets that line store shelves across the country. "They are for people who want the latest and best, with price no object," says Mr. Mullarkey. Philips new 27-inch IDTV costs \$1,500, \$2,500 for the 31-inch, and Toshiba's CZ2898 \$2,499.

Digital TV technology has opened a world of special effects for enthusiasts in-

Sony XBR Pro



cluding picture-in-picture (PIP), the ability to move the insert picture anywhere on the screen, to preview 12 TV programs, to store a single frame in memory for later recall, even strobe effects. A few TVs (and not just improved definition) include two separate tuners that eliminate the need for an outboard tuners (such as a VCR). Sony has the 27-inch KV-27TX20, Hitachi the 31-inch HPX TT8550 while RCA has the 50-inch P 50595 projection model.

Although TV engineers have been moving to the far reaches of NTSC with IDTVs, sets with less exotic processing have not been neglected in any way, shape or form. In fact, some big-screen direct view sets have horizontal resolution of over 500 lines such as the Sony 25-inch XBR Pro and Panasonic's new Prism TVs. Although this year marks the 50th anniversary of the television, it also marks the 20th birthday of the Trinitron tube from Sony, one of the first quality breakthroughs in color TV technology and a precursor of advances by other firms. Sony was the first to offer a flat screen that eliminated distortion at the corners of the picture. They also examined every aspect of what makes a TV tick (screen, phosphors, aperture grille,



Pioneer Elite PRO-91

electron gun, electronic circuitry) to generate true-to-life images.

Twenty years later, Sony is not alone in this search for visual excellence. Manufacturers like Toshiba have the 30-inch Magnum FST (Flat Square Tube), Mitsubishi its state-of-the-art 35-inch screen. NEC's 30-inch with built-in Dolby Surround decoding gets over 500 lines of horizontal resolution, the Yamaha YM-300S provides 560. RCA Dimensia sets, Hitachi's HPX series, Tera's 27- and

31-inch monitor/receivers and Panasonic's Prism models all feature picture quality that can accommodate any high performance source material available.

With video images straining the edges of engineering capabilities, audio is considered the new frontier for television. As Toshiba's Jeff Mullarkey remarked: "TV manufacturers wanted audio on a par with the video experience." From two low-fi speakers hung on the side of the set, mid ranges and tweeters are now available and



Toshiba With Carver Sonic Holography

even subwoofers bring down the low end to 60 Hz.

With any quality set, MTS decoding capability is a given, just like a comb filter or flat screen. And according to the Electronic Industries Association over 21 percent of the 19 million sets sold are MTS stereo equipped. Over 500 stations in the US and Canada are currently broadcasting in stereo. Zenith's Carl Eilers was the key scientist behind MTS technology which was first offered in 1984 (he was also a force behind stereo FM radio). It was also at this time that VHS Hi-Fi was introduced by JVC and the home video revolution was really getting under way. All of these factors led companies to examine the speaker systems.

For a good example of how far things have come, take a look at the Panasonic Prism series with its on-screen graphic equalizer, four speakers and a 7 watt per



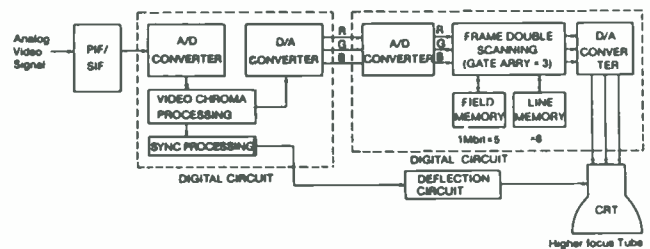
Philips IDTV

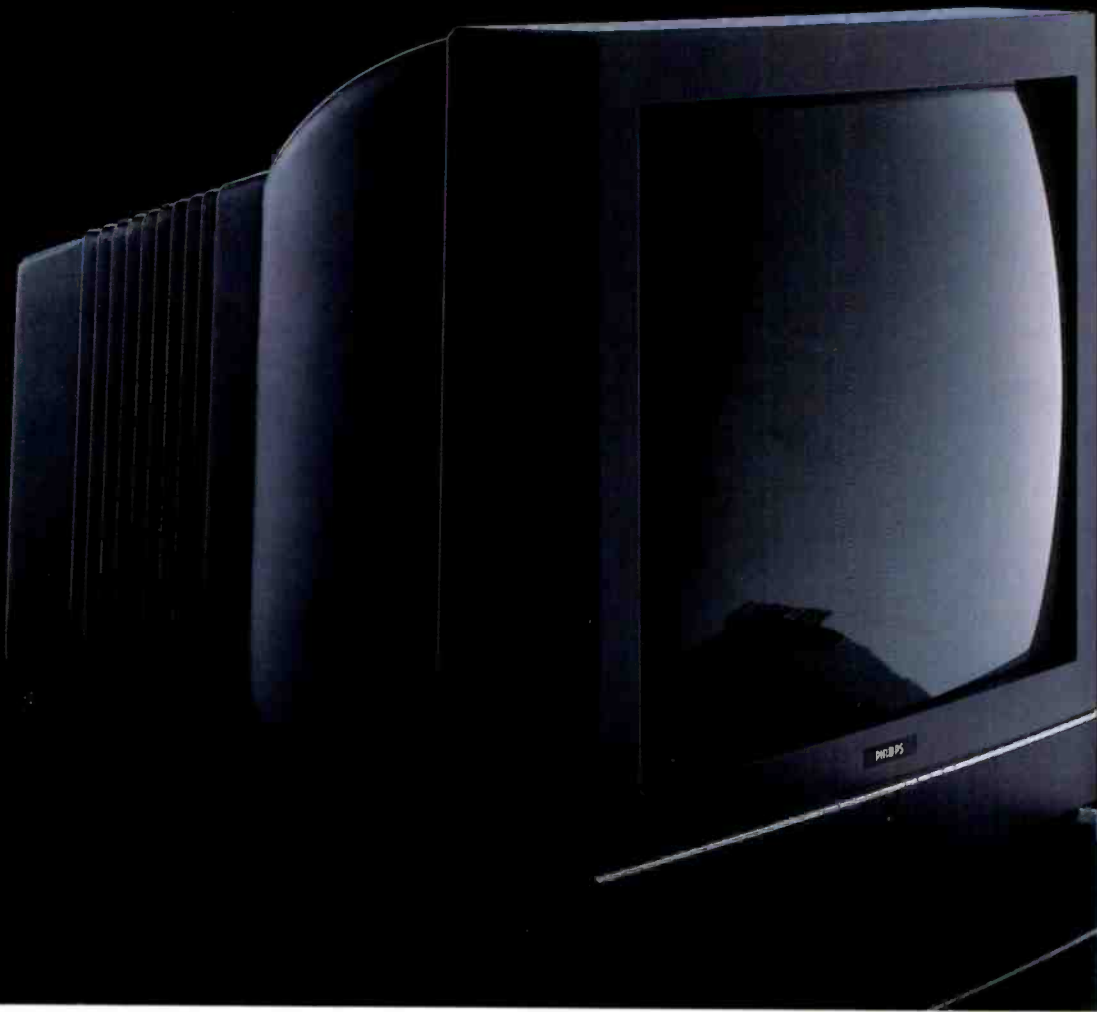
channel amp. Sony's XBR Pro (Model PVM-2530) offers 15 watts per channel plus built-in bass, treble, balance controls and speakers with flat square honeycomb drivers. NEC's KX-2791A has a 4x10 watt amplifier for its two built-in and optional rear speakers for Dolby Surround, Hall and Matrix effects. In fact, it's not uncommon to find Dolby Surround decoding in high performance sets.

The impact of the melding of audio and video is also pronounced in the new generation of projection TVs coming out of the labs. Currently a 35-inch direct view set is the largest available (although Sony has a 43-inch prototype.) One-piece rear projection TVs reach 60 inches (Mitsubishi) while two-piece front models deliver a picture up to 20 feet corner to corner.

Pioneer has always been at the cutting edge of rear projection TV technology. Like other firms trying to optimize video reproduction, they examined every aspect of the TV from the composition of the lenses to the material of the screen. A closer look at the new Elite PRO-91 50-inch model gives an idea of how far technology has come from the "count the dots" projection sets found in pubs across the country years ago. The PRO-91 uses three RGB liquid cooled, optically coupled CRTs that deliver a brighter picture because the liquid efficiently dissipates the heat, allowing the CRTs to operate at maximum efficiency with no loss of light. Low distortion five-element aspherical hybrid (plastic and glass) lens assemblies are used for consistently sharp focus despite temperature fluctuations. The lens surfaces are multicoated for higher efficiency as well. A super fine-pitch lenticular screen of .9mm cuts reflection and color


Block diagram of Toshiba's new Improved Definition TV that utilizes the frame double scanning system.





27" model 27J245 with 8-Video inputs, 2.5 megabytes of memory, S-Video input, Variable audio outputs. Winner of E.I.A.'s "Innovations '88" design and engineering award. 31" model 31J460 also available.

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Barcovision 600S

shift. Video noise reduction and comb filtration prevent crosscolor interference by separating the luminance and chrominance components of the signal. The result is horizontal resolution of 700 lines and brightness of 300 footlamberts with critical viewing angles of 120 degrees horizontal, 50 vertical. And in keeping with our happy A/V marriage, Pioneer engineers included digital delay Dolby Surround, a 10 watt per channel amplifier and two 6-inch speakers.

In the constant race for state-of-the-art equipment, other firms have produced rear projection sets with high resolution, high brightness, built-in Dolby decoding, and quality speakers such as NEC, Toshiba, Mitsubishi, Sony and Philips. Some makers are even going beyond Dolby in attempting to add some spaciousness to good video. Toshiba and Carver joined together (there's that marriage again) for a series of TVs ranging from 27 to 52 inches that incorporate Carver's Sonic Holography. The sound produced by each speaker is split so that a related beam of sound is produced by the opposite speaker in such a way that acoustic interference patterns of the sound occur in the air near each ear, revealing a three dimensional sound image. There is no distortion of spatial perspective or smearing of stereo. The Toshiba/Carver sets even have a sub-woofer for added bass response down to 60 Hz. Zenith and Bose have also combined to perfect an all-in-one A/V unit using the Acoustimass system called

Zenith Digital System 3 With Sound By Bose. Zenith/Bose also uses the exclusive wave guide system in another series of high quality sets.

Two-piece front projection monitors with 10-foot images have also dramatically improved. Monitors are preferred by many enthusiasts who have the space since they can add all of the individual components required to build a dream media system. Infinity, best known for their state-of-the-art speakers have been selling a front projection model (RSVP) as does Harmon Kardon (VPM 600). Barco, a European firm known primarily for industrial monitors used in CAD/CAM applications, is offering the 600S that delivers 800 lines of resolution.



Panasonic Prism CTK3194

Performance is the key word to use when describing the new video technology. It's the motivator driving audio enthusiasts to connect their gear to state-of-the-art televisions and video components. And it's performance that can be found in VCRs, laser disc players, surround sound processors, A/V receivers and more. Enthusiasts can now literally re-create the movie experience in their homes. The following pages will tell you how.

SUPER SOUNDTRACKS

Douglas Pratt is the Editor/Publisher of *The Laser Disc Newsletter* in New York City, a monthly geared to audio/video enthusiasts. What follows are his choices for movie and concert discs that highlight the sound engineers' art.

Movies

Citizen Kane (Criterion) "Although not CX encoded, unique sound editing."
The Birds (MCA) "One of the best sound editing jobs of the '60s."



Empire Strikes Back

(CBS/Fox) "Japanese version preferred but rumors have it all three *Star Wars* movies will be remastered in '89."

RoboCop (Image) "Bass will knock your arms and legs off."

Princess Bride (Criterion) "Sound transfer and effects makes it worth including."

Poltergeist (MGM/UA) "Excellent effort in the transfer."

Jewel of the Nile (CBS/Fox) "Fun movie, fun disc, good representation of how to have fun with sound."

One From The Heart (RCA/Columbia) "Coppola's movies all have great sound, very enjoyable."

Back To The Future (MCA) "Amblin Entertainment (i.e. Steven Spielberg) known for exceptional transfers and sound editing."

Witches of Eastwick (Warner) "Impish soundtrack filled with wonderful pops and whizzes."

Gremlins (Warner) "Another winner from Amblin."

Also worth a look and listen: **E.T.** (MCA), **Ben Hur** and **Dr. Zhivago** (both MGM/UA), **West Side Story** (CBS/Fox) and **2001** (new Criterion edition has newly Dolby encoded soundtrack supervised by Stanley Kubrick.)

Non Movies

Al Jarreau in London (Pioneer Artists)

"Considered the best transfer ever. Digitally recorded down the line."

GRP All Stars (Pioneer Artists) "A fine transfer."

Bach's Six Brandenburg Concertos (Polygram) "Recorded in a Vienna library so the sound comes at you from left and right, up and down. Fantastic."



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Surround Sound Blasts Off

The roar of the jets...the rumble of the boulder...interstellar spacecraft warping through the galaxies...Mickey Mouse battling bucket-carrying broomsticks. Filmmakers have been putting audiences right in the middle of the action in movie theaters with dramatic soundtracks for over 40 years. Walt Disney's *Fantasia* offered stereo imaging in 1941 with "Fantasound." It wasn't until Dolby Stereo became the definitive movie recording system in 1975 and home video exploded on the scene that the possibility of re-creating the movie palace experience at home became a reality. Today Dolby Lab's high-quality stereo optical system of four channels of sound (front, center, rear and surround) achieved through the use of the Dolby MP (motion picture) 4:2:4 matrix is readily available on over 1,500 different videotapes and discs. And manufacturers are providing Dolby decoders in a wider variety of equipment than ever before. It's no longer necessary to pack up the family and battle traffic to enjoy Hollywood's finest...you can literally re-create that experience in your livingroom.

It wasn't until the early '80s that the first home Dolby decoder, the M-360, was made available by HTM Surround Sound, (now known as Surround Sound Inc). Since that time, dozens of firms have entered the field, each one pushing the decoder performance curve to the ceiling. The soundtracks duplicated on the software have risen to the challenge as well. Dolby decoders now offer active matrixing as well as passive. The former is called Dolby Pro Logic and the latter, Dolby Surround (any equipment that licenses the circuitry from Dolby will feature the familiar double "D" with the appropriate phrase after it). Manufacturers are even going beyond Pro Logic and offering digital soundfield processing for specific ambience creation.

With Dolby Surround a fixed L/R matrix is used while in active units a variable matrix with logic is incorporated. To create the center dialog channel, a "phantom center" is produced from the left and right channels, just like normal stereo. An adaptive matrix recovers sound placement information by constantly analyzing two input signals and producing a steering vector that places the sound in the right location in your listening environment. Directionality of sound is increased and signal leakage is reduced. By adding a steered center channel, the dialog is placed right in the middle of the screen



Surround Sound Inc. System 4000



Lexicon CP-1



Yamaha DSP-3000



Toshiba XB-1000

where it belongs and all other effects are properly placed around you.

There's no shortage of high quality Dolby Pro Logic decoders and some firms have even "tweaked" the Pro Logic system and created their own forms of active matrixing. The Surround Sound Inc. System 4000 (\$599) uses their own dynamic logic circuitry to create a wider, quieter soundfield without crosstalk. There are even three modes of center channel operation. The system's logic derived center channel, wider front to rear separation (65 dB at 1 kHz) and sub bass information make the most of the sound engineer's creativity.

Peter Scheiber, one of the original developers of the Dolby Pro Logic system, was instrumental in designing the current Fosgate decoders that range from the Pro Plus 3606 (\$630) up to the 3610 (\$1,430). They incorporate variable, digitally generated time constants to maintain wide stereo stage and accurately located center dialog image.

Lexicon, a key supplier of audio signal processing equipment for recording studios, recently entered the home Dolby Pro Logic arena. They are the first to use

all-digital implementation of Dolby Pro Logic in the CP1 (\$1,200). The highly-acclaimed unit can provide Surround processing for up to six speakers, has a S/N of 85 dB and provides 12 programs for reverberation, ambience, panorama as well as surround.

Yamaha has a separate Dolby Pro Logic decoder, DSR-100 Pro (\$599), while NEC is offering three active matrix decoders, PLD-910, 610 and 310 (\$999-\$599). Most high end Pro Logic decoders are simply that and amplifiers are required to power each channel. NEC is offering the AVA-505 amp that drives three or five channels and has dynamic power of 240 watts. In the five-channel mode it has 30 per channel front and rear with 60 center. Fosgate has designed three power amps, the T-100, S-100 and M-100 (\$599-\$269), that offer 3x60 watts, 2x60 and 60 respectively for any possible speaker arrangement.

For those wishing to get an entire package in one, Shure Brothers has the HTS Reference System for \$9,600 that uses a proprietary Acra Vector decoder, three amplifiers and five speakers. On a much simpler note, firms from Archer (Radio Shack) to Sansui offer passive Dolby Surround decoders and amplifiers for quick rear channel hookups. A good example is Technics' SH-AV44 (\$295) that delivers 25 watts per channel.

As digital circuitry has made it easier to re-create the movie theater experience at home, many enthusiasts want to change the acoustics of their listening rooms. Yamaha was instrumental in this breakthrough with the DSP-1 (\$699) and later with the DSP-3000 (\$999) which can turn your home into the Village Vanguard or Anaheim Stadium (acoustically, that is).

Lexicon's CP-1 has similar capabilities and the Toshiba XB-1000 integrated amp (\$900) not only has Dolby Surround but seven other sound modes ranging from Cathedral to Space Fantasy. Delay times on the XB-1000 are full adjustable from 1 to 99 ms with 50 watts delivered to each of the four channels.

Dolby Pro Logic and active digital matrixing are the leading edge of home entertainment. Dolby Surround is now available from separate decoders as well as in television sets and the many A/V receivers on the market. The Wizard in *Fantasia* would've been hard pressed to duplicate these high performance breakthroughs.



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Picture Perfect



It's almost like the battle between the superpowers for every technological advantage but instead of throw weights and "Star Wars," we are discussing signal-to-noise ratios and the soundtrack of *The Empire Strikes Back*. Today the race is on for equipment that can deliver the ultimate in audio and video as high-band VCRs (Super VHS and ED Beta) with almost CD quality hi-fi sound have become available and CD Video finally gets its moment in the sun because of its top quality image and digital sound. And for the most demanding audio enthusiasts, there are VCRs and camcorders that deliver PCM sound...in other words, truly cutting edge technology for the home.

After almost 10 years of 220-250 line resolution, VCRs took a giant step forward in video performance in 1988 as Super VHS and ED (Extended Definition) Beta became available. (Audio had already taken a quantum leap in 1984 with the introduction of Beta and VHS Hi-Fi.) The two new video formats extend the bandwidth from SuperBeta and VHS levels. ED Beta shifts the luminance FM carrier from 5.6 MHz to 9.3 MHz, frequency deviation was increased from 1.2 MHz to 2.5 MHz and S/N ratio improved 3 dB. Super VHS moved the FM carrier from 5.4 MHz to 7.0 MHz. Both use Y/C



Panasonic's PV-S445 Super VHS camcorder with color electronic viewfinder and built-in character generator.

or S-connectors to eliminate cross color and dot crawl along with reduced head gaps and special tape formulations for maximum performance. Super VHS resolution is now over 430 lines while ED Beta can yield over 500.

Super VHS VCRs are making strong inroads and many boast a wealth of digital effects (Hitachi's VT-3800A and JVC's HRS-8000U) while hi-fi sound with its 90 dB dynamic range is practically a given. Sony has two ED Beta VCRs currently available (EDV-9500 and EDV-7500) and range in price from \$1,900 to \$3,300 while a loaded S-VHS such as the NEC DS-8000U with built-in video noise reduction costs \$1,499, Mitsubishi's highly-rated HS-U80, \$1,700, Toshiba's SV970, \$1,600.



NEC DS-8000U



Mitsubishi HS-U80



Yamaha CDV1000

Since this is such new technology there is very little prerecorded software to watch on these high-powered decks although Super Source Video in San Francisco offers S-VHS titles via mail order. Late in '88, Mitsubishi had a special promotion with Orion Home Video to duplicate copies of *RoboCop* in Super VHS and Hitachi and Orion teamed up for another promotion so it appears the software log-jam may be breaking up. There is no software in ED Beta but you can make your home tapes in both formats thanks to the introduction of Super VHS and ED Beta camcorders. Over 20 different S-VHS camcorders are available and Panasonic's PV-S445 (\$1,950) is one of the most sophisticated with a one-inch LCD color viewfinder, a built-in speaker and

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Philips CDV488



Pioneer LD-S1



Sony EDV-9500

character generator and, of course, 400-line picture quality. Sony has the ED Beta camcorder, the ED CAM EDC-55 (\$7,700) with broadcast results and Beta Hi-Fi sound. For budding George Lucases there are a few other camcorders with concert-level audio including the Zenith VM7100 (VHS Hi-Fi) and the Sony CCD-V220 which has to be considered state-of-the-art today. The CCD-V220 (\$2,500) records using Pulse Code Modulation and has a one point stereo mic along with a side mounted condenser mic to add narration to the PCM soundtrack while you shoot. Dynamic range is greater than 85 dB and frequency response is 20 Hz-15 kHz.

PCM audio is also available on Toshiba's DX900 VHS VCR, on Sony's 8mm decks, the EVS-800 and EV-S1;

Canon has the ES-100. The 8mm PCM VCRs can record up to 24 hours of digital sound on a P6-120 cassette and the Toshiba six hours in EP on a T-120 blank.

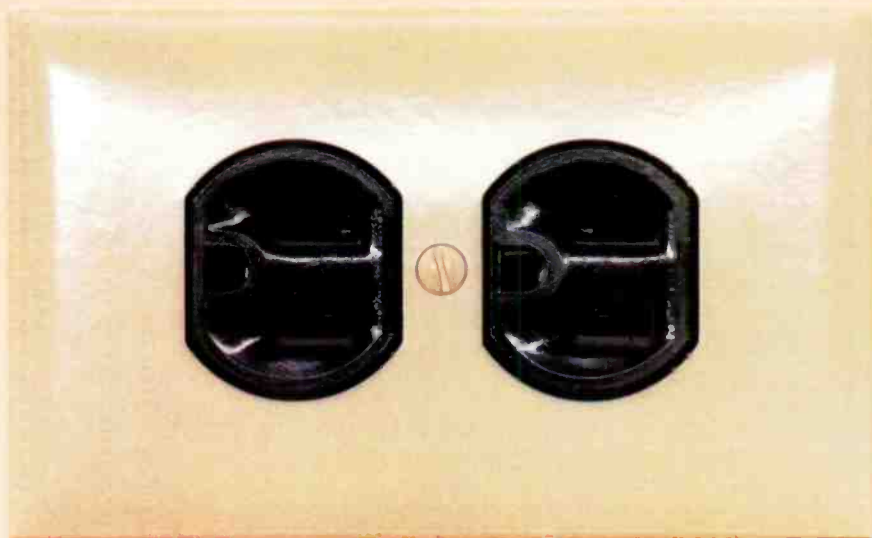
Digital sound and a wealth of the finest prerecorded software are the major drawing cards with the many CD-Video combination players now being introduced. They truly marry the best audio and video in one machine. And there are literally thousands of discs (movies and concerts) to choose from with picture quality of over 350 lines of horizontal resolution. Many have digital soundtracks for pristine CD-level audio. After many years as a solitary voice in the laser-optic wilderness, Pioneer has been joined by Yamaha (CDV1000), Sony (MDP700 and MDP200), Magnavox (CDV474) and Philips (CDV488) in the combi (CD, CDVs, LVs, etc.) player ranks. A good example of a machine that truly weds audio and video at their best is the new Philips player. It uses a Select Grade TDA-1541 AS-1 16-bit DAC chip with four times oversampling digital filter. Plus it is one of the first with an internal Y/C comb filter to improve color reproduction from the composite video on the disc. Video S/N is greater than 45 dB with horizontal resolution of over 440 lines. Audio specs are superb with S/N greater than 100 dB, dynamic range and channel separation of 96 dB. According to David Birch-Jones, Philips audio product manager, the CDV488 "can play all formats from 3-inch CD singles to the new 8-inch LD single to 12-inch laser discs...all without adaptors. And to aid the A/V marriage, it has a smart remote that can learn the functions of 10 other components."

Pioneer is continuing to advance their CD-V players as well. The LD-S1 utilizes separate power supplies and heat sinks along with dual 16-bit DACs with four times oversampling, according to Mark Smith, Brand Manager of Pioneer. "The LD-S1 uses a full-floating mechanism that isolates the disc from the world." The LD-W1 is the first combi player to handle two discs at once for up to four hours of entertainment. Sony's new CD-V player (MDP700) can provide digital effects on both CAV and CLV discs and Yamaha's CDV1000 uses five newly developed LSIs that deliver top notch sound with THD of .003%.

While the battle for technological superiority rages on, enthusiasts who love the best in audio and video are clearly the victors.



