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