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The Heart Of The New Home Theater System

The A/V Receiver

A/V receivers. For audio enthusiasts this may sound like an oxymoron at best. Is it possible to achieve top-notch sonic reproduction from a receiver and incorporate key video capabilities such as Dolby Surround decoding? According to David Birch-Jones of Philips, a died-in-



Philips FR980

the wool audiophile, the answer is a resounding "Absolutely. The problem with most A/V receivers is they are just receivers with video switching capabilities. The real benefit is to integrate Dolby Surround into it. Up till now, if you wanted Dolby Surround, you had to buy an outboard box with outboard amplifiers. Now there are high quality receivers with Dolby sections and separate amplification. These units can easily be the centerpiece of a quality A/V system.

"The problem audio people have with receivers is they are very lightweight in terms of power capabilities," Birch-Jones added. "It's easy to make a \$500 rack system with 100 watts per channel. The moment you hook up a decent pair of speakers—Infinities, Bostons, ARs, Snells, anything—the thing just shuts down if it's anything but a high efficiency 8 ohm boom box speaker. Now A/V receivers have the IHF dynamic power that can handle the most complex speakers."

An A/V receiver like the new Philips FR980 shows how far these units have come. It's rated 125 watts front/15 rear channel with dynamic power of 380 watts into 2 ohms. Along with Dolby Surround there are Movie and Music modes to enhance dynamic range, a graphic equalizer to tweak prerecorded soundtracks, plus extensive A/V switching. The FR980 has 9 pairs of audio ins, 4 audio outs, 4 video ins/3 outs to handle any equipment configuration. It even includes split screen video enhancement to improve detail. The Philips intelligent

remote—and those from other firms—really brings the home theater concept together by being able to learn the codes from other IR remotes (from TV, VCR etc.), even from other manufacturers.

Onkyo, Pioneer and Technics also offer multifeatured A/V receivers that can please the demanding enthusiast. Onkyo's TX-SV7M (\$1,050) has 100 watts front/20 rear and dynamic power of 230 watts into 3 ohms. Along with a built-in MTS/SAP decoder, it has Dolby Surround, Hall and Matrix effects with digital delay capabilities. The TX-SV7M has a smart remote as well.

Pioneer has been a leader in the A/V receiver ranks and they were the first to offer Dolby Pro Logic in the VSX-9300S (\$935). Dolby Pro Logic decodes four distinct outputs (left and right front, rear and center front) and features active matrixing and steering logic to reduce crosstalk and improve separation between adjacent channels to more than 25 dB. (A separate mono amp is required for the center channel.) On the video side, the VSX-9300S has a split screen video enhancer, video recording enhancer and a VCR noise filter



Mitsubishi M-AV1

to eliminate hiss. As with all high-end A/V receivers there's extensive hookup capabilities and a smart remote.

Technics' top-of-the-line SA-R530 (\$850), is rated at 100 watts front with .007% THD into 8 ohms, 5 watts rear. Along with Dolby Surround it has its own proprietary surround decoding and six surround modes including theater, concert hall, studio, hall, club and stereoplex. Mitsubishi recently introduced the M-AV1 (\$1,000) as an integral part of their home theater system. The sleek receiver pumps out 125 watts front/25 rear with Dolby and Matrix surround. To tie into the latest high band equipment, the M-AV1 has S-connectors. NEC's AVR-1010 (\$899) has one of the most powerful rear channel decoders at 50 watts; 100 are available for



Onkyo TX-SV7M

the front speakers. Radio Shack's AV-900 (\$600) is 35 watts per channel and boasts an MTS decoder.

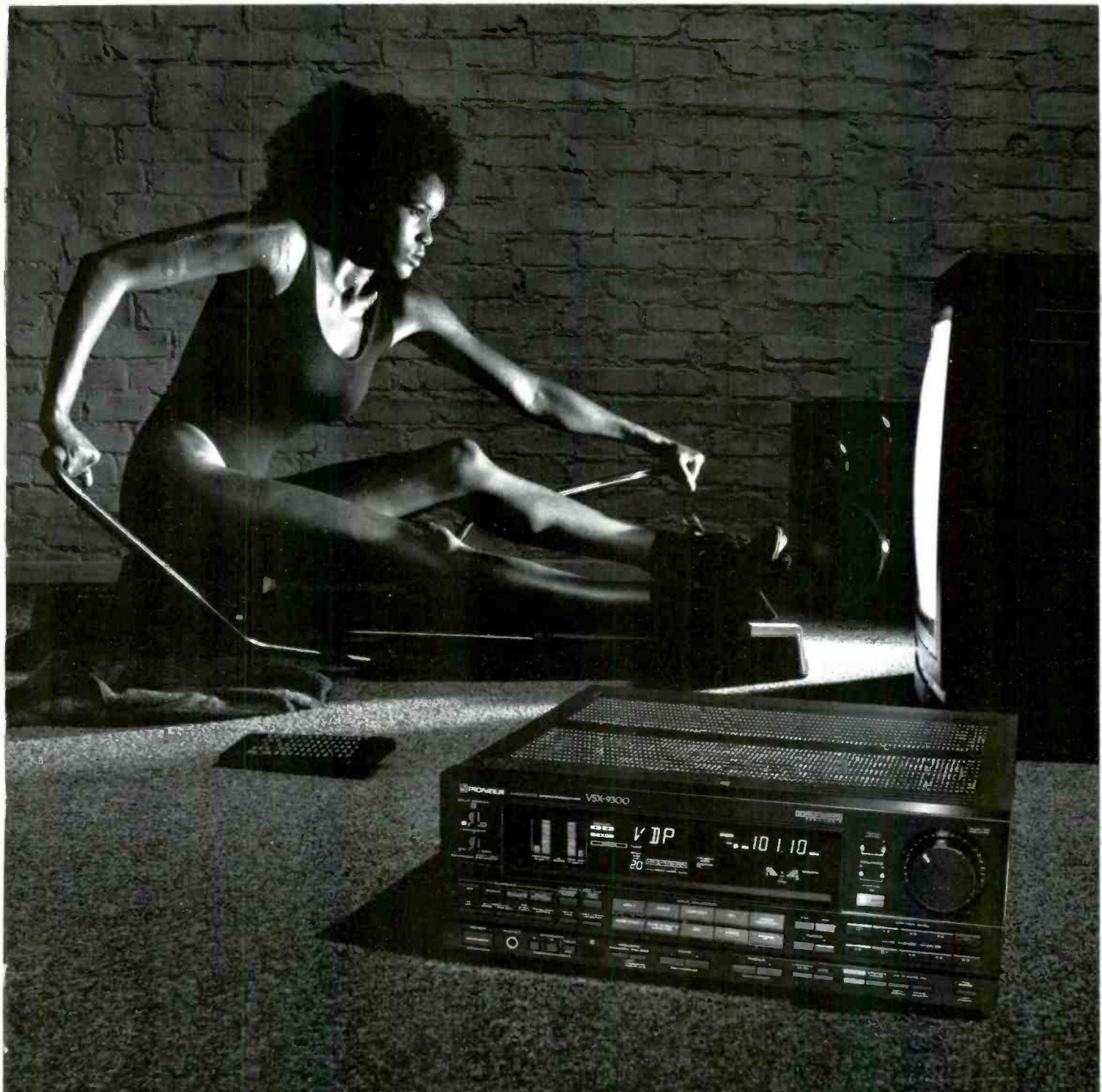
For those who prefer to pair outboard AM/FM tuners with integrated amplifiers and still want A/V capability, Technics' SU-AV55 (\$800) has digital Dolby Surround and their own AV surround effect for non-Dolby encoded material. The SU-AV55 offers 65 watts front/13 rear. Four video ins (including an S-connector) offer wide system adaptability. And to help find the low end on notoriously mid-range TV shows and tapes, the SU-AV55 has Digital Sampling Bass that reproduces signals an octave below the original input. As with many new A/V components there are inputs on the front of the amp to accommodate camcorders or video games.

Yamaha has an A/V surround amplifier, the AVX-100U (\$699), with Dolby decoding and several unique video features including the ability to superimpose the operating modes on the TV screen. Home tapers can even add 3 24-character titles to the picture being recorded. A video enhancer can sharpen the image. The AVX-100U delivers 65 watts front/14 rear and it offers 16 pairs of inputs including an S-connector. Bass extension adds omph to video programs as well.

There have been great strides in components that combine top quality audio and video...they are dichotomies no more.



Pioneer VSX-9300S



Home Body. This is your time. And you enjoy it most when your home entertainment system is performing at its best. Which is why Pioneer created the VSX-9300S audio/video receiver.

It actually improves the performance of *all* your components. The VSX-9300S features the latest innovation from Dolby Labs, Dolby Pro-Logic™. This surround sound experience rivals even the most sophisticated movie theaters. There is also a split-screen video enhancer that sharpens and focuses every video image. And a "Smart Remote"™ control that turns your existing components into a unified A/V system.

Pioneer's VSX-9300S A/V receiver. There is simply no better way to get it all out of your system.

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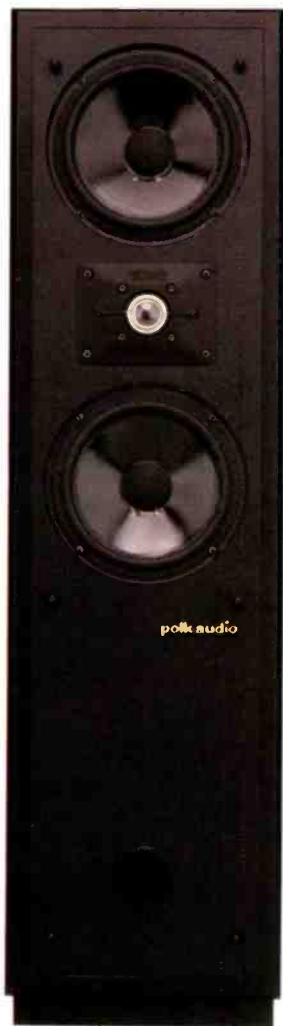
The Final Link

The Right Speakers

When Tomlinson Holman, Lucasfilm's corporate technical director, would listen to a movie in a theater, he'd shudder. "When I joined George Lucas in the '70s, we began to look at the entire sound chain and found that the theater loudspeakers were the worst link. They were standardized in '47 with the Voice of the Theater system and by around 1980, they were getting a little long in the tooth. What we then did," the USC School of Cinema and TV professor and key player on the soundtracks of "Indiana Jones" and "Empire" remarked, "was pull together the most relevant developments for a new system called THX."

The THX system was designed to accurately reproduce the film sound in theaters clarifying dialog, widening frequency range, lowering bass distortion and improving stereo localization.

Polk RTA 8t



Yamaha NS-W10

Specific power amps, Dolby processors and loudspeakers (screen, surround and subwoofers) were designed for the ultimate in reproduction of Dolby encoded movies. Thanks to advanced software duplication techniques, home decoders and amps, enthusiasts can achieve almost state-of-the-art theater effects in their livingrooms—if attention is paid to all parts including that final (or, as many would argue, first) link, the loudspeakers.

From specially designed "video speakers" of years ago, it is now known that any high efficiency speaker (87-92 dB at 1 watt) will be able to handle the extreme highs and lows of movie soundtracks. This holds true for front, center channel, side and rear positions. Today audio enthusiasts have a wide range of options for the speakers required for the ultimate home theater. Whether you are using just two for VHS Hi-Fi or seven with a full blown Dolby Pro Logic system, there's no shortage of choices.

Thinking back to the early days of the audio/video marriage, Rich Baccigaluppi, Infinity's VP of Marketing, had to laugh. "People would put their speakers right next to their TV sets which would cause a degaussing of the picture—an actual color smear—not to say what it did for stereo separation. Today they know they have to put them at least 12 to 18 inches away." Infinity is a key player in the A/V mix with their high quality speaker line as well as the RSVP front projection TV with built-in Dolby Surround.

As people upgraded their home theaters and searched for the most realistic sound reproduction, several important options were opened. Consider the advances in separate subwoofer and satellite speaker systems. The low frequencies are non-directional so you can put the subwoofer

anywhere. Not only does this keep a livingroom uncluttered (a vital design consideration) the subwoofers deliver the low end frequencies that give the power to many movie soundtracks. A good example of a powered subwoofer is the M&K V-1B (\$850) which bellows out frequencies in the 20-125 Hz range with a special long throw 12-inch polypropylene cone. When coupled with M&K's S-1B satellite speakers for the front (\$725) and S-3B (\$395) rear "your room will have the same tonal balance and seamless blend between all five speakers," remarked M&K Executive VP Charles Back. F/R for the S-1Bs are 75 Hz-22 kHz 85 Hz-22 kHz for S-3Bs. For quality and design, M&K's new MX-1000 (\$1,495) pedestal subwoofer has received accolades including a Design and Innovation award from the EIA during the June '88 Consumer Electronics Show. The MX-1000 houses two

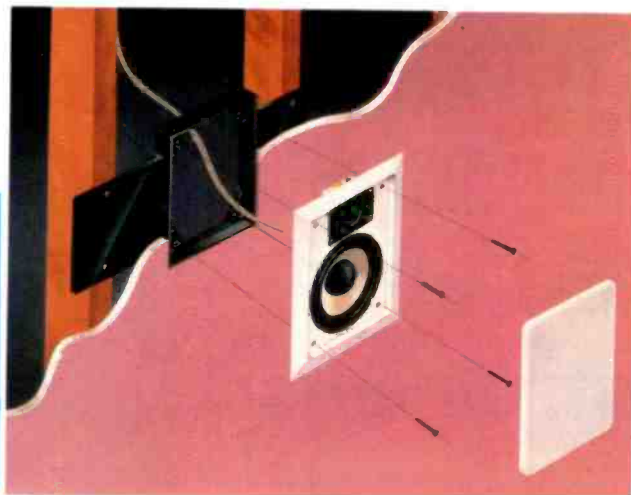


Infinity 9 Kappa

magnetically shielded 12-inch drivers that lower distortion.

Bose has also been a leader in satellite speaker technology with their Acoustimass AM-5 system (\$699). Four 2½-inch wide-range drivers in small cubes plus a specially designed Acoustimass module that can be placed anywhere in the room offer full low fre-

Cutaway view of installation of Sonance built-in speakers. All Sonance models offer tweeter adjustments to fine tune installed systems. Wall speakers can be used in either new construction or retrofits.



the woofer and a ferro-fluid damped polycarbonate 1-inch dome tweeter. F/R is 65 Hz-18 kHz. Moving up to Sonance IV built-ins (\$650 pair) extends the range from 35 Hz-22 kHz. Sonance even has a wall mounted powered subwoofer.

JBL has built-in models as part of their Signature series. Models S-3 (\$245 pair) and S-4 (\$295 pair) have F/R of 125 Hz-22 kHz with sensitivities of 86 and 88, respectively. They can be matched with the standalone S-1 subwoofer (\$295, 88

dB, 40-200 Hz) and S-2 pedestal loudspeakers (\$550, 88 dB, 40 Hz-20 kHz). Polk and Boston Acoustics are also offering enthusiast-grade built-ins as well.

For the ultimate in rear-channel portability, Koss Kordlesspeakers (\$349 pair) are battery powered and can be moved with ease. An infrared transmitter is plugged into the amp or receiver and sends the signal to two dual driver, full response speakers (40-20kHz) eliminating the need for across-the-room hard wiring.

There's no shortage of high-quality speakers that can deliver the wide frequency response and dynamic range of movie soundtracks. For those seeking the ultimate, Infinity's IRS Series V (\$50,000) will definitely do the trick but their Reference Standard 9 Kappa (\$1,450 each) are top quality and do not require home equity loans! Audio enthusiasts have a wealth of sonic systems to choose from—from Infinity to Polk to B&W, KEF, Boston Acoustics...the list goes on. And a new name is joining the high-quality ranks. To complement its cutting edge laser disc players, A/V receivers and projection TVs, Pioneer recently introduced Reference loudspeakers, the Elite TZ series. The TZ-9 (\$2000 each) and TZ-7 (\$900 each) use ceramic graphite and ceramic carbon diaphragms in the midrange and tweeter with an integrated twin bass drive system. "Unlike most dynamic speakers," Mike Fidler, Pioneer's VP of Marketing said, "the new TZ series features a cabinet design which adds virtually no extraneous coloration to the pure sound. The TZ series offers a depth and width of sound that will reproduce the acoustical atmosphere of an actual soundstage."

The intertwining of audio and video has now come full circle as equipment designers no longer focus on just sight or sound. High performance audio linked to top quality video in the home is a reality. Even General Sarnoff would've been pleasantly surprised just how far we've come....



Koss Kordlesspeaker

quency reproduction and accurate tonal balance. AR is another brand to explore if you are thinking satellites.

To hear the full impact of the bass punch in many soundtracks, standalone subwoofers can easily added to A/V configurations, such as the Yamaha NS-W10 (\$359). It has a built-in 60 watt amplifier for low frequency signals with a switchable filter that will roll off frequencies above 80 or 120 Hz at a rate of 18 dB/octave. NEC's SW-400 (\$599) is a combination powered subwoofer and full range speaker system making it ideal for Pro Logic setups. The 60 watt amp has left and right inputs with a mono input for the center dialog channel. A 12-inch woofer and two 4-inch full range speakers offer three crossover frequencies (70, 100 and 150 Hz) and it's magnetically shielded.

Many installers suggest handling the center Pro Logic channel with a powered speaker such as the Proton P301 (\$169), an AR Powered Partner (\$400 the pair) or a Bose Video RoomMate (\$279 a pair) and hooking it directly to the center channel out of the decoder.

For more extensive media room/surround sound arrangements, particularly with a new home, many installers recommend built-in speakers for the rear channels (and even the front). For the Sonance II models (\$245 pair) speaker designer Bill Kindel added a full crossover between



Pioneer Elite TZ-9

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Peter Scheiber, classical musician, received U.S. Patent No. 3,632,886 in 1972 for the invention of matrix surround. His latest patent in the field issued in 1987. Peter is known as the 'Father of surround.'

Jim Fosgate, inventor and audio pioneer, invented the most advanced concept in surround processing: Variable speed digital steering logic.

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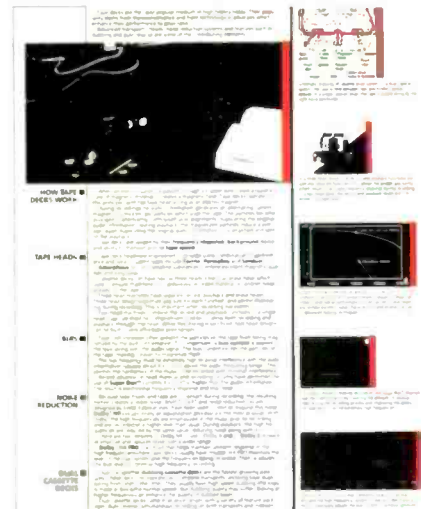
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1

HAFLER XL600 POWER AMPLIFIER

Manufacturer's Specifications

Power Output: 305 watts per channel into 8 ohms; 450 watts per channel into 4 ohms; bridged mono, 900 watts into 8 ohms; all from 20 Hz to 20 kHz.

THD: 0.05% into 8 ohms; bridged mono, 0.1% into 4 or 8 ohms.

Continuous Power at Clipping: 360 watts per channel into 8 ohms; 500 watts per channel into 4 ohms; 750 watts per channel into 2 ohms; 900 watts per channel into 1 ohm; bridged mono, 1,000 watts into 8 ohms and 1,500 watts into 4 ohms.

All ratings for continuous duty cycle across audio band; depending on load impedance, duration may be thermally limited to several minutes.

SMPTE-IM Distortion: 0.04% at rated power into 8 ohms.

Frequency Response: 10 Hz to 50 kHz, ± 0.1 dB, 0.1 Hz to 500 kHz, ± 3 dB.

Phase Shift: Less than 0.25° from 20 Hz to 20 kHz.

Slew Rate: 100 V/ μ S for 130-V peak-to-peak square wave.

S/N Ratio: 100 dB, re: rated output into 8 ohms.

Input Sensitivity: 2.6 V for 305 watts output into 8 ohms.

Damping Factor: Greater than 200 at 1 kHz, 150 at 10 kHz (both at 8 ohms).

Dimensions: 19 in. W \times 7 in. H \times 13 in. D (48.3 cm \times 17.8 cm \times 33 cm).

Weight: 51 lbs. (23.2 kg).

Price: \$1,195.

Company Address: Hafler Div., Rockford Corp., 613 South Rockford Dr., Tempe, Ariz. 85281.

For literature, circle No. 90



Having known and respected David Hafler for several decades, I was frankly concerned when he sold his company. Would the new owners continue the tradition of straightforward equipment design that characterized Hafler and, before that, Dynaco products? Would the "new" Hafler products offer the same great value that Hafler's earlier amps, preamps, and tuners had for so many years? A few hours spent with the Hafler XL600 power amplifier on my test bench, and a few days spent listening to it, allayed my fears and doubts. The Hafler tradition continues under the new owners, the Rockford Corp.

In designing the XL600, Hafler engineers applied many of the same circuit approaches used in the Model XL-280, which I previously tested for *Audio* (November 1987). The XL600's circuitry includes a double differential, J-FET, cascoded push-pull input stage and a current-mirror second stage, driving 16 lateral MOS-FET outputs. The direct-coupled circuit is something of a departure from previous Hafler amps in that it employs far less overall feedback. The use of additional MOS-FET output devices increases the low-impedance drive capability, so the amplifier is able to drive difficult speaker loads that require high current levels.

Although only one large power transformer is used, the separate power supplies for each channel employ a total of 72,000 μF of capacitance for improved low-end performance. These electrolytic capacitors are bypassed by smaller capacitors for improved high-frequency performance. A separate supply powers the low-level stages for improved isolation and efficiency. The large heat-sink is cooled by a variable-speed d.c. fan that turns on only when needed and is extremely quiet.

Hafler's Excelinear circuit enables the user to adjust the amplifier for minimum nonlinearity with the speakers which it will normally drive. This adjustment is made by using one channel of the XL600 as a "driving" amp, and a special gain-control circuit (see "Nulling Out Amp Distortion," February 1987) whose schematic is shown in Fig. 1. A control within the amplifier is adjusted until no sound is heard from the listening room speaker. Any difference between the input to, and the output from, the test amp represents some form of distortion which will be audible in the monitor speaker, either as program-related content or as noise. When the signals are identical, no sound will be heard from the monitor speaker. Headphones or a sensitive a.c. voltmeter may be paralleled with the monitor speaker for an even better "null" adjustment. After adjusting one channel of the amp for minimum distortion and phase shift, the amplifier channel positions shown in Fig. 1 are reversed, and the procedure is repeated for the opposite channel. Since my bench measurements were made using purely resistive loads, I did not make this adjustment until I was ready to listen to the amp with my reference Infinity RS 9 Kappa speakers. Accordingly, the static distortion and S/N measurements which will be discussed later in this report were obtained with the factory settings of the Excelinear feature.

Control Layout

A heavy-duty, on/off rocker switch on the front panel is accompanied by a red pilot lamp. To avoid turn-on transients, the XL600 provides a 3-S delay before a relay con-

nects the output terminals. This relay will also disconnect the load if significant d.c. is present at the output or if the heat-sink's short-term temperature is excessive. However, under such conditions the fan will continue to operate.

The rear panel is equipped with two sets of red and black binding posts for speaker connections. Both output and input terminals are gold-plated. A mono/stereo switch is used to change operation from stereo to bridged mono. When mono output is desired, the single speaker load is connected across the red terminals only. A pair of speaker fuse-holders are equipped with 5-ampere fast-blow fuses. Hafler supplies a pair of spare 10-ampere fuses that are intended for bench-testing or high-power applications. A quick calculation told me that even a 10-ampere fuse would not be enough to enable me to measure power output at low impedances, so I occasionally replaced these with 20-ampere fuses during my bench tests.

Measurements

Figure 2 shows the frequency response of the XL600, from 10 Hz to 200 kHz. Considering that at no frequency within this range did the amplifier exhibit any "minus" readings, the slight rise of +0.2 dB at 50 kHz may be considered as meeting Hafler's published specification of ± 0.1 dB. There was virtually no deviation from perfectly flat response over the audible range from 20 Hz to 20 kHz. The slight rise of +1.3 dB at 200 kHz was of no particular concern to me, inasmuch as I could detect no signs of instability for any of the load impedances or drive conditions employed during my bench or listening tests.

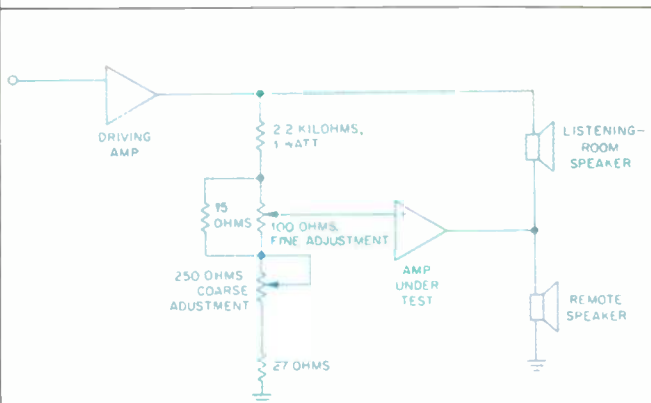


Fig. 1—Setup for straight-wire differential test.

When the pots are adjusted for minimum sound output from the speaker, only the distortion and the phase and amplitude errors are heard. For more critical adjustment, a meter or headphone can be used in parallel with the listening room speaker.

Hafler's Excelinear circuit allows the user to adjust this amplifier for maximum linearity with the very speakers he'll be using.

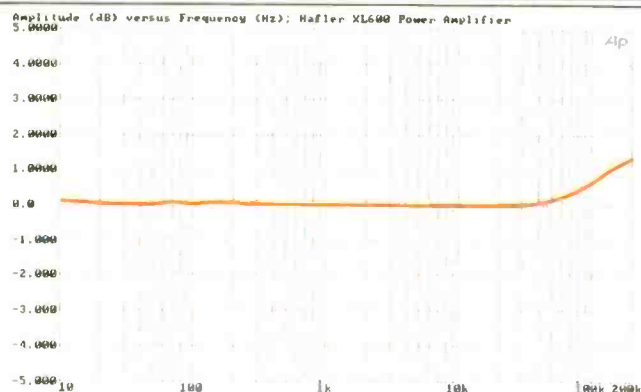


Fig. 2—Frequency response.

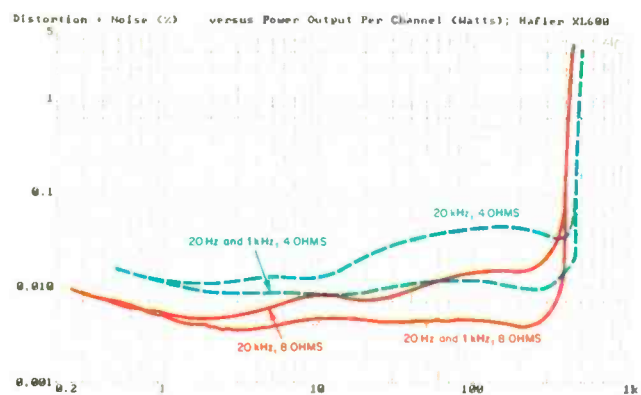


Fig. 3—THD + N vs. power output per channel into 8- and 4-ohm loads, for three frequencies. The curves for 20 Hz and 1 kHz are identical.

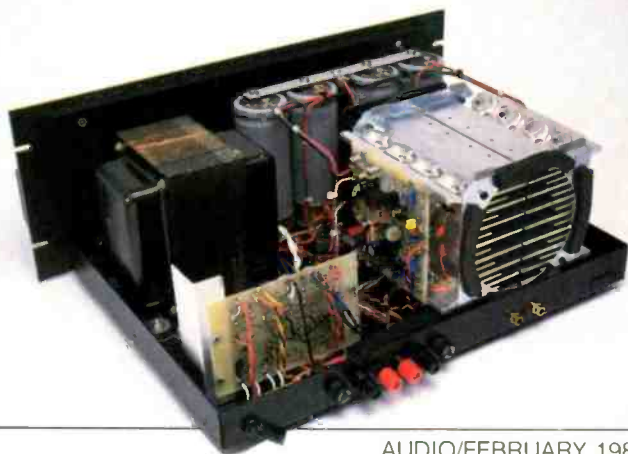
Figure 3 shows how THD + N varied with increasing power output, using 8- and 4-ohm loads. At the rated output of 305 watts per channel into 8 ohms, THD + N was only 0.006% at 20 Hz and 1 kHz. THD was a bit higher at 20 kHz, measuring 0.023% for rated output. With a 4-ohm load, THD + N was 0.017% at 20 Hz and 1 kHz, and 0.04% at 20 kHz, for the rated output of 450 watts per channel.

Figure 4 shows how THD + N varied as a function of frequency, keeping power output constant at its rated levels (305 watts per channel for 8 ohms, 450 watts per channel for 4 ohms), with both channels driven. The slight discrepancies between the readings in Fig. 3 and Fig. 4 at 20 Hz, 1 kHz, and 20 kHz are probably caused by slight temperature variations which occurred between the times when I made each of these measurements. In any event, THD + N was well below published specifications in both instances, and the 8- and 4-ohm graphs are quite similar to each other.

How SMPTE-IM distortion varied as power output was increased from below 1 watt to above clipping levels is shown in Fig. 5. At 305 watts per channel, with an 8-ohm load connected, SMPTE IM measured precisely 0.04%, as claimed by Hafler. No specification was supplied for 4-ohm loads, but my results show that it was about 0.1% at 450 watts per channel. CCIF-IM, or twin-tone, distortion is caused by spurious beats between two frequencies that are 1 kHz apart. As Fig. 6 shows, CCIF IM was less than 0.002% for 305 watts per channel into 8 ohms and just over 0.003% at 450 watts per channel into 4 ohms.

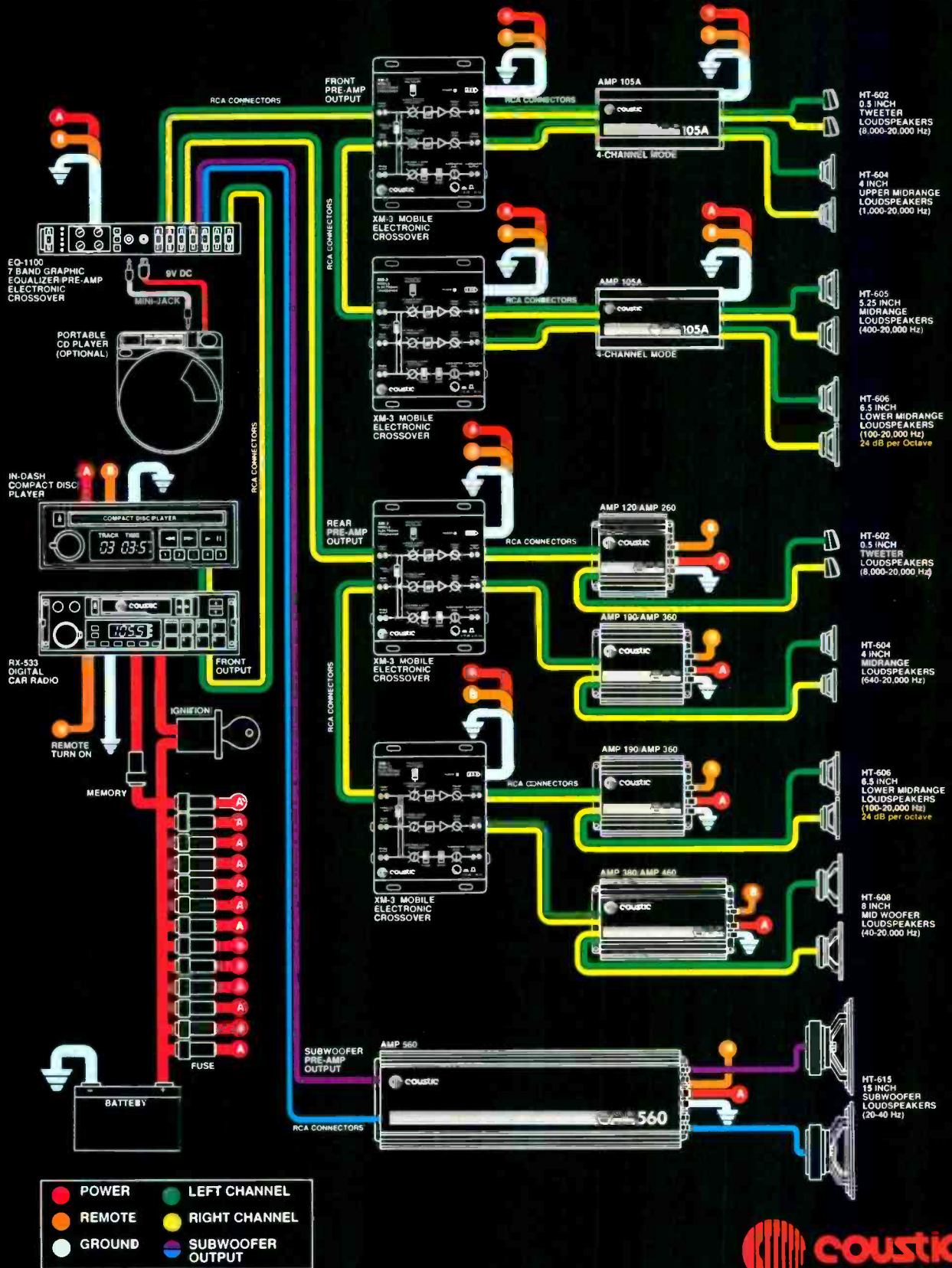
There was no way to adjust the output level of the XL600 so that it would deliver 1 watt into 8-ohm loads for an input of 0.5 V, the conditions for testing an amp's S/N in accordance with EIA Standards. Therefore, I measured S/N with respect to 1 watt output by adjusting the signal source to the value needed to produce this level. The XL600 required 150 mV, which I thought was rather high, as this would require 2.6 V input for full rated output at 8 ohms. However, most preamplifiers can deliver this voltage without any noticeable increase in distortion. In any case, the XL600's A-weighted S/N ratio, referred to 1 watt, was 93.11 dB. If you want to reference this to rated output of 305 watts into 8 ohms, add around 25 dB to my result, for over 118 dB of S/N. If that sounds too good to be true compared with Hafler's claim of 100 dB, bear in mind that Hafler quotes unweighted S/N, whereas the EIA Standard calls for A-weighting.

Damping factor, at 50 Hz and referred to 8-ohm loads, was 153. After I had completed the tests of continuous power, I made some short-term measurements to determine clipping levels at various load impedances. For an 8-ohm load, severe clipping occurred at levels approaching 400 watts per channel. With a 4-ohm load, clipping was evident at about 475 watts per channel, and at 750 watts per channel for a 2-ohm load. I did not attempt to drive this amplifier into clipping for a 1-ohm load, simply because of fuse limitations in the adjustable line-voltage transformer I use to maintain constant 120 V a.c. during bench tests. In the bridged mono mode, using an 8-ohm load, clipping occurred at 1,050 watts. Again because of my transformer's fuse limitations, no attempt was made to determine clipping level using 4 ohms in the bridged mode. I did confirm the XL600's ability to deliver more than 900 watts of power into 8



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The signal delivered by the XL600 into actual speaker loads replicates its input signal almost perfectly.

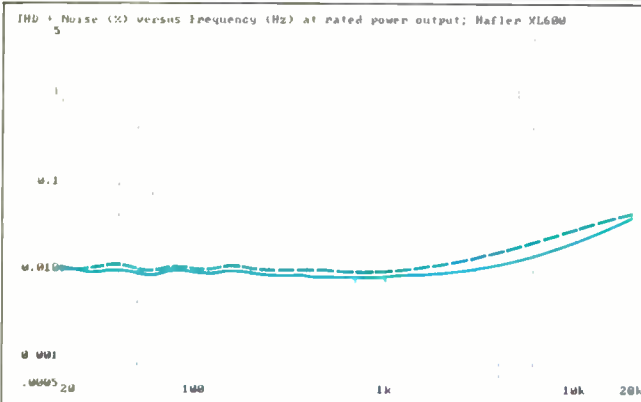


Fig. 4—THD + N vs. frequency, at rated output of 305 watts per channel into 8 ohms (solid curve) and 450 watts per channel into 4 ohms (dashed curve).

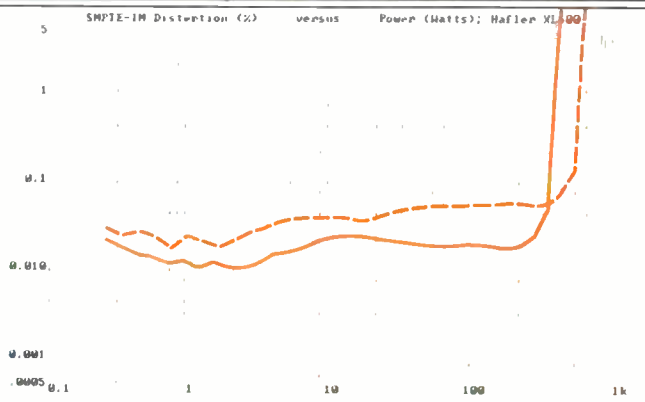


Fig. 5—SMPTE-IM distortion vs. power output for 8-ohm load (solid curve) and 4-ohm load (dashed curve).

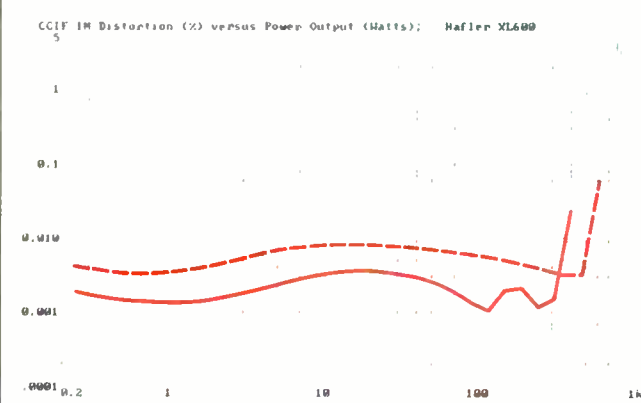


Fig. 6—CCIF-IM (twin-tone) distortion vs. power output for 8-ohm load (solid curve) and 4-ohm load (dashed curve).

ohms, in the bridged mono mode, with less than 0.1% THD. Reverting to stereo operation with 8-ohm loading, I determined that this amplifier's dynamic headroom was an impressively high 2.3 dB.

Use and Listening Tests

I installed the Hafler XL600 in my reference listening system and, since I was also testing a couple of excellent CD players—the Philips CD880 and the Onkyo DX-G10—I used these components as program sources for the listening tests and final adjustment of the Excelinear circuitry. I should point out that the special gain-adjustment circuit

shown in Fig. 1 had been supplied earlier, when I tested Hafler's XL-280 amp.

I wanted a consistently loud piece of music with which to make the final nulling adjustments, since I assumed that the louder music, with its more limited dynamic range, would enable me to adjust the internal potentiometers and trimmer capacitors more precisely. I therefore chose that old war-horse of an overture by Von Suppé, "Light Cavalry," as recorded by the Utah Symphony Orchestra on a Pro-Arte Compact Disc (CDD 402). The nulling adjustment was amazingly easy to make—even easier than I remembered from my tests of the lower-powered XL-280. Just for the fun of it, I then played some softer chamber music, using a Delos disc entitled *Brahms/Schumann Soiree* (D/CD 3025). Surprisingly, the adjustment was just as easy to perform with equal precision. I subsequently used an a.c. voltmeter to see if I could come even closer to a perfect null. I could not, so audible adjustment using headphones would seem to be just as accurate as with test instruments.

I was curious to find out if, indeed, a different adjustment would be required with a different set of speakers, as Hafler states in the owner's manual. To verify this, I used my other reference speakers, the KEF 105.2s. (I had not attempted this sort of check when I last used the Hafler Excelinear technique.) Sure enough, while the readjustment was quite minimal with this second set of speakers, it was needed.

The best way to characterize the sound of the XL600 would be to describe it as absolutely non-grating and as delivering high-frequency peaks that did not tend to be the least bit brittle or irritating. I hate to use the term "tube-like" sound, but I suspect this is just how some listeners would describe the Hafler XL600's sonic reproduction. Above all, this is an amp that simply will not run out of power with any pair of loudspeakers intended for high-fidelity home audio applications. More than that, the output signal the XL600 delivers into actual loudspeaker loads is as close a match to its input signal as I've seen in any amplifier I have ever tested.

Leonard Feldman



What Is The Meaning Of Life?

Many have pondered this weighty question, no one has found an answer that satisfies all.

At best, life is synonymous with what we know to be *real*, i.e. genuine, unaffected and natural. As life grows denser and more technologically complex, simplicity becomes more appealing.

The same applies to hifi. High end audio systems are now dedicated to

the transparent reproduction of authentic, lifelike sound.

Unfortunately, too many of us remain impressed with massive speakers that produce a brutish and exaggerated "larger-than-life" sound.

But truly lifelike sound is always more thrilling, simply by the sheer impact of its total fidelity. That's why it's universally acclaimed as "the real thing." Those who know the truth

when they hear it can't be satisfied by any substitutes or illusions of reality.

For them, we offer Celestion loudspeakers. A range of subtle and elegant components that deliver "lifelike" sound.

If you've had enough surreal sound to last a lifetime, we've been building the world's most honest loudspeakers for you. Discover the meaning of life at your qualified Celestion component dealer.

CELESTION

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2

SONY PCM-2500 DIGITAL AUDIO TAPE RECORDER

Manufacturer's Specifications

Tape Recorder

Sampling Frequencies: 48, 44.1, and 32 kHz.

D/A Conversion: 16-bit linear.

Frequency Response: 2 Hz to 22 kHz, ± 0.5 dB.

Dynamic Range: Greater than 90 dB.

THD: Less than 0.05% at 1 kHz, 4 dBs input.

Wow & Flutter: Below measurable limits.

Power Requirements: 100, 120, 220, or 240 V a.c.; 50/60 Hz; 37 watts.

Dimensions: 17 in. W \times 4 in. H \times 16 $\frac{3}{8}$ in. D (43 cm \times 10 cm \times 42 cm).

Weight: 27 lbs. (12.2 kg).

Interface Unit

Rated Analog Input Level: +4 dBs (0 dBs = 0.775 V rms).

Maximum Analog Input: +24 dBs.

Rated Analog Output Level: +4 dBs.

Maximum Analog Output Level: +24 dBs into 600 ohms.

Digital Input and Output Levels and Impedances:

Sony/Philips Digital Interface Format, 0.5 V peak to peak, 75 ohms; AES/EBU Format, RS-422, 110 ohms; Sony Digital Interface Format-2, TTL level, 75 ohms.

Sync Output for Sony Digital Interface Format-2: TTL level, 75 ohms; accuracy at 25° C ($\pm 2^\circ$), ± 30 parts per million; accuracy from -10° to +60° C, ± 60 ppm.

Maximum Cable Length for AES/EBU Format: 300 meters.

Power Requirements: 110, 120, 220, or 240 V a.c.; 50/60 Hz; 12 watts.

Dimensions: 17 in. W \times 4 in. H \times 15 $\frac{3}{8}$ in. D (43 cm \times 10 cm \times 39 cm).

Weight: 13.7 lbs. (6.2 kg).

Price: \$3,200.

Company Address: Sony Communications Products, 1600 Queen Anne Rd., Teaneck, N.J. 07666. For literature, circle No. 91

Although consumer versions of R-DAT machines remain unavailable in the U.S., pro R-DAT units are being eagerly gobbled up by small and large recording studios and other professional sound facilities. These R-DAT recorders generally cost quite a bit more than the consumer machines, but then again, they can do so much more.

Any *Audio* reader who absolutely, positively must have a DAT recorder right now can follow two courses of action. You can take a quick trip to Japan (or one of several European countries) and buy one; there is no prohibition against bringing R-DAT recorders through U.S. customs. Alternatively, you can search for a local dealer who has made the journey to Japan. Doing either will, naturally, substantially increase the unit's final price. If you follow the first method, you'll be paying for the trip as well as customs duty. If you follow the second, you'll be paying a substantial increase over the retail price in Japan—and, because manufacturers do not usually recognize "gray market" dealers, you are not likely to be given a factory warranty.

Recording engineers have a third option. They can walk into a pro dealer and obtain an imported R-DAT recorder that is guaranteed by its manufacturer. The price will still be high, but the pro machine, as mentioned, has much greater capabilities than a consumer model.

The Sony PCM-2500 is such a unit. It consists of two physically matching components which can be screwed together; a pair of side panels is supplied for this purpose. Cables are also supplied to connect the R-DAT recorder itself with the companion interface unit. But what makes the



PCM-2500 a professional product? For one thing, this combination is able to record, via its analog or digital inputs, at either the 44.1- or 48-kHz sampling rate. Consumer R-DAT units can only record at a sampling rate of 48 kHz via their digital or analog inputs—although they can play back prerecorded DAT cassettes that have been recorded at 44.1 kHz. This restriction was voluntarily assumed by the makers of consumer R-DAT machines in an effort to placate the major record companies. Because professional R-DAT models like the PCM-2500 can record at 44.1 kHz, they can make recordings that can readily be transferred to digital editing



equipment or used to make CDs. In addition, recordings can be made at a sampling rate of 32 kHz via the digital inputs; this sampling rate has become the standard for satellite transmissions in Japan and parts of Europe.

The PCM-2500, being a pro unit, does permit multiple sampling rates in recording as well as playback. I must stress that it does not permit dubbing a CD in the digital-to-digital mode if that disc has been encoded with the copy-inhibit flag. In addition to sampling-rate differences, the PCM-2500 interface unit permits the user to add pre-em-

phasis at will. It is equipped with XLR balanced-line connectors for compatibility with professional analog audio equipment. It is also fully compatible with three recognized digital interface standards that have evolved over the past few years; these are the AES/EBU, Sony/Philips, and Sony Digital Interface Format-2. (Incidentally, SDIF-2 is used in the Sony PCM-1630/1610 digital audio processor installed in many professional recording studios.)

The R-DAT recorder of the PCM-2500 strongly resembles the Sony DTC-1000ES, the one-box consumer model sold overseas, which I reviewed in the July 1987 issue. Although their rear panels differ, in that the PCM-2500 incorporates the various connectors needed for linking it with the interface box, the front-panel features are identical. Specifically, three types of subcodes (start ID, program number, and skip ID) can be "written" onto the tape. Start IDs permit each selection to be located at high speed, and program numbers allow any desired selection to be searched for directly. Skip IDs mark portions of the tape which the user wants the deck to zip past during playback. All of these subcodes can be "written" to a tape even after it has been recorded, without erasing any of the program material itself. As is true of the Sony DTC-1000ES, four-times oversampling, digital filtering, and separate D/A converters in each channel are used.

Recorder Control Layout

A power switch is at the left end of the panel, adjacent to the DAT cassette tray. Below this are a timer switch and a



The ability to make direct digital recordings at the sampling rate of 44.1 kHz is one mark that the PCM-2500 is a professional product.

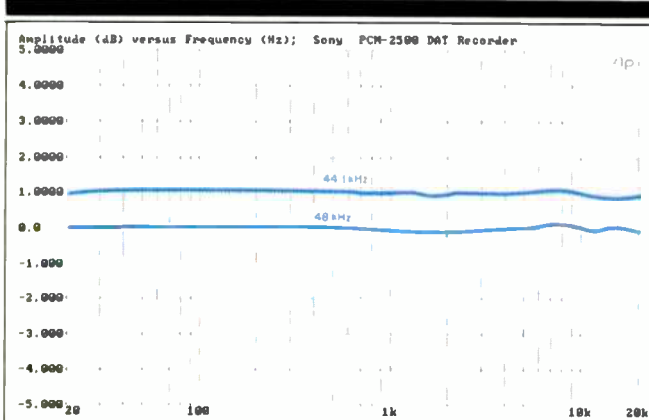


Fig. 1—Record/play frequency response at 48- and 44.1-kHz sampling rates.

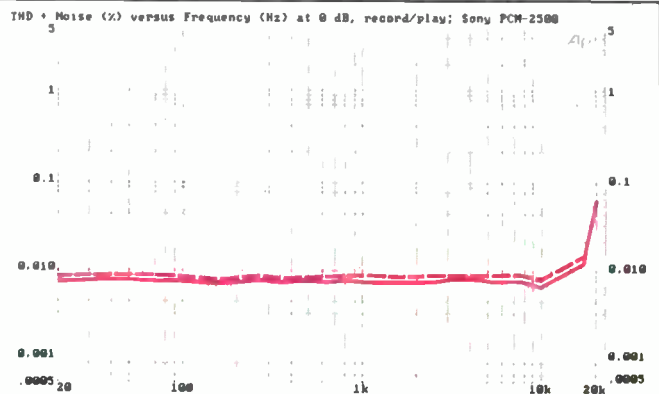


Fig. 2—THD + N vs. frequency at 0 dB (maximum) recording level, for record/play at 44.1 kHz. Dashed curve is right channel.

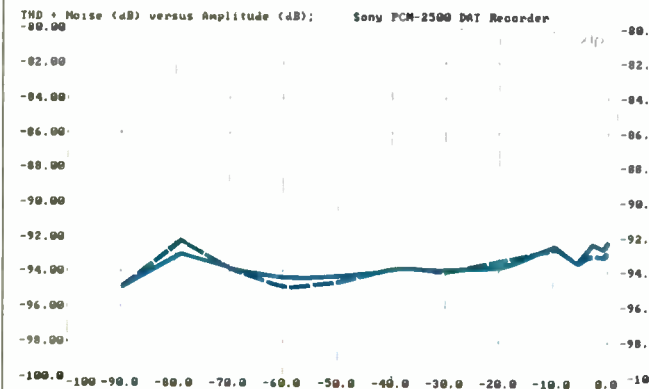


Fig. 3—THD + N vs. recording level for record/playback of a 1-kHz signal via the digital inputs. Dashed curve is right channel.

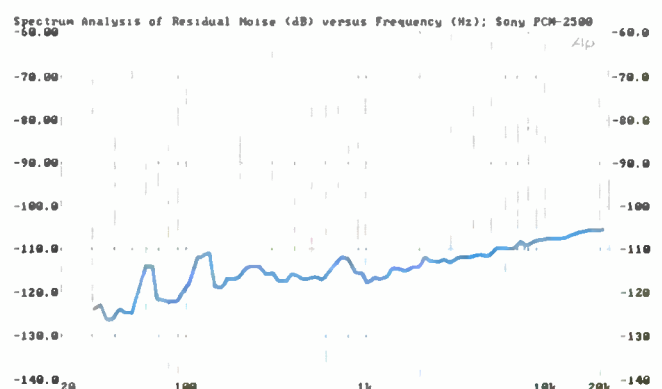


Fig. 4—Residual noise vs. frequency for playback of "quiet" track of test tape.

headphone jack. The tape-position indicator (which can show elapsed time within the current program, estimated time elapsed since the tape's start, or remaining tape time) is part of a large display area to the right of the tape tray. To the right of the position indicator are displays of program and "AMS" (Automatic Music Search) numbers. A pair of peak-level bar-graph meters, calibrated from below -50 dB up to 0 dB (followed by a red "Over" warning), take up the bottom of the display. Other indicators in the display panel are for tape-counter function, sampling frequency, presence of copy-inhibit code in digital input signals or in playback or its insertion in recording, pre-emphasis detection or use, skip and start ID (which light when IDs are written, erased, or detected during playback), and search-mode actuation. Finally a "Caution" light glows when condensation is present on the tape heads.

Below the display are buttons to open and close the tape tray and to start and stop play, plus rockers for forward and reverse fast-winding and program search. To the right of these transport controls are smaller buttons for record, pause, and record mute. Still further to the right are numeric buttons for accessing programs directly and the large, dual concentric recording level knobs. At the lower right of the panel are a "Skip" switch (set to the "On" position when you want skip IDs to be recognized during playback), an "Input Select" button (for choosing analog or digital input recording), and a small headphone level control.

Interface Control Layout

There are far fewer controls and switches on the interface unit of the PCM-2500 than on the main recorder. At the left are a power switch and a switch to select wired or wireless

Announcing a
new movement
to put more
power into the
hands of
more
people.



The A GTP-400 Tu The sound o



Adcom brings the superior performance of its separates (amplifiers, preamps and tuners) into a price range previously associated with ordinary receivers with the introduction of the new GTP-400 Tuner/Preamplifier. By combining the GTP-400 with one of Adcom's power amplifiers, you can now afford the clear sound, powerful dynamics and exceptional performance for which Adcom has been called "legendary" by the critics. The GTP-400 will put more power into your hands than you ever thought possible...and its sound is truly revolutionary.

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Because receivers have limited space, they cannot be equipped with the heavy duty, high-current, high-voltage power supplies available in

the best separate components. And if a receiver was so equipped, it would generate unacceptable levels of heat and hum, inevitably degrading all performance parameters.

Consequently, the overall performance of receivers is always compromised for the seeming advantage of all-in-one convenience and affordability.

The Tuner/Preamp Advantage

The GTP-400 Tuner/Preamplifier eliminates all such compromises. By dividing the tuner/preamplifier from the power amplifier, low-current, low-voltage elements are totally isolated from high-current, high-voltage elements ensuring sonic quality and superior performance.

And because the GTP-400 is designed to be used with any of Adcom's power amplifiers, you

Adcom Turner/Preamp: of a revolution.



have the advantage of choosing the right amount of power for your needs. If 60 watts per channel will drive your speakers to the level you want, consider our least expensive amplifier, the GFA-535. If you need more power, consider the 100 watt GFA-545 or Adcom's legendary 200 watt GFA-555. For the truly power hungry, the GTP-400 will drive two GFA-555's each bridged in mono, for an awesome 600 watts per channel.

Affordable High-Performance

Designers and engineers usually use Class "A" audio circuits in components where price is no object. Demanded by those who can distinguish outstanding sonic performance from merely average, Class "A" circuits are employed in the GTP-400's phono and high-level preamp stages. These circuits provide superior resolution and

dramatic musicality. It took Adcom's approach to high performance/high value to make Class "A" affordable.

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Several of Adcom's components have been favorably compared to other components costing two and three times more. The GTP-400 promises to keep faith with this tradition of exceptional value by delivering superb performance at a reasonable price. *(over please)*

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GTP-400/GFA-535 (60 watts/ch)*



GTP-400/GFA-545 (100 watts/ch)*



GTP-400/GFA-555 (200 watts/ch)*

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Optimum signal-to-noise ratios at both the phono and high level inputs ensure superior performance from your treasured LP's as well as your new compact discs and a wide range of HiFi video sources.

Proprietary linear-gain amplifiers in the high level and phono stages operate in full Class "A" to provide low distortion, low noise and high speed. High accuracy in the RIAA equalization circuit provides superb sound from high output moving coil or moving magnet phono cartridges.

A separate recording selector allows listening to one source while recording another. Feedback tone controls and contouring circuits can fine tune your system to room acoustics or individual listening tastes.

The Tuner Section

Quartz-referenced and digitally synthesized, the tuner has an accuracy of 0.00025% providing a significant reduction in audible distortion.

Eight FM stations and eight AM stations can be programmed for instant retrieval at the touch of

Specifications

Preamplifier

Total harmonic distortion: <0.01%
 IM distortion: 0.005%
 Frequency response: 20 Hz - 20 kHz \pm 0.1 dB
 Maximum output level: >8 volts
 Input sensitivity for .5V output:
 Phono: 0.8 mV
 High level: 78 mV
 Signal-to-noise ratio:
 For .5V output: Phono: 80 dB
 For 2V output: High level: >95 dB
 Tone controls:
 Bass (40 Hz) \pm 9.0 dB
 Treble (15 kHz) \pm 7.5 dB
 Output impedance: 100 ohms
 Voltage: 117V/60Hz (Available in 220V/50Hz on special order)
 Dimensions: 17 \times 3 $\frac{1}{4}$ \times 12 $\frac{1}{4}$ "
 (432 \times 80 \times 325 mm)
 Shipping weight: 15 lbs (6.8 kg)

FM Tuner

IHF sensitivity, mono: 11 dBf
 Signal strength for -50 dB quieting,
 mono/stereo: 13.5/37 dBf
 Capture ratio: 1.7 dB
 Alternate channel selectivity: 75 dB
 Separation at 1 kHz: 50 dB
 THD/stereo at 1 kHz: 0.1%
 Maximum signal-to-noise ratio,
 mono/stereo: 80/75 dB
 Frequency response: 30 Hz - 15 kHz \pm 0.5 dB
 Antenna impedance: 75 or 300 ohms

a button. Once a station is tuned in, it's locked in without drift. A touch of another button activates the scan mode, up or down.

When reception conditions are marginal, a switchable high-blend circuit reduces background noise and fading of FM stereo signals.

The Sound of a Revolution

The price of the GTP-400 with a GFA-535 power amplifier (illustrated above, left) is close to that of a good receiver. But that's as close as they get. . . because no receiver will deliver the wide dynamic range and lasting satisfaction of an Adcom music system.

So if you would like to be part of the new movement towards bringing more power into your home, ask your Adcom dealer to demonstrate the GTP-400 with any Adcom power amplifier. You'll hear what a revolution sounds like.



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*Power output, watts/channel, continuous both channels driven into 8 ohms, 20 Hz - 20 kHz <0.09% THD. © 1988 ADCOM

The interface unit provides connections for three major digital signal formats, and it has balanced-line analog input and output jacks.

remote control (both of which are supplied) or neither. The wired remote is essential when the recorder is not in the operator's line of sight, as often happens in recording-studio control rooms. A jack for the wired remote is below the switch. At the extreme right of the panel are recessed, screwdriver-adjustable record and playback level controls. The record level controls adjust the interface unit's output level to the recorder within a range of -20 to -2 dB. The playback level controls adjust the output level at the analog output connectors within a range of -6 to $+12$ dB. Several small toggle switches are at the lower right corner of the panel. The first selects one of the three available digital interface formats. Next come on/off toggles for "Emphasis" and "Master Safe." (When the latter is on, recording cannot take place, regardless of other switch settings.) The final toggle switches are "Copy Prohibit (Write/Off)" and "Sampling Frequency (44.1 kHz/48 kHz)." The "Sampling Frequency" switch is only needed when recording from the analog inputs. If the digital inputs are used, the PCM-2500 automatically sets its sampling rate to 48, 44.1, or 32 kHz to match the incoming signal. (The 32-kHz sampling rate is only available through the AES/EBU and Sony/Philips digital inputs.)

Once the cables have been connected between the R-DAT recorder and the interface unit (the supplied cables cannot be connected incorrectly since the plugs are all different), all signals are routed to and from the PCM-2500 via the interface unit.

The interface's rear panel has connectors for use with the three standard digital formats, a "Word Sync Out" connector for use with SDIF-2 signals, a ground terminal, a "Voltage Selector," and stereo pairs of balanced-line XLR analog input and output connectors. The XLR connections are wired with pin 1 as ground, pin 2 as the hot lead, and pin 3 as the return or cold lead. A line-voltage selector completes the rear-panel layout.

Measurements

The multilingual owner's manual incorporates some excellent diagrams that illustrate how digital and analog interconnections should be made between the PCM-2500's units and between the PCM-2500 and other equipment. It took me only a few moments to make the necessary connections between the PCM-2500 and the input and output terminals of my Audio Precision System One test equipment, after which the DAT recorder was up and running.

In preparing to test the PCM-2500, I thought it necessary to record several definitive test tones (via the analog inputs) and to play them back and measure the results via the complete record/play loop. This is the same procedure I would follow for any tape recorder. But the PCM-2500 is also a digital tape player, so I wanted to know how well it could play back the tape I have been using to test car DAT players. (This tape is a dub of the CD-1 test disc I use when evaluating CD players.)

Since the copy-inhibit flag prevents me from making further digital-to-digital dubs from my CD-1 disc, I also wanted to record the contents of my CD-1 dub using the PCM-2500 in the digital-to-digital mode, with my Sony DTC-1000ES DAT recorder as the playback device and its digital output

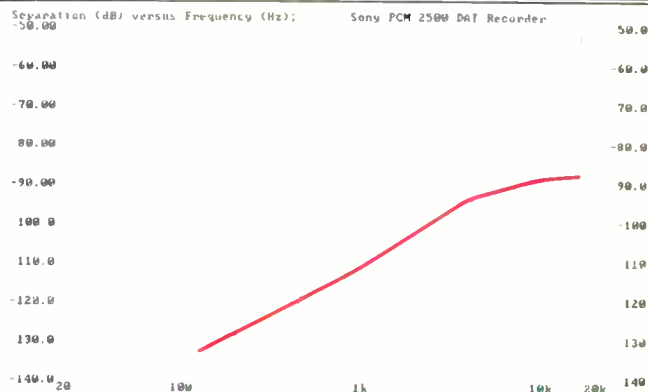


Fig. 5—Interchannel separation. Even after full record/play cycle, separation was virtually

identical from left to right and right to left, so only one curve is shown.

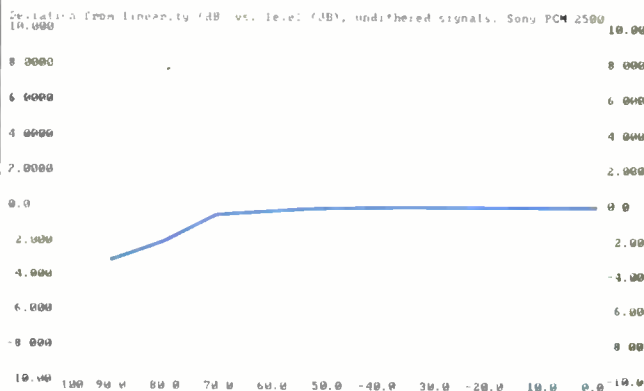


Fig. 6A—Deviation from linearity for direct digital record/play of undithered

signals at 44.1-kHz sampling rate.

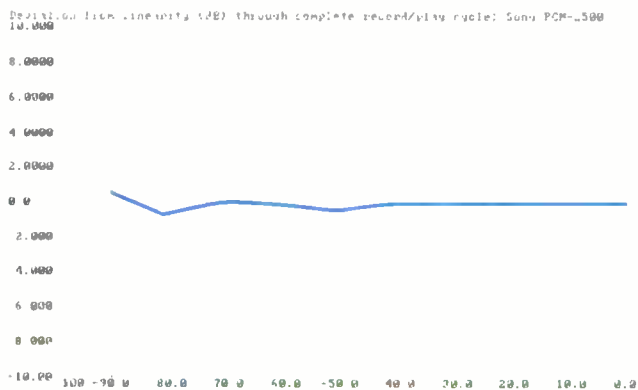


Fig. 6B—Same as Fig 6A but recorded via analog inputs. Note that there

was less deviation from linearity in this mode.

After switching between the 48- and 44.1-kHz sampling rates during recording, all I heard in the playback was a slight transition click.

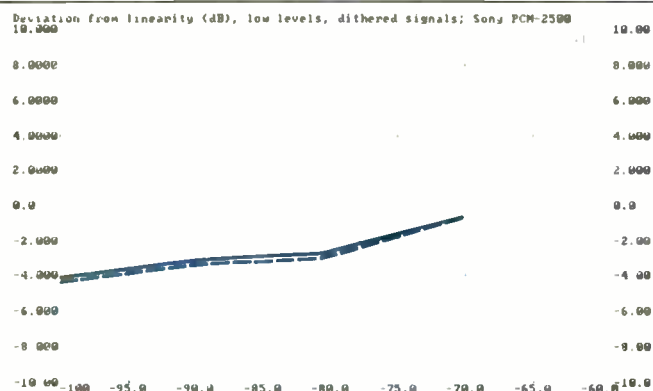


Fig. 7A—Deviation from linearity at low signal levels, using dithered signals played back from **digitally recorded test tape at 44.1 kHz. Dashed curve is right channel.**

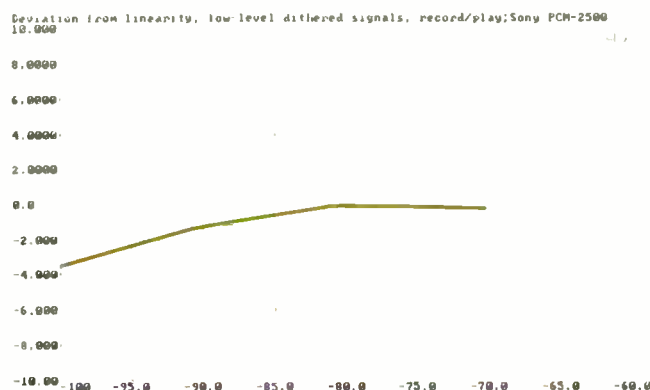


Fig. 7B—Same as Fig. 7A but for full record/play cycle of one channel.

fed to the digital input of the PCM-2500. After making comparison measurements for a few of the tests in this report, I eventually abandoned this latter approach, since I could see no difference in performance between playback of the copy I made on the PCM-2500 from the CD-1 dub and playback of the CD-1 dub itself. Therefore, though some of the test results that I will present were obtained by recording via the PCM-2500's analog inputs and some by recording via the digital connections, others were obtained by playing back my existing CD-1 dub. This combination of tests, I feel, presents a thorough analysis of this professional R-DAT recorder's capabilities.

First, I applied an analog frequency sweep signal from my Audio Precision test system to the analog inputs of the PCM-2500. The recording was made at the 48-kHz sampling rate and was played back to produce the response curve shown in Fig. 1. Other than a very slight rise around 7 to 9 kHz, amounting to no more than about +0.2 dB, frequency response was virtually flat from 20 Hz to 20 kHz for this complete record/play cycle. The procedure was repeated,

this time using a sampling rate of 44.1 kHz. These results, also shown in Fig. 1, were substantially the same (if anything, the slight rise was a bit smaller), so the curve has therefore been displaced by 1 dB for clarity. Again, the signal was supplied by my DAT copy of the sweep signal from the CD-1 test disc.

Figure 2 is a plot of THD + N versus frequency, using a signal level of 0 dB (maximum recording level). The results were obtained by copying my CD-1 dub, using the analog outputs of my DTC-1000ES and the analog inputs of the PCM-2500, and then playing back via the PCM-2500's analog outputs. For much of the frequency range, THD + N measured 0.007% for the left channel and 0.008% for the right. A rise in THD + N can be seen above 10 kHz, but even at 20 kHz, THD + N was still below 0.1%.

Using direct digital connections for recording yielded somewhat better results. Figure 3 shows how THD + N varied as a function of recorded level for a 1-kHz signal. As usual, this graph depicts THD + N in dB referred to maximum recorded level, and at all levels, it was at least -92 dB. If one wanted to translate this to a percentage, THD + N would be less than 0.0025% at 0 dB and would be even better at lower levels. Since the distortion shown in Fig. 2 is 0.007% at 1 kHz and 0 dB, it's obvious that some quantization distortion is added when going through the entire record/play cycle via the analog inputs and outputs of the machine. The additional THD + N is by no means audibly significant, but it is there, nevertheless. Although Sony's literature does not mention the methodology used in their A/D conversion (during recording), I have ascertained that it does not involve oversampling nor does it employ digital filtration. This may possibly account for the added quantization distortion.

Overall, A-weighted signal-to-noise ratio of the PCM-2500, after recording and playing the "silent" track of my CD-1 through the deck's analog inputs, measured 90.93 dB for the left channel and 91.72 dB for the right. By contrast, when I played back the "silent" track from the same tape on the PCM-2500 and plotted the residual noise (Fig. 4), at no frequency did the noise level exceed -105 dB relative to maximum recorded level. Again, this shows that some noise is contributed by the PCM-2500's analog input circuitry.

Figure 5 shows how separation varied with frequency. This is a worst-case result, having been derived from a test tape that was put through the entire record/play cycle. At 10 kHz, separation in either direction was still around 88.9 dB, decreasing slightly to around 88 dB at 16 kHz. At 1 kHz, separation was more than 110 dB between channels.

The results of the two linearity tests represented by Figs. 6A and 6B are especially interesting. In Fig. 6A, a series of signals, each decreasing in amplitude, was recorded from my CD-1 tape copy onto a new tape in the PCM-2500. The 44.1-kHz sampling rate was used, as was the digital-to-digital recording mode from my own DAT recorder to the PCM-2500. Deviation from perfect linearity was certainly not excessive—only 3 dB at -90 dB recorded level. However, when the same signal was recorded from the analog outputs of my consumer DAT deck into the analog inputs of the PCM-2500, playback resulted in even less deviation from linearity (Fig. 6B). The only explanation I can offer is that the

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I've never heard an analog recording of my voice that sounded like me, but the voice I heard from this Sony deck sure did!

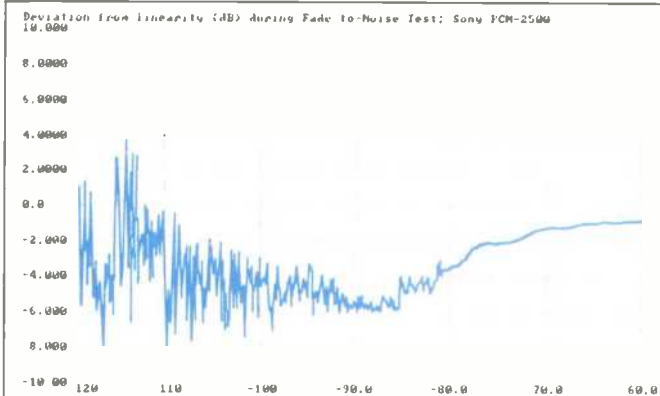


Fig. 8A—Fade-to-noise test, for playback of digitally recorded test tape at 44.1 kHz.

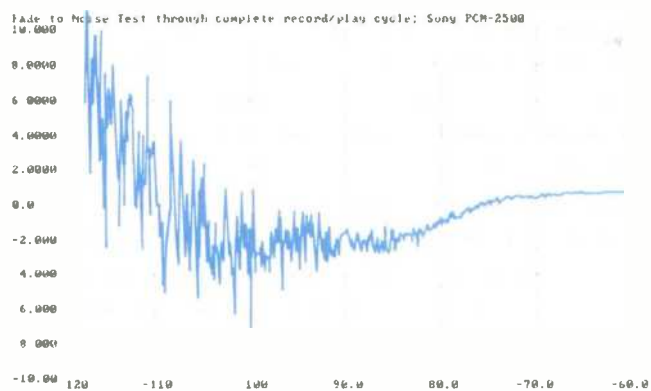


Fig. 8B—Same as Fig. 8A for full record/play cycle via analog inputs and outputs. Predictably, the noise level is higher than in digital-to-digital recording.

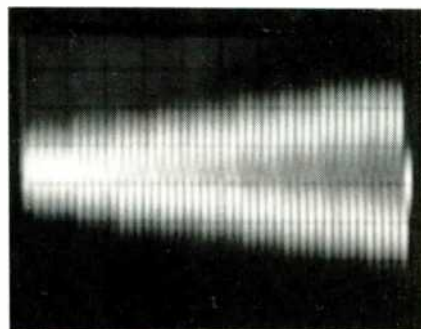


Fig. 9—Monotonicity test.

combination of the D/A converters in my unit and the A/D converters in the PCM-2500 may have produced a positive-going deviation from perfect linearity which nearly cancelled out the negative-going deviation seen in Fig. 6A.

The plots in Fig. 7A were obtained when I used the PCM-2500 to play back the low-level, digitally recorded dithered signals of my CD-1 dub. Maximum deviation from perfect linearity was -4 dB at -100 dB recorded level. Going through the entire record/play cycle via the analog outputs and inputs resulted in a somewhat smaller deviation from linearity (Fig. 7B). These results further confirm my theory regarding the cancelling effects of A/D and D/A errors in the two recorders. I had no way to determine whether the compensation was being afforded by circuits in the DTC-1000ES consumer DAT recorder or in the A/D converter section of the PCM-2500. In any case, these differences are so slight that, from an audibility standpoint, they are rather academic. Then, too, there's no predicting whether the D/A and A/D converters in any other PCM-2500 will exhibit exactly the same linearity characteristics as my sample.

Interesting results were also obtained when I employed the fade-to-noise signals from my digital tape copy of the CD-1 test disc. Initially, I simply played back this track of the tape in the PCM-2500. Results are shown in Fig. 8A. Next, I recorded and played back the same signal, using the analog outputs of my own DAT machine and the analog inputs of the PCM-2500 (Fig. 8B). Note how much more noise is evident at the extremely low levels, from around -100 dB downward, in Fig. 8B. Clearly, the additional noise must be coming from the D/A converters of my own DAT machine, the A/D conversion process of the PCM-2500, or both.

Finally, I recorded the monotonicity test signals of my CD-test dub. A slight amount of jitter during playback made the signal difficult to "lock" or synchronize on my oscilloscope, but Fig. 9 is still sufficiently clear to illustrate the nearly perfect uniformity and symmetry of the signal's positive-going and negative-going steps.

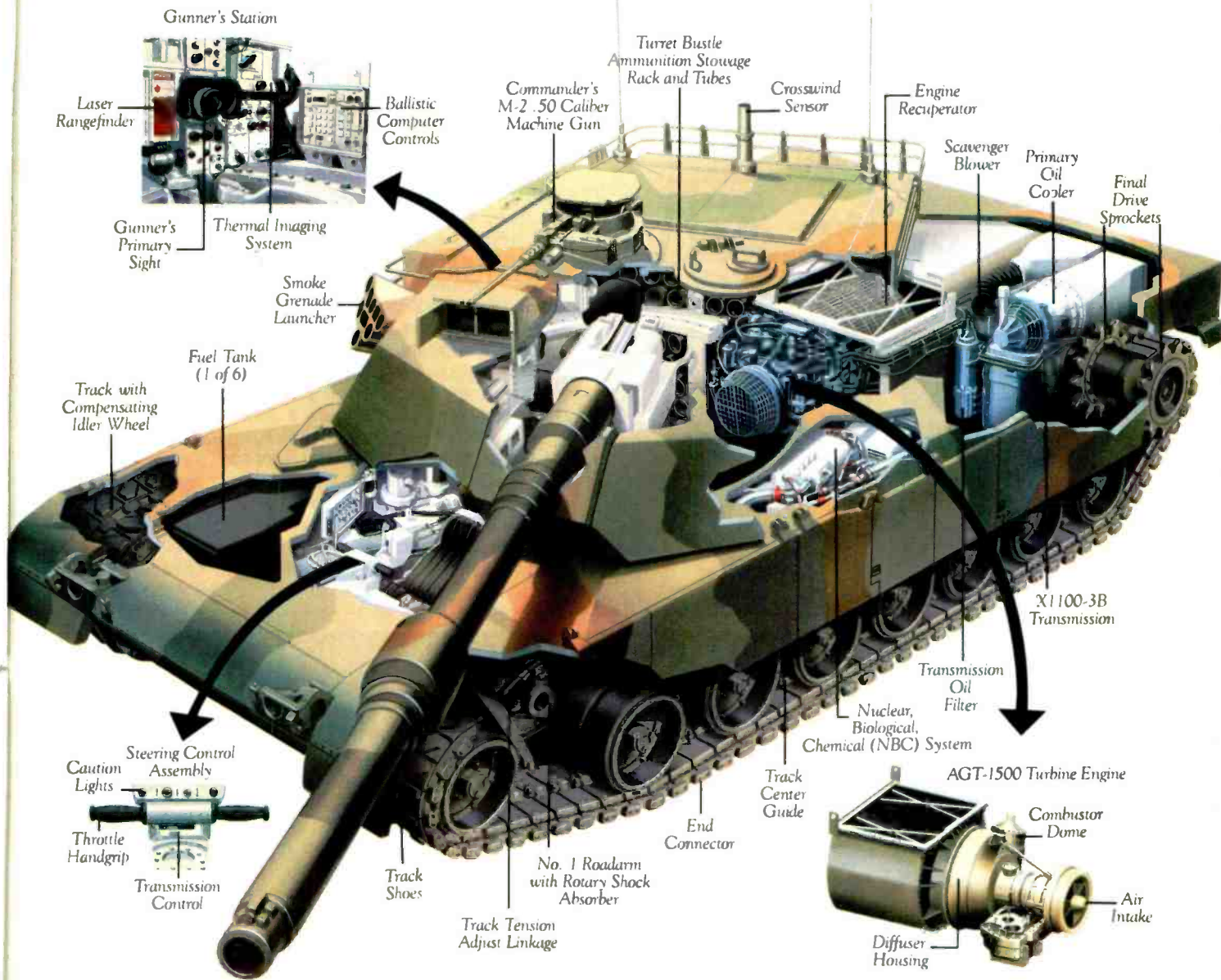
Use and Listening Tests

After using my own DAT machine, which has only 48-kHz digital recording capability and does not let me add emphasis to my recordings, it was a joy to be able to use the full range of technology built into the R-DAT Standard. I did not have access to any of the equipment that utilizes the special professional digital interface modes, but even being limited to DAT digital-to-digital recording, I became increasingly angry that this technology is not granted to us "ordinary" consumers.

It's worth mentioning again how quickly a DAT machine can access a given numbered selection. High-speed search occurs at something like 200 times normal tape speed! Being able to number selections, either while they are being recorded or during post-production work, is also a most convenient feature, as are the numerous helpful displays made possible by the R-DAT subcodes.

In addition to test signals, I recorded my voice using an old pair of Beyer 500 microphones and an equally old little TEAC mixer. Of course, neither the mikes nor the mixer were up to the quality of the PCM-2500, but I was still impressed with the noise- and distortion-free sound in playback. In the

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past, whenever I have heard analog recordings of my voice, I have tended to say that they didn't really sound like me. I've always thought that this was a normal reaction, because we don't hear ourselves as we sound to others. Surprisingly, when I played back my voice recordings made on the PCM-2500, I could honestly say that the voice I heard did sound like Len Feldman! I transcribed several CDs, too, though I had to copy them through the analog outputs of my CD player and the analog inputs of the PCM-2500. In some cases, I deliberately switched from the 44.1- to the 48-kHz sampling rate in the midst of recording. During playback, I could detect only a slight click at the point where the switching had been done. There was no difference in perceived sound quality or tonal balance.

As I testified many times during the fight against Copy-Code, DAT represents a new and better type of professional and consumer tape recording technology. It should be available, in appropriate form, to both professionals and serious audio enthusiasts who are willing to pay for it. Until it is, I suspect that those of us who want this technology at any cost and who can't make a pilgrimage to Japan or Europe will simply have to find some way to purchase—and afford—the professional PCM-2500. In so doing, the buyer will get not only a superb tape recorder, but the very facility the recording company giants hoped to deny consumers—the ability to do digital-to-digital taping.

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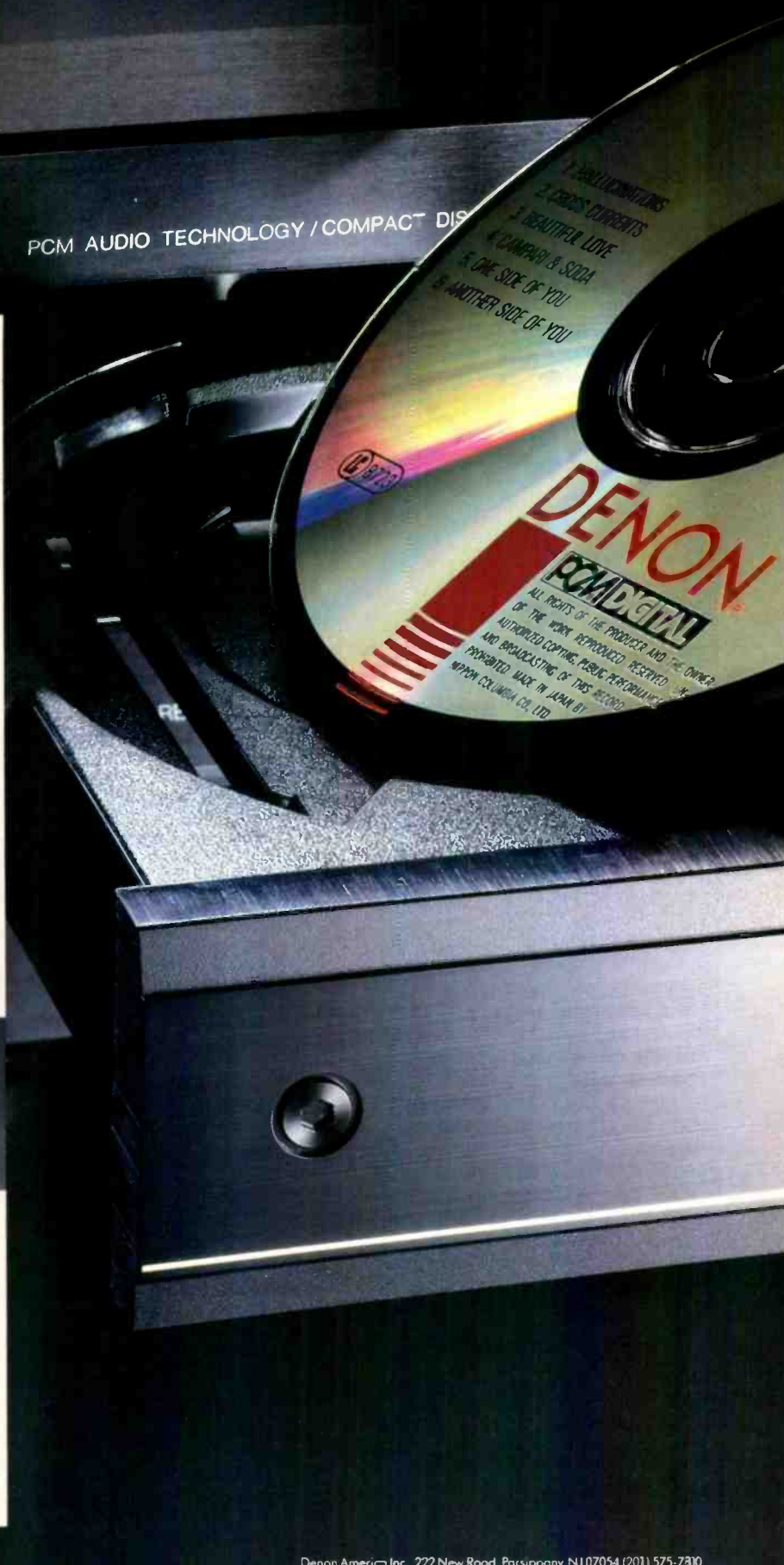


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3

TERK 9600 Pi FM ANTENNA

Manufacturer's Specifications

Dimensions: 5¼ in. diameter × 1¾ in. thick (13.3 cm × 2.1 cm).

Price: \$85.

Company Address: Terk Technologies, 56 Harrison St., New Rochelle, N.Y. 10801.

For literature, circle No. 92

When I first saw the new Terk Pi indoor FM antenna, I was sure that it couldn't do as good a job of receiving FM signals as an ordinary, simple wire dipole. I was even more convinced that this little disc-shaped antenna couldn't compete against a properly oriented rabbit-ears unit. Considering that my good friend Larry Schotz had done the electronic design, I should have known better. It is a truly amazing product!

Offered in a choice of white or gray matte finish, the Pi is not much larger in diameter than a Compact Disc. Its size and shape make it possible to place the unit anywhere—even on top of a tuner or receiver, or on the shallowest of shelves. This antenna's unusual styling, as important a feature as its performance, was a joint effort of Neil Terk, an award-winning industrial and graphic designer turned manufacturer, and John Lonczak, another accomplished industrial designer. As for the electronics, the Pi incorporates a low-noise amplifier, developed by Schotz, that provides up to 30 dB of gain.



The circular antenna rests in its horizontal position for omnidirectional reception, or can be positioned vertically and oriented for best reception of weaker signals. A 75-ohm shielded cable carries d.c. operating power and the received r.f. signal back to the FM tuner or receiver. The unit comes with its own impedance-matching transformer and a separate a.c. power adaptor. If your tuner or receiver is equipped with a switched a.c. receptacle, the adaptor can be plugged into it. This antenna will then draw power only when the tuner or receiver is turned on. However, even if you leave the a.c. adaptor plugged into a live receptacle at all times, it's not likely to affect your electric bill much, as the Pi consumes only a watt or so of power.

Little information was supplied regarding technical specifications, but then again, proof of performance was

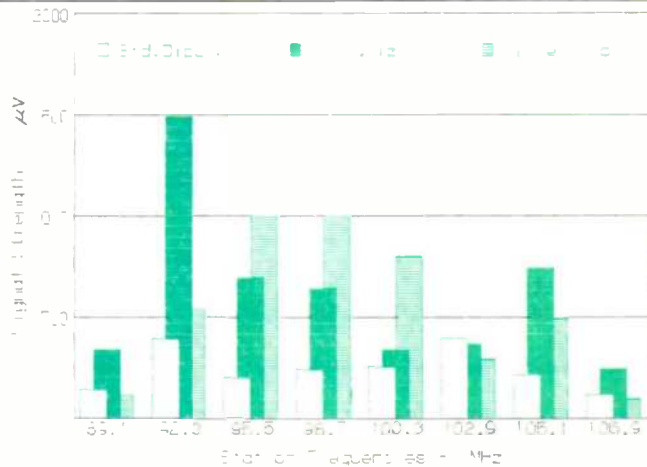
easy enough to establish. My tests consisted of measurements of the Pi versus the performance of a standard, indoor wire-dipole antenna, followed by extensive listening tests.

Measurements and Listening Tests

To conduct the comparison tests, I mounted a simple dipole on an outside wall of the lab, orienting it for best reception of station signals arriving from the west. (The lab is about 20 miles directly east of New York City, where most local stations' transmitting antennas are located.) Using a Blonder-Tongue Model FS-2 field-strength meter, I tuned in several signals and noted their frequency and their indicated signal strength. The field-strength meter's most sensitive full-scale readings are 100 μ V, so it is easily possible to read down to 10 μ V if necessary.

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Fig. 1—
Performance comparison between the Terk Pi, in horizontal and vertical orientations, and a simple dipole antenna.



Next, I connected the Terk Pi antenna to the meter and tuned to the same frequencies as before. I alternately measured the signal strength when the Pi was positioned vertically and oriented for strongest signal and when it was mounted horizontally, flat on the test bench. The results, seen in the bar graphs of Fig. 1, pretty well speak for themselves. For all but one of the signals (102.9 MHz), the Pi, in one or both of its mounted positions, outperformed the dipole. In five out of eight cases, improved performance, compared with the dipole, was noted regardless of the Pi's orientation. For two of the remaining stations, the signal strength was actually higher with the Pi in its horizontal (omnidirectional) position than when it was set vertically and oriented for maximum signal strength. Perhaps these two stations are transmitting only horizontally polarized signals. Table I

Table I—Signal-level changes for Terk Pi antenna relative to a wire dipole.

Frequency, MHz	Maximum Change, dB
89.1	+7.36
92.3	+11.48
95.5	+12.04
98.7	+12.04
100.3	+9.87
102.9	-0.5
105.1	+10.46
106.9	+6.02

shows how the signal strengths pulled in by the Terk, in its best orientation for each of eight stations, compared with those from the simple dipole antenna. Note that the Terk's signal was significantly greater on all but one station, and only marginally poorer on that lone exception.

As impressive as these results may be, the real proof of performance comes in the listening tests. It is relatively easy to add an r.f. amplifier to an antenna and thereby boost apparent incoming signal strengths as measured on a field-strength meter. Unfortunately, in the past, many antennas that used this approach amplified the noise as much as the desired signal. Since FM performance is judged primarily in terms of signal-to-noise ratio, such boosters were of little or no practical use. The nice thing about this Schotz-designed circuit is that, even though it amplifies the incoming signal, its own noise factor is so low that it makes the signal sound quieter than an amplified dipole would.

Am I suggesting that the Terk Pi antenna can replace a multi-element outdoor FM antenna? Of course not. But for the apartment dweller who is not permitted to install an outdoor antenna or even for the homeowner who prefers not to, the Terk Pi is as nicely styled and as effective an indoor FM antenna as you are likely to find. Having something that looks as good as this and works well, too, is a rare treat.

Leonard Feldman

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4

AUDIO DYNAMICS T-2000E TUNER

Manufacturer's Specifications

FM Section

Usable Sensitivity: 11.2 dBf.

Frequency Response: 20 Hz to 15 kHz, ± 1.0 dB.

S/N: Mono, 75 dB; stereo, 70 dB.

THD at 1 kHz: Mono, 0.1%; stereo, 0.2%.

50-dB Quieting Sensitivity: Mono, 16.2 dBf; stereo, 40 dBf.

Separation at 1 kHz: 43 dB.

Alternate-Channel Selectivity: 67 dB.

Adjacent-Channel Selectivity: 9 dB.

Capture Ratio: 1.5 dB.

AM Rejection: 55 dB.

Image Rejection: 80 dB.

I.f. Rejection: 80 dB.

Spurious-Response Rejection: 80 dB.

Subcarrier Suppression: 60 dB.

Stereo Threshold: 22 dBf.

Output Level: 500 mV.

AM Section

THD at 1 kHz: 0.8%.

S/N: 40 dB.

Selectivity: 36 dB.

I.f. Rejection: 30 dB.

Image Rejection: 40 dB.

Output Level for 30% Modulation, 1 kHz: 150 mV.

General Specifications

Power Requirements: 120 V a.c., 60 Hz, 8 watts.

Dimensions: 17 in. W \times 2 $\frac{1}{8}$ in. H \times 12 $\frac{5}{8}$ in. D (43 cm \times 5.35 cm \times 32 cm).

Weight: 7 lbs. (3.2 kg).

Price: \$349.

Company Address: 851 Traeger Ave., #210, San Bruno, Cal. 94066. For literature, circle No. 93



Most readers of *Audio* are familiar with the name Larry Schotz. His innovative FM and r.f. circuits have found their way into many products sold by many companies which have employed his consulting firm over the last decade or so. Now Schotz has lent his expertise to a moderately priced AM/FM tuner offered by Audio Dynamics. To be sure, Schotz's only apparent contribution was his noise-reduction system; the rest of the circuitry is relatively conventional in design and performance. But when stereo reception in your listening location gets noisy, being able to push that "Schotz NR" button and realize usable reception by means of a carefully controlled amount of blending makes this tuner worth considering. Physically, it is one of the most low-slung

components I've seen in quite a while; the designers obviously realized that they didn't have to wrap the circuitry in a tall but partially empty enclosure. The T-2000E stands only a bit over 2 inches high and will therefore fit under or above other components without taking up much shelf space. The owner's manual suggests that the unit requires no special cooling or ventilation, which is no great surprise since it consumes not much more power than a 7-watt night light.

Control Layout

A power button is at the lower left of the slim front panel. Nearby, arranged in a single row, 10 tiny numbered buttons and a "Memory" button enable you to store the frequencies

of 10 FM plus 10 AM stations for instant recall. A display area near the center of the panel shows selected frequency, signal strength (using four LED segments), and whether a stereo signal is being received. A remote sensor is also located in the display area. While the tuner itself is not supplied with a remote control, this sensor accepts infrared commands from the remote control supplied with the Audio Dynamics CA-2000E integrated amplifier.

Further to the right are buttons for "FM" and "AM" selection, "Schotz NR" on/off, up and down tuning, and mono/stereo. The Schotz noise-reduction circuit can be activated only in the stereo mode. When this circuit is in operation, its control button lights up to show that the circuit is active. Depending on signal strength and high-frequency content, the Schotz NR circuit dynamically reduces the contribution of the high-frequency difference (L - R) signal, effectively blending the channels. The result is less noisy stereo reception but some loss of separation. When the signal is strong enough, the blending shuts off automatically.

The rear panel has 75-ohm coaxial as well as 300-ohm antenna terminals, a pair of terminals for connecting a supplied AM loop antenna or an external AM antenna, and the usual left and right output jacks. The loop antenna is mounted in a bracket attached to the rear panel so that the loop can be swung away from the panel and oriented for best AM reception.

Measurements

Figure 1 shows the T-2000E's FM frequency response, which actually turned out to be considerably better than the published specification. There was a slight attenuation of no more than -0.3 dB at 20 Hz, while the treble end of the response curve deviated by no more than $+0.15$ and -0.1 dB. Response of both channels was identical.

Figure 2 shows how residual noise varied with input signal strength. Ultimate quieting at 65 dBf and higher fell short of the claimed 75 dB for mono; I measured 70 dB. In stereo, without Schotz NR, quieting was 65 dB at 65 dBf (again, 5 dB lower than the spec); at 80 dBf, ultimate quieting was 67 dB. In mono, 50-dB quieting occurred with an input signal of 22.5 dBf; in stereo, 38 dBf of signal strength was needed to produce 50 dB of quieting. With the Schotz noise-reduction circuit active, no difference could be detected in the stereo quieting curve at strong signal levels. However, in the region between 20 dBf (the stereo threshold) and 40 dBf, signal-to-noise readings were clearly better with the Schotz circuit turned on. For example, at 30 dBf, stereo S/N was approximately 43 dB without the noise-reduction circuit and 50 dB with the circuit in use. At low signal levels, a 7-dB improvement is quite significant—and audibly so, as I proved later, when listening to weak signals.

Figure 3 shows how THD + N varied as a function of signal strength. The incoming signal was modulated with a 1-kHz audio tone, to 100% total modulation for both mono and stereo. Usable sensitivity, defined as the signal level which produces residual noise and THD of 3%, measured 12.5 dBf in mono. In stereo, it is determined by stereo threshold and varied from 20 to 30 dBf, depending on the station frequency at which the test was made. Harmonic distortion for strong signals, using a 1-kHz modulating tone,

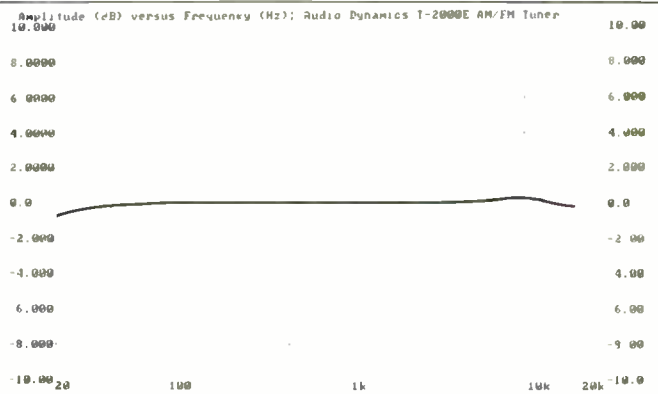


Fig. 1—FM frequency response was identical for both channels.

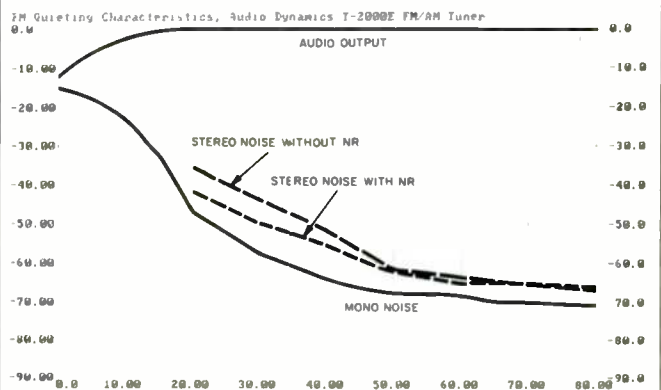


Fig. 2—Mono and stereo quieting characteristics. Note the difference in stereo noise at low signal levels when Schotz NR is used.

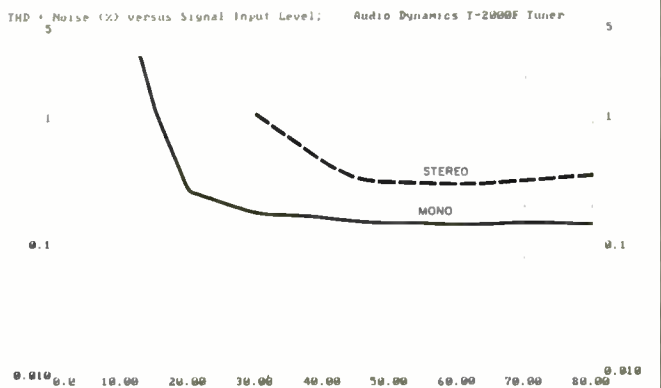


Fig. 3—THD + N vs. signal strength at 1 kHz.

The T-2000E's performance is good but conventional, until you switch in the Schotz NR circuit to clean up noisy stereo stations.

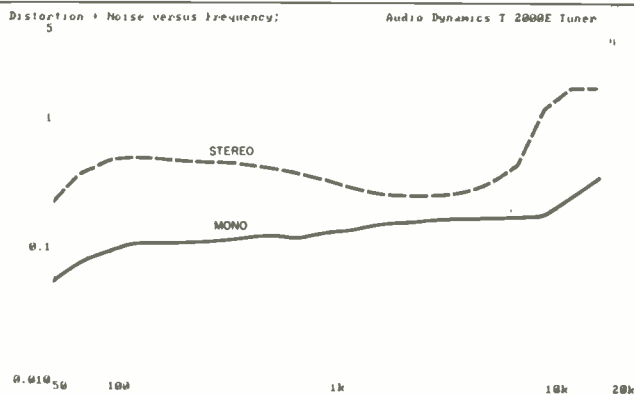


Fig. 4—THD + N vs. frequency.

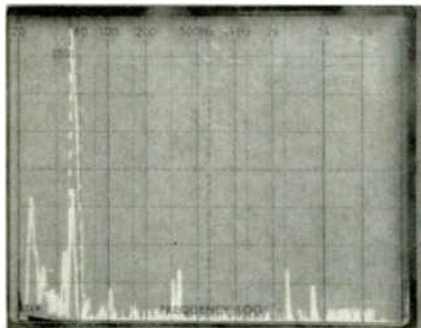


Fig. 5—Separation and crosstalk components for a 5-kHz FM modulating frequency; see text.

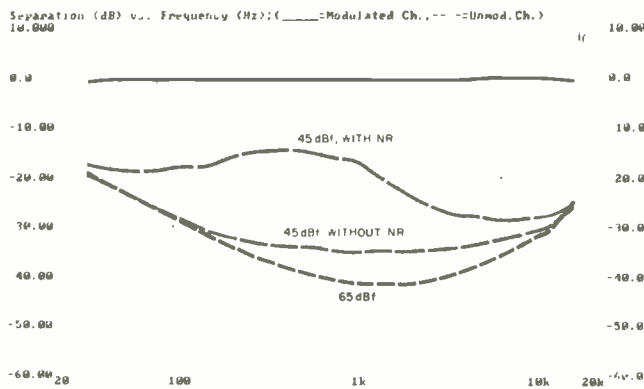


Fig. 6—Frequency response (top curve) and stereo separation at two signal levels. Note the deliberate reduction in mid-frequency separation that occurs when Schotz NR is used.

measured 0.16% in mono and between 0.31% and 0.35% for stereo. To determine distortion at other frequencies, a sweep of distortion plus noise versus frequency was made using a constant input signal strength of 65 dBf (Fig. 4). For the three frequencies at which THD is supposed to be quoted, for mono I read 0.1% at 100 Hz, 0.16% at 1 kHz, and 0.185% at 6 kHz. In stereo, the readings were 0.5% at 100 Hz, 0.32% at 1 kHz, and 0.42% at 6 kHz.

Figure 5 shows my usual spectrum analysis sweep while measuring the output of the channel that has been fully modulated with a 5-kHz tone. (The sweep extends linearly from 0 Hz to 50 kHz.) The spike at the extreme left of the display can be ignored, for it is simply a zero beat of the heterodyning oscillators within the spectrum analyzer. The tall spike near the left of the oscilloscope's screen represents the desired 5-kHz output. A second sweep, made while the analyzer was connected to the output of the unmodulated channel, shows separation of approximately 40 dB at 5 kHz as well as spurious and harmonically related crosstalk products. The worst of these products is a full 60 dB below the opposite channel's maximum level, and you can see evidence of 19- and 38-kHz residual products in addition to sidebands surrounding 38 kHz.

Figure 6 shows FM frequency response (top curve) and stereo separation. Separation was 41.5 dB at 1 kHz, 29 dB at 100 Hz, and 32 dB at 10 kHz. With signal strength reduced to 45 dBf, separation tended to decrease slightly, even without Schotz NR. When the Schotz circuit was turned on, its blending action was clearly evident: Separation at 100 Hz was reduced to approximately 18 dB; at 1 and 10 kHz, separation now measured 17 and 28 dB, respectively. These separation figures are still sufficient to render a good stereo image. The advantage of this dynamic blend action is that out-of-phase noise in the L - R stereo subcarrier signal is partially cancelled.

Capture ratio for the FM section read 1.8 dB, and alternate-channel read 70 dB. Image, i.f., and spurious-response rejection were all between 80 dB (the published specification) and 85 dB, depending on the station frequency at which the measurements were made. AM rejection was 53 dB, and subcarrier suppression was 62 dB. SCA rejection, not specified by the manufacturer, measured just over 60 dB.

Using the newly standardized pre-emphasis of 75 μ S between my audio generator and the modulation input of my AM r.f. generator, I was able to obtain a fairly good frequency response for the AM section, as shown in Fig. 7. The -6 dB points, which are usually used to specify the bandwidth of AM response, were at 42 Hz and 4.2 kHz. Distortion, for a 1-kHz signal modulating the AM carrier to 30%, was 0.73%. Other measured parameters included S/N of 43 dB for a 10-mV input signal, i.f. rejection of 30 dB at 1 MHz (exactly as claimed in the specifications), and AM selectivity of 35 dB. Incidentally, the Schotz noise-reduction circuitry plays no part in AM reception.

Use and Listening Tests

I hooked the T-2000E into my reference system and connected a rotatable outdoor antenna as well as an amplified indoor antenna from Terk Technologies (which is also

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At strong signal levels, the Schotz noise reduction makes no difference. But at 30 dBf, it improves S/N by a very significant 7 dB.

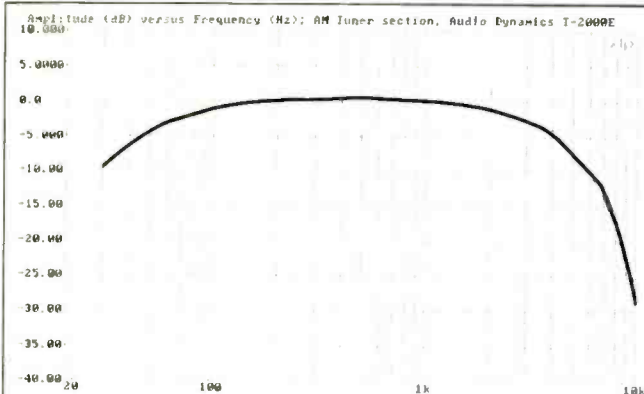


Fig. 7—AM frequency response, using new standard 75- μ S pre-emphasis.

reviewed in this issue of *Audio*). Using the outdoor antenna, I was able to pull in some 48 usable signals, with 42 of them in stereo. Of these stereo stations, without the noise-reduction circuit activated, some dozen or so were too noisy to be enjoyed; more than half became usable when the "Schotz NR" button was pressed. There was still some audible

background noise but not enough to hinder enjoyment of the program material. All of which substantiates the claims made for this novel circuit. I confirmed the additional claim that the Schotz circuit has no effect in the presence of strong stereo signals, even if its switch remains on. This raises a question as to why the switch is on the front panel at all. Why not leave the circuit on all the time? Indeed, Audio Dynamics recommends that course of action, and I suspect the main reason for giving the user an "on/off" choice is so that he can be satisfied that the circuit really does make a difference.

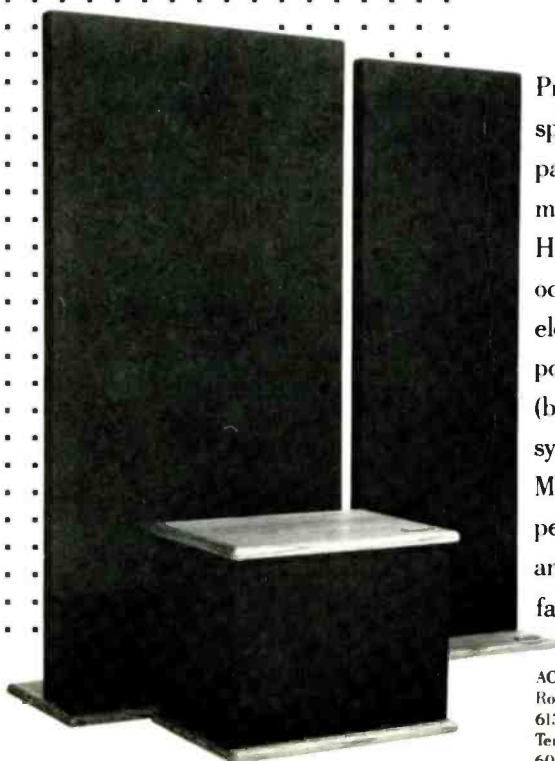
With the Terk Pi amplified indoor antenna (also designed by Larry Schotz), I was still able to pick up some 39 stations, provided I reoriented the little Pi for best reception of the weaker ones. This is good performance, considering that the Pi was at ground level in my lab, as opposed to 30 feet above ground for my multi-element outdoor antenna. Of those 39 stations, 15 were initially too noisy in stereo to be enjoyed, but the Schotz circuit rendered 10 of them listenable in stereo.

In summary, the T-2000E is quite fairly priced for what it can do. While certainly not the most sensitive AM/FM tuner I have ever measured, it should do well in most urban and suburban locations and, with an adequate outdoor antenna, should satisfy most users in fringe areas as well—especially if that "Schotz" button is kept pushed in. *Leonard Feldman*

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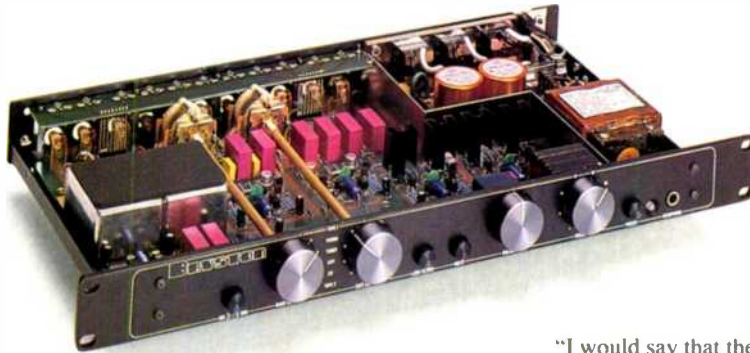
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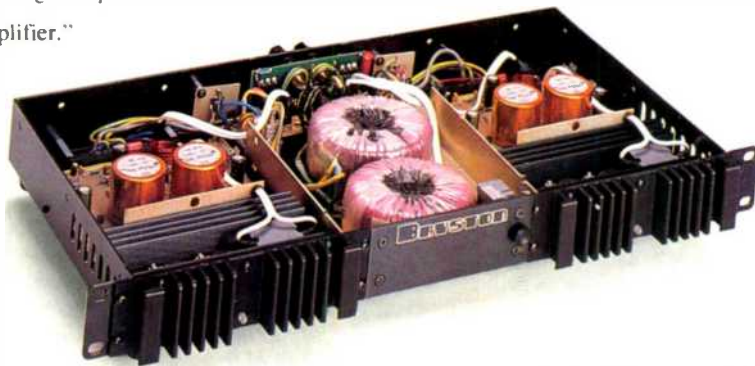
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EMINENT TECHNOLOGY LFT-III LOUDSPEAKER

Company Address: 225 East Palmer St., Tallahassee, Fla. 32301.
For literature, circle No. 94

Few speakers really introduce a new approach to speaker technology; most simply refine existing drivers and concepts, the vast majority of which date back to the '20s and '30s. The Eminent Technology LFT-III is different. While it builds on the work of other planar and dipole speaker technologies, it marks a significant departure from any other existing planar or ribbon design. It is the first full-range, push-pull dynamic planar speaker and is intended to combine the best sonic virtues of electrostatic, ribbon, and previous planar designs.

At \$3,250 a pair, the LFT-III can scarcely be treated as just an interesting experiment. Fortunately, its performance is up to audiophile standards. It has a superb midrange and good performance at both frequency extremes. Further, the speaker has gone through a long enough teething period to have been modified to the point where it is compatible with any good, high-current power amplifier.

Bruce Thigpen of Eminent Technology, the LFT-III's principal designer, traces the speaker's origin back to his first exposure to the original Quad electrostatic speakers and his conclusion that a box speaker could never sound as good as a planar. This led Thigpen to study speaker theory, and he went on to build his own electrostatic systems. In the process, he became interested in trying to build a push-pull planar speaker that could drive the entire surface area of the diaphragm uniformly and that could do so with the speed and detail of an electrostatic or ribbon design.

Thigpen also sought to create a speaker that would not present the drive-voltage and transformer problems of an electrostatic, one which would be more inherently linear than a ribbon. He also sought to create a



Photograph: Barry Gross

magnet structure that would be fully linear, unlike some small planar tweeter and midrange designs that use opposing magnets with like poles and which tend to create a nonlinear distortion that can exaggerate the brightness and detail of the sound.

The end result is the LFT-III, a planar doublet system using a single-diaphragm transducer with a specified response from 35 Hz to 40 kHz. It is fully push-pull and has a linear magnetic field over the entire area of its diaphragm. The area of the diaphragm is 580 square inches, the foil thickness is 0.00033 inch, mylar thickness is 0.0005 inch, laminate adhesive thickness is 0.00015 inch, the gap between conductors is 0.03 inch, and peak-to-peak diaphragm displacement is 0.2 inch. The conductors that make up the equivalent of a voice-coil in the LFT-III are etched onto each diaphragm. They

are flat, with very thin traces and narrow gaps between each trace. Cross-overs segment the diaphragm so that a 2-inch line source at the outer edge of each speaker reproduces the full frequency range, with good high-frequency and upper-midrange dispersion. The remainder of the diaphragm plays only low frequencies.

Unlike other planar magnetics, the magnets are on both sides of the LFT-III's diaphragm. This is the key to giving it its true push-pull operation and to allowing the use of a very low-mass diaphragm. It also means that the LFT-III has to be heavy and solidly built: It uses twice the weight of magnets as a single-ended planar speaker, and its magnets cost about eight times as much as those in a comparable full-range cone system. There has to be an extremely strong structure because the magnets are aligned in repelling

"The opportunities presented by the T1000 were the most interesting of my entire career. For one thing, the tower shape was ideal for the three-way, four-driver system we had in mind. For another, since the T1000 was to be our top model, we had more design flexibility than with our less elaborate systems.

"For the best possible stereo imaging in real-world conditions, it's important to place the mid and high-frequency radiators at the ear level of a seated listener. The 42-inch height of the T1000 cabinet does this very effectively.

"Our best tweeter, the ferrofluid-cooled one-inch soft dome CFT 5, was perfect for the upper frequencies. A subtle but important touch: the tweeter is mounted flush with the baffle (not even a screw-head projects). That assures wide, even dispersion.

"The middle frequencies are most critical, because they contain the human voice—the range in which the ear is most discriminating. We kept this in mind when designing the new 6½-inch mid-frequency driver for the T1000. Among its special qualities: lower distortion than possible with smaller units, and the ability to deliver very high transient levels without the slightest strain. The internal frequency-dividing network uses this driver down to 300 Hz, to take full advantage of its strengths. To our knowledge, there isn't another mid-frequency speaker designed like it, or used like it.

"For the bass, we designed a new 8-inch woofer system, with a 1½-inch diameter long-throw voice coil operating in a high-flux magnetic field. Each T1000 uses two of these special drivers, each in its own subenclosure, for a total radiating surface equal to a 12-inch woofer. This dual woofer system delivers superior power handling capability and faster, tighter response than a single larger woofer.

"All the elements of the T1000 system combine to provide uniform frequency response throughout the audible spectrum, with bass that is full, clean and solid, down to the lowest recorded frequencies.

"What's more, the T1000 is narrower than almost all "bookshelf" speakers, enhancing its ability to fit into an existing room arrangement. And its tall and slender shape contrasts handsomely with the usual bulk of conventionally designed cabinets.

"To sum up, the T1000 is our best speaker system, and we believe it ranks among the very finest speakers available for the serious music enthusiast. Ask to hear it at a Boston Acoustics dealer, and see if you agree."

Boston Acoustics

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**"There's more
to the new
T1000 than meets the eye...
much more."**

Andy Petite, chief designer, Boston Acoustics



The T1000 Series II.
Hand-finished in furniture-grade oak and walnut veneers, or black ebony vinyl laminate. Finished back allows placement where all four sides might be visible. Wiring connections under cabinet. Dimensions: 42½ h × 10¼ w × 12¼ d.

To ensure optimum loading and balance of this three-way system with four active drivers, the two woofers and the midrange operate from their own sealed subenclosures. (Note: acoustic filler partially removed to show interior details.)

The designer's idea was to produce a push-pull planar speaker without a ribbon's nonlinearity or the drive problems of electrostatics.

fields. The LFT-III uses a very heavy welded metal frame to achieve rigidity and proper magnetic "focus"; as a side benefit, the structure is far less resonant than that of most planar speakers. At the same time, the LFT-III does use diagonal flux lines across the diaphragm. This improves linearity, but it also leads to low efficiency.

The overall dimensions of the LFT-III are 27 inches W x 54 inches H x 1 inch D (12 inches at the base), and each unit weighs 95 pounds. The finished system is relatively good looking.

Eminent Technology provides more technical data on the performance of the LFT-III than is possible to summarize in a brief review. The specified frequency response is 35 Hz to 20 kHz, ± 4 dB, and phase accuracy is said to be $\pm 20^\circ$ from 100 Hz to 31 kHz. High-frequency level is switchable; the settings are flat, -3 dB, and -6 dB. The speaker's rated sensitivity is 82 dB at 1 watt/meter, maximum SPL is 106 dB at 1 meter, and the lowest diaphragm resonance is 38 Hz. Minimum power requirements are 100 watts of high-current amplification into 4 ohms. The speaker's nominal impedance is 4 ohms, although a 16-ohm version, for use with output transformerless amplifiers, is available on special order.

As in most pioneering efforts, Eminent Technology changed many of the speaker's design details in the process of moving toward full production. The first version was a two-way design with a 16-ohm impedance. Its efficiency was only 77 dB with a 2.83-V drive, which was too low for most amplifiers. The second version's impedance was 4 ohms, and it had a three-way crossover. The efficiency rose to 81 dB. This was still low, but workable, although most tube amplifiers could not drive the speaker. It also lost extension in the highs and definition in the bass, compared with the 16-ohm version.

These developments led to the third version, which has been in full production for the last year. It uses a multiple-layer diaphragm in the bass panels; tension is adjustable in each layer in order to improve bass definition. According to Bruce Thigpen, the loss of bass definition in the 4-ohm version resulted from a loss of diaphragm control by the amplifier because the amp got less voltage feedback from the

speaker. This caused the low-frequency resonances of the panels to become more audible and resulted in less definition. Multiple-layer diaphragms in the low-frequency section now allow the panel resonances to be spread out over the entire bass range, improving definition.

The magnet structure of the mid-range and tweeter sections was also modified to increase magnetic field strength at the diaphragm. This provides more speed and transparency. These changes required a redesign of the crossover and allowed an efficiency improvement to 82 dB. This efficiency is still relatively low but makes the LFT-III somewhat more competitive.

The end result of this mix of technical innovation and evolution is a speaker whose sound equals the best ribbon and electrostatic designs. At the same time, the Eminent Technology LFT-III has a sound character notably different from most competing high-end speakers.

One of the LFT-III's greatest strengths is an exceptionally flat response and natural timbre from the lower through the upper midrange, with exceptionally low coloration. While the LFT-III certainly has a different timbre from the Quad ESL-63, and is slightly more forward and detailed (with more extension and power) in the lower midrange, it is one of the few speakers to rival the Quad in overall midrange accuracy and coherence. If proper attention is paid to room placement—away from the rear and side walls, and with the stands firmly spiked to the floor—then the LFT-III is an exceptionally flat and neutral speaker in the band where this is most important for creating the illusion of an actual live performance.

It doesn't make much sense to talk about the treble and midrange coloration of this speaker. When properly set up, the LFT-III has very little audible irregularity from about 150 Hz up. The apparent speed of the upper midrange and treble are also quite good, superior to that of most dynamic planar speakers and electrostatics I've heard. At the same time, some of the latest dome tweeters, EMITs, and ribbon speakers offer more apparent detail and air in the upper octaves. They appear to have more life and dynamic

excitement and to give music a more immediate and involving character.

Accordingly, some trade-offs have been made. On the one hand, the LFT-III is very neutral, and now is much faster and more transparent than the earlier versions. On the other hand, it may seem just slightly recessed and flat in comparison with some of the leading competition. The designer claims that the LFT-III's sound reflects a lack of coloration present in the competition. Because of this, and because both reviewers and audiophiles disagree as to what kind of performance creates the most credible illusion of live music, any prospective buyer should audition the LFT-III carefully before making a decision to buy.

The LFT-III's bass response also involves trade-offs. If the speaker is carefully positioned according to the instructions in the owner's manual, and then is fine-tuned to find the point (away from the rear wall) where it gives the most natural bass sound, it produces relatively extended bass response—with a good signal, down to about 35 Hz. The bass is tight and controlled rather than warm and full. Once again, because there is so much debate about what type of performance is right, the issue will be whether the LFT-III's performance is the kind you like. All I can say is that with really powerful high-current amplifiers (from Classé Audio, Mark Levinson, Krell, et al.), this speaker can deliver very powerful and convincing bass and good detailing of the organ, bass viol, and percussion. It may not be the speaker for bass freaks who are heavily into power and floor vibration, but it can be very musically convincing. Audiophiles who care about bass information and detail may appreciate that the LFT-III, in my opinion, outperforms virtually every planar of similar size and any type of speaker that cuts off at 35 Hz.

The LFT-III provides very good overall resolution of transient response and high-frequency detail. If you are familiar with some of the better electrostatic speakers in these areas, you will probably recognize a similar type of performance in the LFT-III. Its latest version now arguably seems more detailed and lifelike than the Quad ESL-63, which is high praise indeed. The lower mass of the diaphragm may contribute

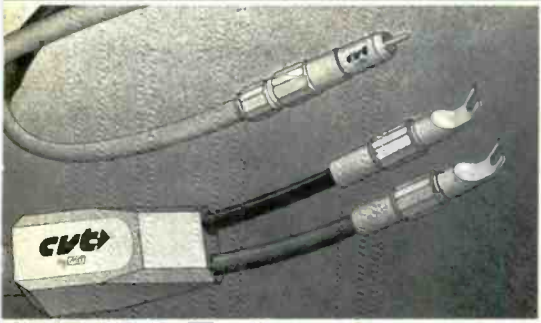
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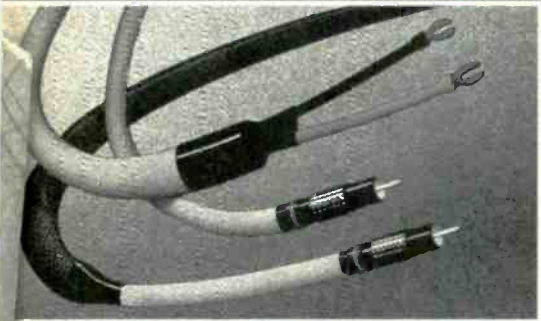
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Placing magnets on both sides of the diaphragm gives the LFT-III true push-pull operation and allows low diaphragm mass.

to the fact that it outperforms most cone speakers and dynamic planars in these areas. Yet the LFT-III is not as exciting in these respects as some ribbon speakers, and it does not seem to etch or emphasize detail and transient information with the special excitement of a speaker like the Infinity IRS Beta.

Once again, it presents the kind of trade-offs inherent in the choice of any high-end speaker.

With a good amplifier, the LFT-III plays loud by any standard, and its dynamics are very good. It is sufficiently lacking in frequency coloration and bass overhang to resolve sudden mu-

sical shifts from low- to high-level passages about as well as virtually any speaker around. Its dynamics do, however, still lack the apparent speed and power necessary to rank as excellent in comparison to some large high-end cone speakers, Apogee ribbon speakers, and some Infinity models.

The LFT-III provides a soundstage that is wide and coherent, with excellent placement of instruments and voice. When the tweeter switch is set for the most natural balance in a given room, there is no artificial detail or tendency to etch the imaging in place. Depth is very good. If given careful placement, the LFT-III can sound very natural over a reasonably large listening area—say, a three-person couch at a reasonable listening distance. Yet, this speaker is limited in vertical dispersion and should be listened to while sitting down. To provide the best high-frequency performance and imaging, the LFT-III should be tilted slightly back by carefully adjusting its feet. As for the apparent listening position, this system tends to have a middle-of-the-hall character regardless of the setting of the treble switch. The imaging, timbre, and dynamic response tend to make the listener feel he is sitting slightly back in the hall, even when the music is closely miked and has a forward character. These aspects of the sound may please classical music fans more than jazz or rock fans.

The LFT-III offers reasonable flexibility in setup and room placement, although you do need at least 3 feet of clearance from the rear and side walls to get the best response. Further, the bass is likely to sound more natural and extended when the speaker is placed along the short wall of a rectangular room. This is very well explained in the owner's manual, which offers excellent advice about room setup.

Like all dipole speakers, getting the bass right requires very careful experimentation in terms of distance from the rear wall. In some rooms, a change of only several inches can make the difference between irregularities in the bass and smooth response. As mentioned, the spiked feet also need adjustment to angle the speaker so the top tilts slightly away from the listening position. In addition, there should be as little furniture as possible around the

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VTL.....? Read Their Lips

J. Gordon Holt

Stereophile Vol. II., No. 10, Oct. 1988, pp. 111-116

"...there is no doubt in my mind that the VTL monoblock 300's are the best power amplifiers I have heard, by a substantial margin and at a remarkably low price for that level of performance...I would recommend them to anyone who can afford them... and (then) just forget about power amplifiers until someone comes up with a major design breakthrough that will render these (and all else) immediately obsolete. But don't hold your breath till that happens!"

John Atkinson

Stereophile Vol. II., No. 11, Nov. 1988, pp. 94-99.

"This is one hell of a transparent amplifier. To say that I was impressed with the VTL 100 watt compact monoblock is an understatement... I was extremely impressed...and (it's) a bargain price! *Highly recommended.*"

Dick Olsher

Stereophile Vol. 10, No. 6, Sept. 1987, pp. 102-104.

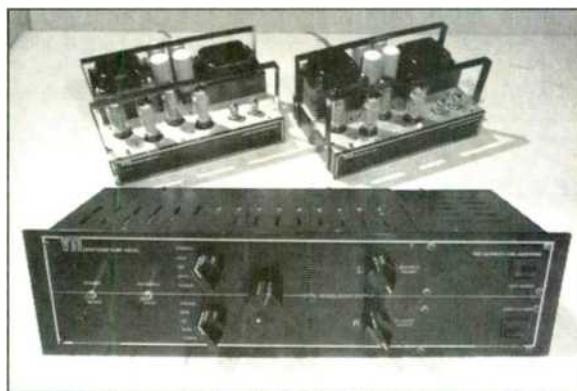
"...I really like this amp...The VTL 30/30 offers a rather large slice of the best there is in amplifiers... at the asking price, the amp is nothing short of the proverbial steal."

TAS doesn't allow reprints or quotes, so you have to investigate these articles yourself.

PHD with lavishly favorable comment by HP

The Absolute Sound Vol. 13, Issue 53, May/June 1988, pp.67-73.

Titled 'The VTL Monoblock 300 Amplifiers'



preamp \$550-3,300 amps \$1,300-4,900

John Nork

The Absolute Sound. Vol. 13, Issue 55, Sept./Oct. 1988, pp. 49-61.

Titled 'A Tale of Three Amplifiers'

As TAS doesn't allow actual "quotes", suffice it to say that the VTL 300 is JR's new reference amplifier.

Aaron Shatzman

The Absolute Sound Vol. 12, Issue 29, Fall 1987, pp. 85-95.

Titled 'TUBES TRIUMPHANT'

or Two Preamplifiers from VTL in which the Author Touches upon the Ticklish yet Timely Topic of the Transistor Twilight and asks 'if the Dark Chill of the Solid-State Night has finally been Banished by the Warm Gold (aero) Glow of a New Valve Dawn.

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The uncolored, detailed midrange of the LFT-III delivers a sound that's outstandingly musical rather than spectacular.

speaker and between the speaker and the listening position.

The treble energy is variable over a reasonable range, and the three level settings allow you to tailor the speaker to a given room and system. I would suggest experimenting with string music to determine the setting that best

suits your conditions; I found that the -3 dB setting worked best in my room.

As for bass, the owner's manual tends to imply that re-tensioning the diaphragm is optional. It is not. You will need to do this to get adequate bass response. You will also need a true

high-current amplifier that delivers at least 100 watts; consult your dealer as to which amplifiers are compatible. The LFT-III should not be used with receivers or amps designed to meet test specifications rather than the far more demanding conditions imposed by today's high-end speakers. For best results, I would suggest keeping the volume high enough to approach natural musical sound levels. There is nothing to warm the bass or lower mid-range at lower volumes, and the Fletcher-Munson effect means that the severe bass roll-off in your hearing will make any speaker seem to be lacking in bass.

The LFT-III has jacks for bi-wiring. It can also be rewired internally for use with an electronic crossover, but I can see no reason for such devices. This speaker will perform best in a straightforward system that has one amplifier per channel and emphasizes mid-range purity and bass power.

The Eminent Technology LFT-III has evolved into a speaker having excellent performance capabilities but involving some sonic trade-offs. Its strongest suits are its lack of coloration in the midrange and its ability to provide remarkable detail and natural sound in the region most important to enjoying music. This outstanding performance shows up particularly well in terms of voice, but it is equally impressive on chamber music, small orchestral music, and jazz.

Performance at the frequency extremes is less outstanding but still very good. The LFT-III is better than any full-range electrostatic in the treble, except for early Quads with their separate "tweeters." It scarcely has "sub-woofer" bass, but it produces far more in this region than more expensive planar and electrostatic speakers. In short, the LFT-III is a speaker for the audiophile who wants outstanding midrange quality and musicality rather than spectacular sound. Like most high-end speakers, it needs a good, high-current amplifier and careful placement. With such care, however, it can provide an exceptional degree of transparency, transient detail, and musical accuracy and realism. For many music lovers, the Eminent Technology LFT-III may well be an ideal reference speaker.

Anthony H. Cordesman

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MASTERS IN DISGUISE



Traveling Wilburys—Volume 1 Wilbury 25796-2, CD.

Sound: B+ Performance: A

Over the years, a lot of super session albums have turned out to be bummers when heard—badly played turkeys with bad material that's badly performed. *Traveling Wilburys* is a grand exception.

Who the Wilburys are, of course, is one of the (purposely) worst-kept secrets in history. Those identified as Otis, Nelson, Lefty, and Lucky Wilbury, and Charlie T. Jr. bear a startling resemblance to, respectively: Jeff Lynne of ELO, George Harrison, Roy Orbison, Bob Dylan, and Tom Petty.

This album (produced by Otis and Nelson Wilbury) is a delicious paradox. Simultaneously, it holds onto the joy of a spontaneous living-room song session—all loosey goosey, with the lead vocal passed around like a hot potato—while also being a beautifully thought-out, well-polished, and well-recorded disc. The only non-Wilburys participating are drummer Jim Keltner, percussionists Ray Cooper and Ian Wallace, and horn man Jim Horn. All turn in lovely work.

All the songs are attributed to the Traveling Wilburys, and nearly all of them are "A" material. Sometimes you can peg the principal writer, but not always. Most important, the album is full of thrilling moments and occasional revelations. For one thing, Dylan's singing has never before been presented this favorably on record. That old bite with a wink is at work on "Congratulations," the only song here that expresses heart-felt bitterness. Dylan hasn't sounded as playful as he does on "Dirty World" in ages. "Tweeter and the Monkey Man"—at 5½ minutes, the only song longer than 3:48—sings like an untold *Blonde on Blonde* vintage narrative, but it isn't. It is an all-new blood-and-guts film-noir yarn. (With results like these, Bob should seriously consider having Jeff Lynne produce a whole album for him.)

Every time Roy Orbison grabs the lead, you get goose flesh up and down your spine. It happens when he takes the bridge from Petty in "Last Night," but that one is just a decoy. Following it is "Not Alone Any More," which plays like a brand-new version of "Only the Lonely." It even has one of those patented Roy Orbison endings where his

CODA

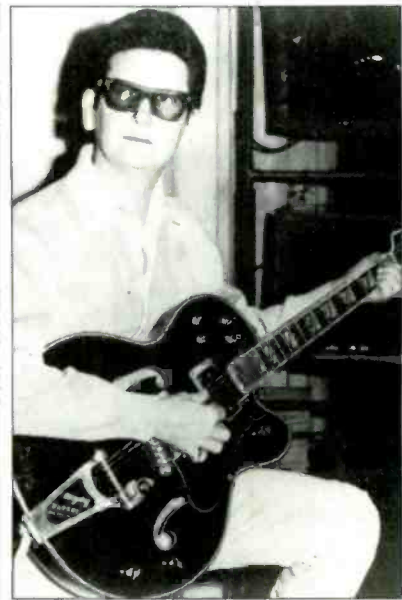
ROY ORBISON

Just as this issue went to press, the tragic news came that on December 6, 1988, Roy Orbison had died of a massive heart attack. His brilliant work on *Traveling Wilburys* is only a part of a recent return to prominence which began with the unforgettable use of "In Dreams" in the film *Blue Velvet*.

In 1987, Virgin Records followed up with the release of *In Dreams*, an excellent album featuring Orbison singing updated versions of his hits. Last fall, Rhino issued *For the Lonely: 18 Greatest Hits*, the best set of Orbison originals ever assembled. The 55-minute Cinemax special, "Roy Orbison and Friends: A Black & White Night," is out and available on videotape, and I couldn't recommend this thrill-packed hour more highly. Finally, Virgin is scheduled to release a new Orbison album, *Mystery Girl*, early this year.

To the end, Roy Orbison sang with the sweetest voice I know, one that could rip your heart out again and again. Since I was a boy, his high notes have always made the hair at the back of my neck stand on end. I already miss him a lot.

Michael Tearson



Photograph: Frank Driggs Collection

voice spirals higher and higher until you want to scream. This one alone is worth the price of admission.

"Handle with Care," the introductory single, features the Wilburys singing in a round-like progression. Harrison

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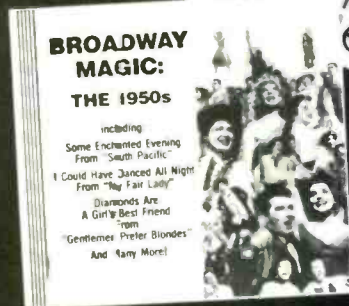
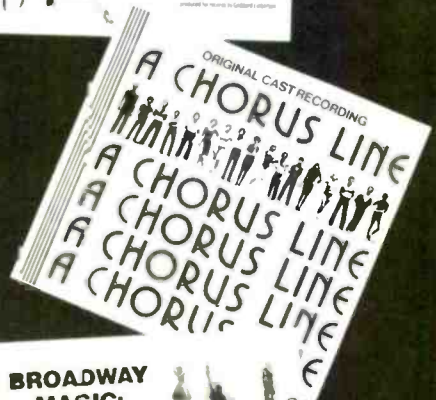
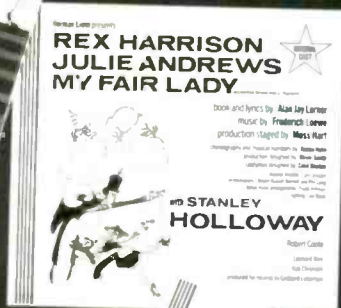
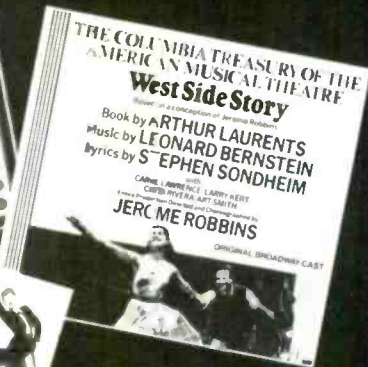
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Grayson Hugh's debut LP shows promise but is not "there" yet. Hopefully he will try harder and one day reach his peak.



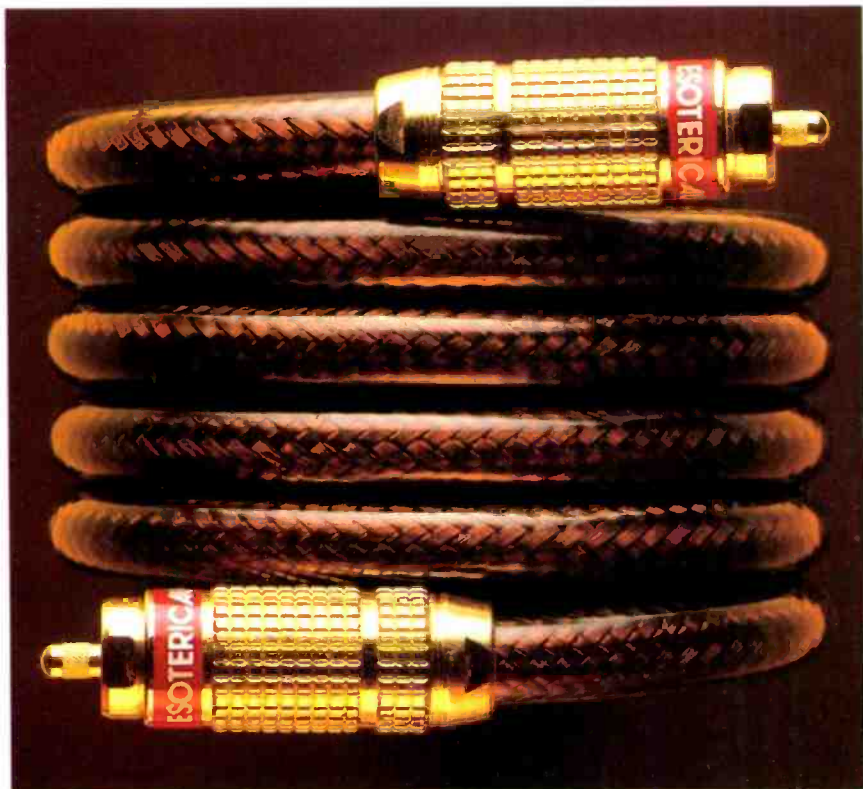
starts it off, followed by Orbison, then Dylan and Petty together, and then Harrison again. Round and round it goes with Lynne sneaking in sweet harmonies all over. This opening song establishes the spirit of camaraderie and collaboration that is the base of all that is here. This feeling extends

straight through to the finale, "End of the Line," which opens and closes with an acoustic guitar figure cribbed from *Rubber Soul's* "I'm Looking Through You." The body of the song is impossibly catchy, and the lyrics are about standing up to hard times and of strength through forgiveness—a perfect and appropriate closer. In the final score, only the mostly instrumental "Margarita" is a throwaway.

Traveling Wilburys was recorded without much advance fanfare to get hopes up too high. The boys don't seem to have taken the whole project too seriously, except in their commitment to having fun while making a good album. This very modesty enhances how memorable *Traveling Wilburys—Volume 1* is. And that "Volume 1" in the title leaves the door open for future Wilbury albums, maybe with family members who aren't yet aware they are.

Incidentally, the liner notes, attributed to one Hugh Lamptor, are a side-splitting mock-serious history of the Wilburys, from stationary days of yore to the more mobile present. The presence of Monty Python's Michael Palin on the "Thanks To" list could be a hint as to the notes' true author.

Michael Tearson



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Blind to Reason: Grayson Hugh
RCA 7661-2R, CD.

Sound: B Performance: B+

The idea behind what Grayson Hugh is trying to do is a lot stronger than the music it has produced, but his debut album shows a good deal of promise nonetheless. Here we have a white soul singer performing with a fair amount of grit and conviction. Unfortunately, most of the self-penned material is only decent. The one cover ("Talk It Over") is clichéd, which is probably why Olivia Newton-John has also recorded the same song on her latest album. Sad to say, her version sounds more impassioned than Hugh's. Producer Michael Baker is a whiz at using the digital technology to contemporize these songs, but perhaps he should have found Hugh a co-writer to make them first-class.

There are a few complaints to be aired about the production, most notably that it was recorded on analog

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Gregory Hines' voice is sweet and vulnerable. His self-titled debut album firmly engraves the word "singer" onto his résumé.

equipment when almost all of the instruments were digitally generated. Also, the comparisons to Paul Young shouldn't be heightened by employing a sitar.

Don't let these complaints stop you from listening to *Blind to Reason*; there are some worthwhile songs on this CD. "Tears of Love" is a beautiful recording—not quite perfect, but impressive nonetheless. Hugh has summoned up the spirit of Sam Cooke, and that's never a bad thing. Now if he could only excise the Steve Perry from his tone, he'd be in great shape.

Whether he gets the chance to prove himself in the marketplace now or a couple of albums down the road, Grayson Hugh is a fine singer with a couple of good songs in him. One can only hope that he knows he's not quite "there" yet, and that he will try harder to reach his peak eventually.

Jon & Sally Tiven

The sound on this digitally mixed and mastered Compact Disc is beautifully transparent, setting a crystalline stage for the singer's solo outing.

With *Gregory Hines*, this gifted dancer and actor firmly engraves the additional title "singer" onto his extensive résumé.

Paulette Weiss

Gregory Hines
Epic EK 40671, CD.

Gregory Hines' voice is as lean and lithe as his supple dancer's body. It has a sweet, vulnerable quality that makes his self-titled debut particularly appealing. But this voice doesn't just lounge around looking good. No sirree—it glides, taps, and pirouettes through eight center-stage songs guaranteed to create the need for movement in even the most insensitive feet.

Producer Luther Vandross has written all of these little gems, most with John "Skip" Anderson, a few with other musicians, and a couple solo. Up-tempo cuts like "That Girl Wants to Dance with Me," "I'm Gonna Get to You," and "Gloria My Love" are all smooth, light rockers with rhythms that won't quit and ingenious arrangements featuring a variety of subtle and not-so-subtle percussive accents. Chimes, brushed cymbals, hand claps, and more are choreographed around Hines' voice in a kaleidoscopic, constantly moving pattern. Slow, tender love songs ("Love Don't Love You Anymore," "There's Nothing Better Than Love," and "So Much Better Now") are filigreed with elegant, airy arrangements that let Hines' vocals glide forward gracefully and movingly.

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Elton John may have left the glitz and the glitter behind, but not his knack for turning out solid and satisfying pop.



Reg Strikes Back: Elton John
MCA 6240, CD.

Elton John, sans wild feather head-dress, sequin-encrusted jumpsuits, and outrageous glitter glasses, is still Elton John, despite his new album's attempt to conjure up the performer's

original persona, Reginald Dwight. Although Elton's efforts to tone down his life and modify his public image have been eagerly followed in the press (his vast collection of costumes and memorabilia was auctioned off at Sotheby's last fall with much fanfare), Reg is destined to remain in the shadow of the fabulous showman Elton has become.

Elton's latest effort, *Reg Strikes Back*, is, like many of the singer/song-writer/pianist's earlier successes, an astute balance of rockers and ballads, all featuring the brilliant, image-provoking lyrics of Bernie Taupin. Davey Johnstone handles guitar (to particularly stunning effect on "A Word in Spanish" and "Heavy Traffic"), Fred Mandel mans the synthesizers, Charlie Morgan is on drums, and David Paton commands the bass. Two Elton alumni, Dee Murray and Nigel Olsson, have been recalled to duty for some fine vocal backup. Making outstanding guest appearances are Freddie Hubbard with his clean, crisp trumpet on "Mona Lisas and Mad Hatters (Part II)," Brian Wilson and Bruce Johnston adding Beach Boyish vocal backup to "Since God Invented Girls," and who else but Pete Townshend running some guitar riffs on "Town of Plenty." Ray Cooper, one of rock's most astonishing percussion men, contributes his particular genius to four cuts.

Now that you've got the lineup, here's the play. Elton's ballads are among the best rock has to offer. Now that he has matured beyond some of his early, sticky-sweet sentimentality, they are better than ever. "Japanese Hands" is filled with impressive lyrical and musical imagery. The subtle, strange synthesizer accents simultaneously suggest the Orient and the song of whales. A cathedral-choir intro sets the stage for Elton's lovely a cappella vocal, and the gentle swelling of instrumentation and vocals builds to majestic heights.

The up-tempo cuts remain true to Elton's pattern of creating rather sedate, controlled rock in which nothing is really ragged or raw. The big single, "I Don't Wanna Go On with You Like That" is bouncy and appealing. "Goodbye Marlon Brando" rocks out yet never obscures the lyrics, which present an amusing compendium of pop-culture trivia. Despite Elton's per-

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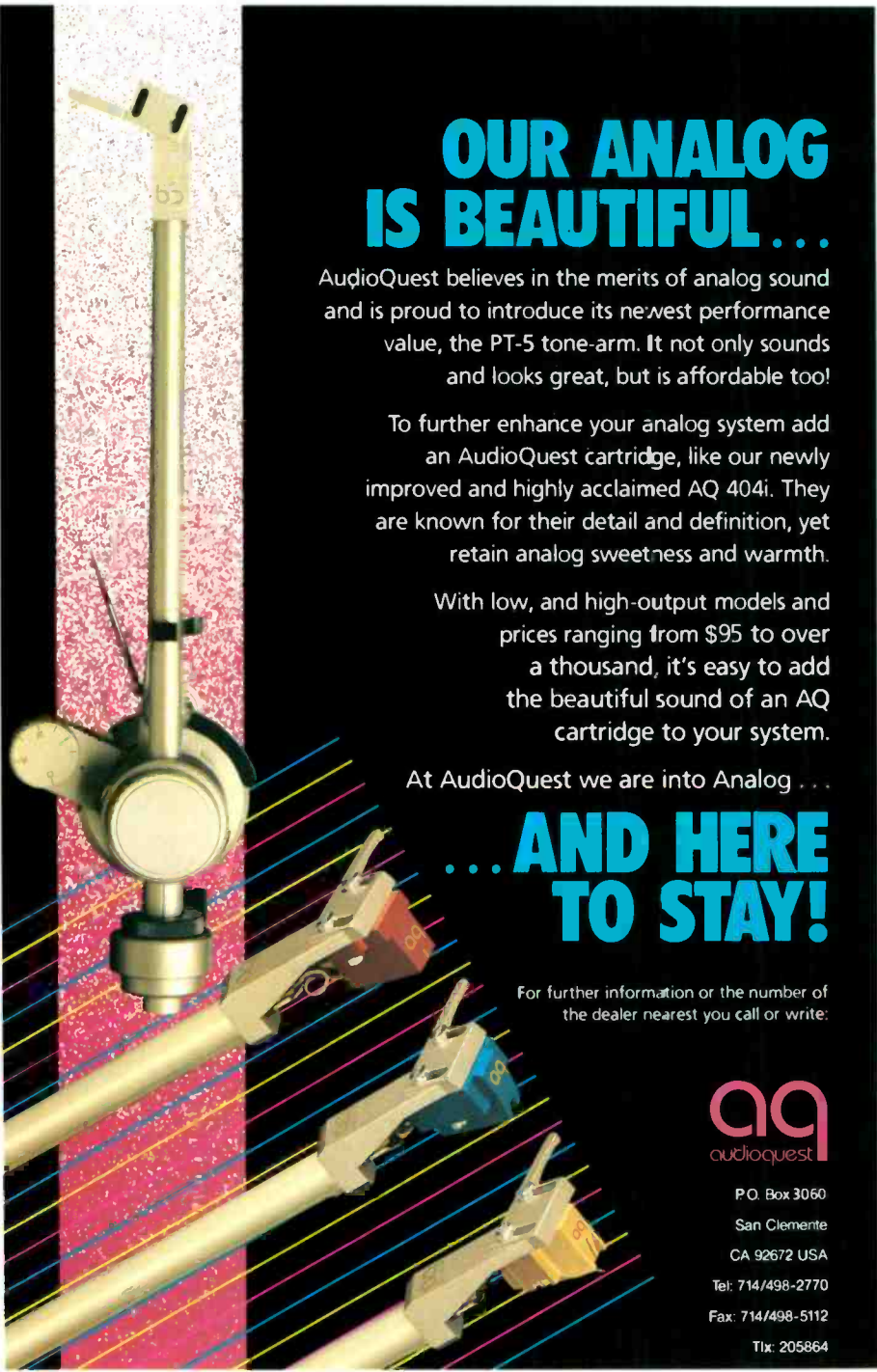
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sonal fondness for it, "Town of Plenty" is a rather pedestrian rocker, although "Poor Cow" will shake 'em up both on the dance floor and at the National Organization for Women headquarters.

Whether you call him Reg or Elton, our boy may have left the glitz and glitter behind, but not his ability to turn out solid, satisfying pop.

Paulette Weiss

Breaths: Sweet Honey in the Rock Flying Fish FF70105, CD.

Sound: B Performance: A

If after five minutes of listening to Sweet Honey in the Rock you are not on your feet singing, doing your best Sam Cooke or Aretha Franklin imitation, quick: Check your pulse and call the paramedics. You must have passed away some time ago, and no one's had the decency to tell you!

Sweet Honey in the Rock is an inspirational group, not so much religiously as intellectually and emotionally. The internationally known a cappella group of six women sings and harmonizes beautifully. The harmonies are just "loose" enough to keep the emotion, and the group sings with such conviction, it is impossible not to be moved. *Breaths* combines two earlier LPs, *We All ... Everyone Of Us* and *Good News*, to provide some 65 minutes of wonderful music.

All the above said, be forewarned that Sweet Honey in the Rock is not an easy listen. While this music falls like honey on your ears, the lyrics are disturbing, enlightening, prodding. These women mean to be heard, and what they are saying is important. Many of the lyrics, most written by Bernice Johnson Reagon, are politically based, with subject matter delving into South Africa and Stephen Biko, Chile, racial disharmony, and, perhaps most of all, personal freedom.

Breaths, because it is a combination of two albums, lists a number of recording engineers and mixers. It was recorded both live (Fedco Recorders) and in the studio (Flite Three, Omega, and Bias Recording Studios). Some of the 19 songs enter and exit with audience applause, but since post-production work was done on the tapes, it is the music, not the audience, which takes precedence. The live recordings



Sweet Honey in the Rock's *Breaths* is not likely to leap onto the charts, but it is a total experience for the head and heart.

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Mahler: Symphony No. 2, "Resurrection." London Symphony Orchestra and Chorus and four other choruses, Gilbert Kaplan; Benita Valente, soprano; Maureen Forrester, contralto. **MCA MCAD2-11011**, two CDs.

As Mahler lovers slowly came out of the closet after 1960, it became less and less uncommon to encounter one of the composer's sprawling compositions in concert and on record. It gradually dawned on acute listeners that, whereas Brahms, Janáček, and Bruckner were usually more visceral from seat H-14 at Carnegie (or whatever hallowed hall one happened to live near) than over speakers at home, Mahler was the first orchestral composer whose effects and sweep were sometimes even more appealing when heard through a very fine audio system. Here was a man whose vision of texture, line, dynamics, and timbre so severely taxed the possibilities of just about all live concert situations that his final thrust into the hearts and minds of music lovers had to await the perfection of stereo—a reverse of the usual concert realism argument! While the accessible First, Fourth, and Fifth happily unfold on stage and are eminently pleasing to the ear there, the tougher Third, Sixth, and Seventh Symphonies could be said to approach their great-

est impact—which is awesome—when heard at home, over exceptional audio gear. Somewhere in between lie the Second, Eighth, and Ninth. They are so profoundly communicative of all Mahler put into his life of composing that they work in either medium.

That's all by way of a prelude to the most extraordinary "Resurrection" that has come along in ages. Remember, we have the recorded legacy of Mahler's great successors at the New York Philharmonic—Mitropoulos, Walter, and Bernstein—so this is no piffling matter. It is a question of an artistic achievement of the highest order (else why bother to discuss it?) but also an event that may well, hereafter, remain unique in music.

Gilbert Kaplan, conductor, is an amateur. He has—not without some satisfaction, one would guess—really put a fox in the musical chicken coop with this coup. For a coup it is.

In the plastic arts and literature, only the pundits, arbiters, and guardians of the public taste have bothered to rake talented amateurs over the professional coals, though the public has usually welcomed them. Not so in the feisty concert music world, where the pros bridle at the mere presence of non-professionals on stage, let alone on that hallowed podium. One might add that there is very good reason for this,

as even some big names on the dais command little or no respect from orchestral players. It is revealing to note that observers of Kaplan's many live performances of the Second, the only work which he conducts, and of his recording sessions in Wales agree that he always has the undivided concentration and respect of his players. Why? He has obviously done his homework on the score, having exhaustively researched it, purchased the original manuscript, and memorized every measure. Of course, many other conductors, good and not so good, have pursued this piece almost as far. Yet Kaplan feels the music deeply. (Who would do a Mahler Second *without* that kind of emotional response to such a long and technically challenging symphony?)

It must be that Kaplan, a businessman who has made an indelible mark in his own world by founding, editing, and building *The Institutional Investor*, a key Wall Street periodical, has had not only the will and the wherewithal to accomplish his dream, but the innate musical instinct to make it a Mahler Second to cherish. The vast score abounds in small side paths, details not explored by many conductors. For example: The subtle horn dynamics, subito pianos after firm attacks, at the work's close; the in-tune brass playing for every measure after the "grosse Appell" of the Fifth Movement, and the gypsy-like lilt, a touchy small swing, to the trumpets and clarinets of the Third and Fifth Movements. Kaplan not only catches the more common ones but adds details most of us have not heard before—all of this within the context of an organically conceived, joyous performance. No Florence Foster Jenkins snickers or vanity press comments can adhere to a man who attains an artistic level like this—and without formal conservatory training. Suffice to say that Kaplan meets his own high standards, as well as those of some very prominent Mahler figures, including the late Jack Diether (who would have enjoyed the ongoing fuss he encouraged Kaplan to disregard in his quest to perform the "Resurrection"). Kaplan certainly has awed and inspired this reviewer.

The technical production, too, is superb. Producer James Mallinson and

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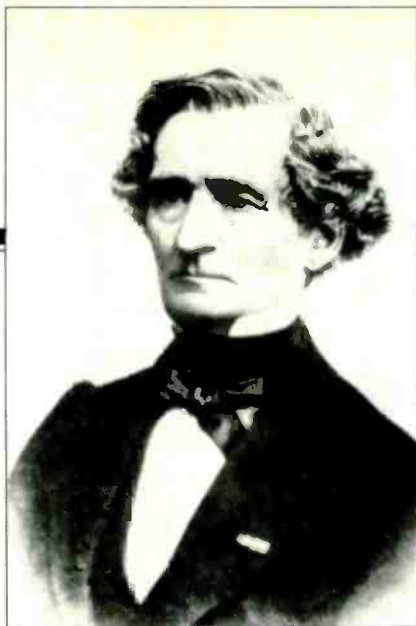
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Berlioz is a persuasive orchestral composer, so unlike anybody else in his remarkable texture, color, and melody.



the ubiquitous Tony Faulkner recorded the work in St. David's Hall, Cardiff, and it is available on all formats. The imposingly registered organ at the closing bars is that of Yale's Woolsey Hall, used by Mahler himself in concert there, and Yale's Harkness carillon is a welcome upgrade from the usual clangy orchestral bells. The first of the two thick CD booklets, both written by Kaplan, is about the symphony and the project. It is exhaustively complete, endowed with cues for all 48 tracks (corresponding to the score markings) and rich in photos. The second booklet is devoted to Mahler's own correspondence about the Second and is in itself a valuable, rather engaging part of the package. But the main thing is the very deeply felt, eloquent performance by an amateur who had the gall to pull off a fantasy bigger than most of us dare dream, and to evoke music of truly magnificent scope. Arrogance? No, just the biggest musical brass ring around. *Christopher Greenleaf*

Berlioz: La Marseillaise and Other Works. Baltimore Symphony Orchestra and Chorus, David Zinman; Sylvia McNair, soprano; Richard Leech, tenor.
Telarc CD-80164, CD.

The American habit of scrambling the order of titles, presumably for better sales, can be downright confusing, as here. The first is actually last, a slightly preposterous setting of the

French national anthem for *everything*—solos, orchestra, chorus—in all umpteen of its verses, until you are ready to drop with patriotism. The rest of the CD, right from the beginning, is orchestral Berlioz: Excerpts from "Romeo and Juliet," "The Damnation of Faust," overtures, "Trojan March," even "Royal Hunt and Storm," which is about the only unfamiliar item included and almost as preposterous as the Marseillaise. Everybody, it seems, has to have a try at storm music.

Still, these are short, representative Berlioz bits (compared to his absolutely enormous complete operas, which nobody, live or via records, has the stamina to take in one piece!), and most of them will be soothingly familiar to classical listening ears. Berlioz is a persuasive orchestral composer, unlike anybody else in the curious, thinly spaced textures and remarkable color and melody.

Like other recent Telarc offerings, this one is entirely competent, but just



Both the Mendelssohn and the Haydn concertos are intimate but lovely, and The Weiss Duo is simply superb.



a shade routine, and rather fast for Berlioz to make his highly emotional points. He has been played with more poignancy and meaning. On the other hand, if you want the (trademark) Tularc drum, Berlioz gives plenty of opportunity. It periodically blows you out of the room. *Edward Tatnall Canby*

Mendelssohn: Concerto in D Minor for Violin, Piano, and Strings; Haydn: Concerto in F for Violin, Keyboard, and Strings. The Weiss Duo; Crystal Chamber Orchestra, Sidney Weiss; Jeanne Weiss, piano; Sidney Weiss, violin.
Crystal CD511, CD.

Let's clear up one question first: Which Weiss does which? Sidney Weiss is both the solo violinist and the conductor of the little string orchestra. That was the tradition in the classic era, late 18th century, and on into the 19th. His wife, Jeanne, is the piano soloist.

Peter Christ runs his own company (Crystal) and was one of the first to "see the light" and convert to CD. He has worked up his usual interesting program here (he is an oboist) with his musician friends, The Weiss Duo. But there is a significant oddity in the recorded sound as between these two outwardly similar works, played by the same performers.

In the first, the Mendelssohn, you will notice that it is surprisingly hard to lo-

cate the string orchestra, a good dozen or so players which Mr. Christ no doubt hired for the event. You hear the two soloists, loud and close, but where is the orchestra? Yet in the Haydn which follows (same players), the orchestra is very evident all the way through. Is this the placement of mikes and musicians, or is it a difference in the music of the two works? I incline to the latter.

The Mendelssohn is a novelty, unheard until quite recently—a sort of "house concerto" for playing in the well-to-do Mendelssohns' spacious music room to show off their genius son, who was all of 14. (The parents often hired a small orchestra for him to play with, so to speak.) At that age, he had already written numerous polished and highly professional works, including two piano concertos. At first, you might think the music Mozart, in Mozart's own favorite key for passionate expression. But even at 14, Mendelssohn was well into the new Romantic

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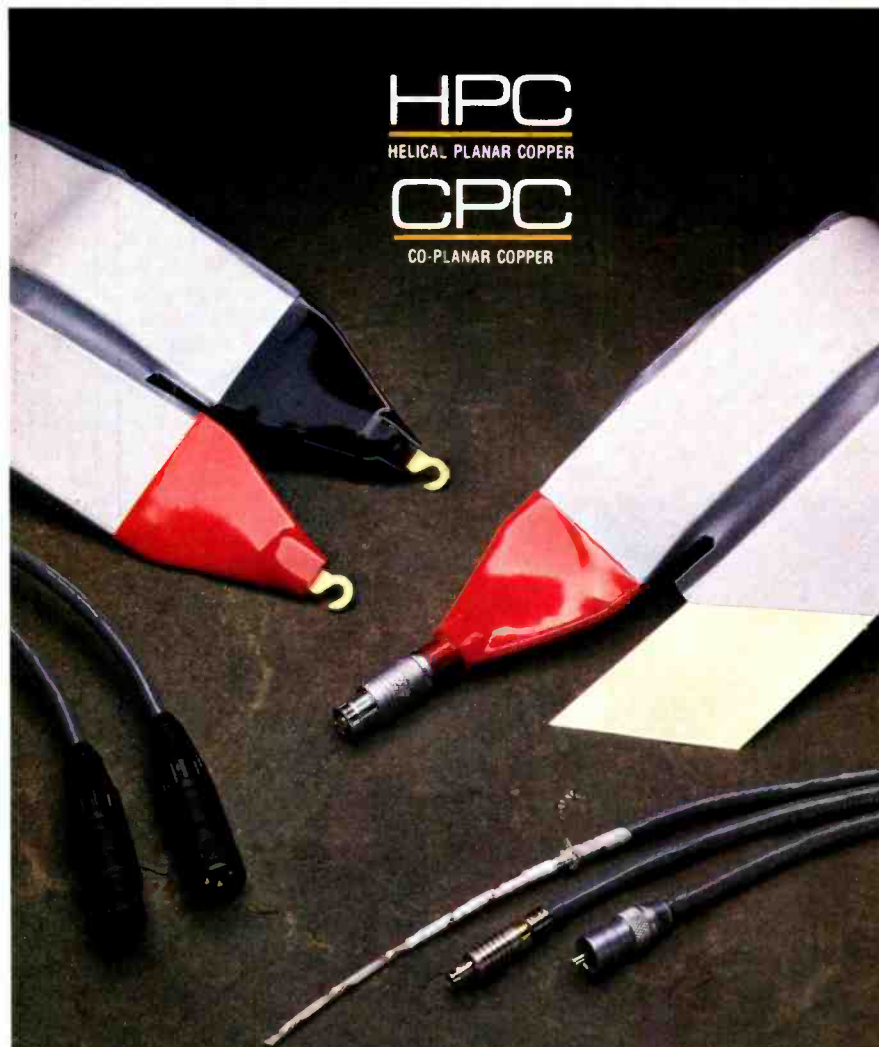
age, and that has much to do with the sound—heavier, more dramatic piano, the same for the solo violin. And not really very much for the added strings to do, as in those Paganini violin concertos where the orchestra dithers around, playing sweet nothings in between the violin fireworks. Result:

There really isn't much to hear from those expensively hired strings! Mr. Christ was right in putting the two solos very much forward and close.

The Haydn, written almost 60 years earlier, is one of the composer's early works, too, and very "Baroque" in the alternation, back and forth, between

the "tutti" string orchestra and the passages for the two solos. This time, the orchestra is entirely audible and rightly so! Part of the art of recording is knowing the music in its live form.

I have to add that both works are intimate but lovely, and the Weiss team, superb. If Mendelssohn harks back to Mozart, then Haydn harks forward to the same, for even more unity in diversity. *Edward Tatnall Canby*



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Frederick Moyer, Pianist.

GM Recordings 2016, CD. (Available from GM Recordings, 167 Dudley Rd., Newton Centre, Mass. 02159.)

The virtues of the CD are calling forth an extraordinary spate of piano music—piano reissues galore, taken from the steadier and cleaner original masters, and floods of brand-new digital recordings. And new labels!

Frederick Moyer, in his very early 30s, is like an astonishing number of other new pianists, a fabulous technician. I was impressed especially by the more showy (and less profound) morsels he plays—which he makes into good listening simply by the casual way in which he projects the music, as though it were easy.

First, an amusing little set of studies for the left hand alone, by, of all composers, Max Reger, that epitome of lengthy Germanic denseness! If you can believe that Moyer has one hand behind his back, you will enjoy. At the end of the CD, similarly, are three more little show works, on a giant scale: Paganini, arranged for piano by the young Liszt, rearranged to make them even more astronomical by the recent Italian genius Busoni!

There's a recent piece by George Walker—an idiom that is of Moyer's generation and, thus, easily comprehensible. And then there is Ravel, the "Valses nobles." Being, by date of birth, a Neo-Romantic at the piano, Moyer gives them the Romantic works, as one does today. But typically, the accents are just a bit on the wrong syllable (for older ears!), the delicious Ravel harmonies just a trace blurred by overpedalling, the rhythms off balance. The Moyer ear hasn't yet caught up with the Moyer fingers. All this is purely relative; I had a good time listening.

Edward Tatnall Canby

'TRANE TRACKS



A Tribute to John Coltrane: Various Artists
MCA-Impulse 42122, LP.

Sound: B+ Performance: A-

Generally speaking, when record companies issue "tributes," "best ofs," or "all-star meetings," they're working off a sales angle. Consumer skepticism should match promoter hype. Once in a while, however, despite manipulative publicity campaigns, these things actually come off with dignity rather than pretention. Happily, this is the case with MCA-Impulse's *A Tribute to John Coltrane*.

The album was recorded and released to coincide with the 20th anniversary of Coltrane's death. For the project, co-producers Eob Thiele and Ken Glancy, in conjunction with MCA executive producer Ricky Schultz, enticed some of the saxophonist's most important collaborators and devotees to participate: Pianist McCoy Tyner and saxophonist Pharoah Sanders, in addition to heavyweights such as bassist Cecil McBee and drummer Roy Haynes. Also participating in the project was prodigal son, reedman, bass clarinetist, and World Saxophone Quartet member David Murray—a youngster, relatively speaking, who was all of 12 years old when 'Trane

died. "I was coming out of Sonny Rollins," Murray admits readily, today. "I was never a Coltrane worshipper."

Tyner, of course, developed into the pianist he is today, to a large extent while he was a part of the most famous Coltrane ensemble, which also included bassist Jimmy Garrison and drummer Elvin Jones. In many ways, by agreeing to undertake this date, Tyner set himself up to be criticized. He played compositions such as "Naima" and "I Want to Talk About You" so immaculately more than a quarter-century ago, how could he expect to duplicate—let alone *improve upon*—those quintessential previous efforts? Furthermore, Tyner's current unit, a trio that features Avery Sharpe on bass and Louis Hayes on drums, occasionally lapses into repetitive-sounding works, somewhat funk-tinged—particularly when Sharpe plucks an electric bass. In some ways, Tyner has not built on what he achieved with Coltrane so long ago. Sanders, likewise, although still performing well when leading his own bands, is not playing with the fervor he did, say, in 1963.

Consequently, given that a project such as this is subject to hype and that Tyner and Sanders may have indeed peaked artistically, the producers and artists definitely were in a risk situation

with *Tribute*. It's nice to know people can rise to the occasion.

McBee is one of the fiercest bassmen around, capable of meeting any challenge. Same with drummer Roy Haynes, who, like McBee, experienced Coltrane, musically, firsthand. The two were magnificent then, and they remain so today. There isn't anything they can't play. Period.

Still, this setting allows us to hear Sanders at his best, his most innovative and fullest-sounding in the past few years. His lines and choice of notes throughout are enlivening and devoid of passivity, particularly in "Bluesin' For John C" and "The Promise," where he sounds downright and continually innovative.

Tyner's attack, throughout, is invigorating. The session isn't overproduced or cluttered, as some of the pianist's recent albums have been. On this date, Tyner plays with enormous power, tremendous clarity, and, as always, an abundance of sincerity. "Lazy Bird," a hornless configuration reminiscent of Coltrane's 1957 "Giant Steps," underscores just how explosive a player Tyner can be when he's in his element. When he's on, as he is here and in Murray's "Last of the Hipmen," virtually no one can touch him.

Maybe everyone, producers included, thought 'Trane was looking down at them, passing judgment. Regardless, this troupe (including Murray, who does a nice, slightly faster reading of Billy Eckstine's "I Want to Talk About You") did their former boss proud.

Jon W. Poses

Hidden Charms: Willie Dixon
Capitol/Bug C1-90595, LP.

Sound: B+ Performance: A

The blues, as we know it today, was shaped, crystallized, and practically created by Willie Dixon. Others may sing the songs, but he wrote them: "Spoonful," "Hoochie Coochie Man," "I Ain't Superstitious," and about a few hundred more. Dixon put his stamp on the music, and it has never been the same again. Even his attitude is taken for granted as "the blues." But more than anything else, the blues is Willie Dixon's vision. The knowledge he imparts and his choice of language are in a class all their own.

On Willie Dixon's new LP, you can enjoy his music bathed in its own purity. Every home should have *Hidden Charms*.

Hidden Charms is a bit unorthodox in that none of its songs are among Dixon's best known. Instead, Dixon has bestowed upon us four brand-new songs which stand with his finest in addition to five lesser-known compositions from 1956 through 1974. There is a consistency to the man's work, and with this new exposure, "Don't Mess with the Messer" or "I Don't Trust Myself" could easily become standards like "Seventh Son." A couple of the newer tunes, such as "Jungle Swing," are ambitious even for a master such as Dixon. They demonstrate that even in his later years, he is expanding his horizons. He is the blues, and more.

The record was produced by T Bone Burnett, and, to whatever extent it was "produced," there is no interference with the *auteur*. Willie is surrounded by sympathetic players—cronies such as Lafayette Leake (piano), Earl Palmer (drums), Cash McCall (guitar), Red Callender (bass), Sugar Blue (harmonica), and Burnett himself (dobro). The recording is an intimate, atmospheric blend of primarily acoustic instruments with very little outboard gear dressing up the sounds. It may sound naked to some ears, but it is completely refreshing. As performed by Muddy Waters,



The Rolling Stones, Led Zeppelin, Howlin' Wolf, and Cream, Dixon's songs take one step away from the essence of the blues. But here, one can enjoy the man's music bathed in its purity. Every home should have *Hidden Charms*.
Jon & Sally Tiven

Lucky Man: Henry Gray
Blind Pig BP-2788, LP. (Available from Blind Pig Records, P.O. Box 2344, San Francisco, Cal. 94126.)

Sound: B Performance: B+

Rock fans have always idolized blues guitarists and harp players, but blues-piano players have never commanded much respect from these same fans. Yet few guitarists or harp players earned their fame without a piano providing the foundation for their solos. Muddy Waters had Otis Spann on the 88s, Elmore James had Johnnie Jones, and Howlin' Wolf had Henry Gray—when Gray wasn't recording behind a slew of others.

On *Lucky Man*, Gray performs as if the heyday of Chicago blues never ended. His thundering, two-fisted piano generates a full head of steam as it plows toward the conclusion of the showpiece solo instrumental "Finger Snappin' Boogie." He's also a confident and powerful singer in a Muddy Waters vein, quite remarkable when you consider that he's 63 and rarely recorded as a bandleader.

Gray pays tribute to his mentor, Big Maceo Merriweather, the blues giant of the '40s, with a strong reading of Maceo's "I'll Be Up Again Someday." As was true of Maceo, Gray's piano doesn't require a rhythm section. In an age of electric bands, however, commercial wisdom predicts a limited market for acoustic piano albums. Consequently, Gray is often saddled with a superfluous three-piece rhythm section that masks his rock-steady left hand.

Henry Gray is too good to slip back into the retirement that preceded *Lucky Man*. Let's hope he tours to support the album.
Roy Greenberg

Ain't Nothing But a Party: Johnny Copeland
Rounder 2055, LP.

Sound: C+ Performance: B+

Johnny "Clyde" Copeland need only wave his guitar to turn an urban club into a roadside juke joint. No matter where his stage, Copeland is one of those bluesmen who always plays as if someone were keeping score. He's twice won awards in the '80s for blues entertainer of the year and earned a Grammy for his contribution to 1986's *Showdown* (on Alligator).

As a son of Houston, Copeland's a master of dazzling Texas shuffles that recall Gatemouth Brown, yet he excels on slower numbers, when his deliberate picking lets you appreciate his grace and taste. He's an even better singer. His raspy voice goes from 0 to 60 mph in a heartbeat, while sounding like a loudspeaker that blew the instant the volume was cranked up. He delivers "Baby, Please Don't Go," the Big Joe Williams number that was a favorite of '60s British rock bands, as a minor-key cry of pain. Though it's no surprise to learn that he once toured as a soul singer, it is puzzling that he failed to find much success.

Ain't Nothing But a Party was recorded at Houston's Juneteenth Festival on June 13, 1987. This was also "Johnny Copeland Day," by declaration of the mayor. Perhaps the occasion explains why this set was released despite excessive crowd noise and recording problems which place the listener almost in the fringes of the audience. Even the promotional materials accompanying this Copeland record diplomatically concede that it was cut under "somewhat less than ideal recording conditions."

The choice of tracks, too, was probably dictated by technical considerations. "Big Time" is the sort of instrumental that's normally considered filler. How many times will you want to listen to the song's bass solo, or to Copeland introducing the members of his group?

Johnny Copeland is one of the least recognized natural resources in the blues world. His well-drilled band is in typically fine form for a collection of mostly new material. I just wish we could all have had a better seat for his performance.
Roy Greenberg

Johnny Copeland



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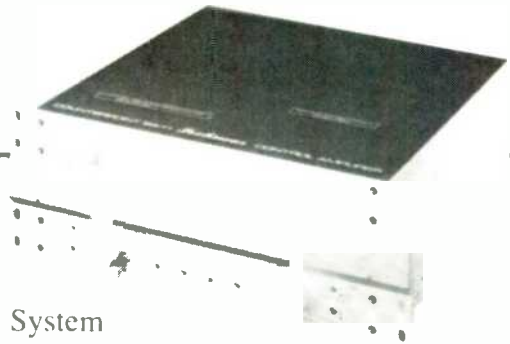
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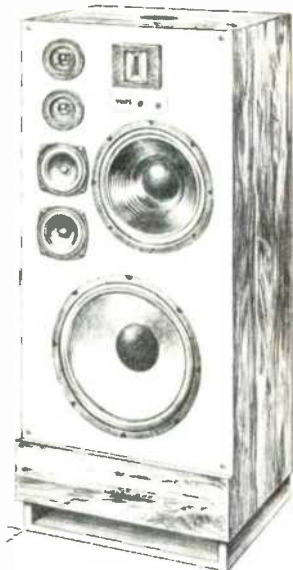
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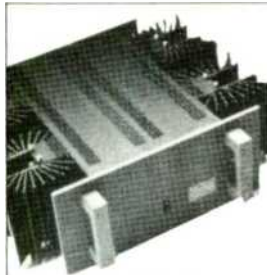
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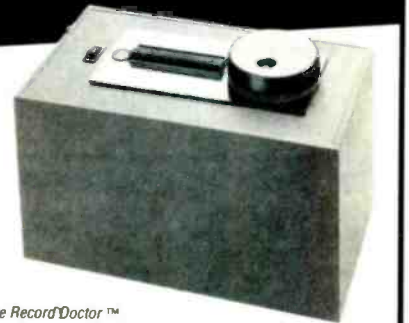
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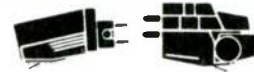
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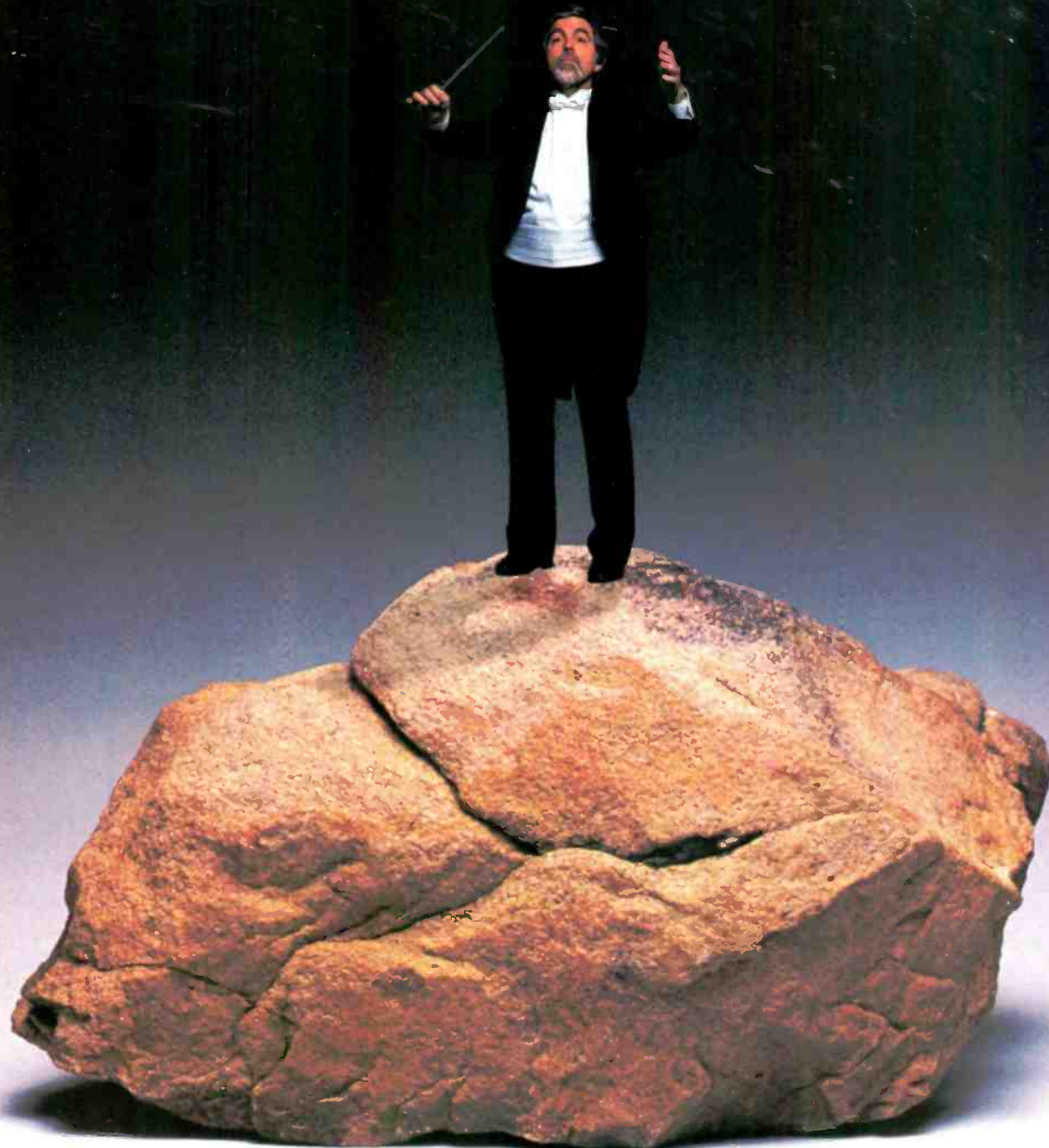
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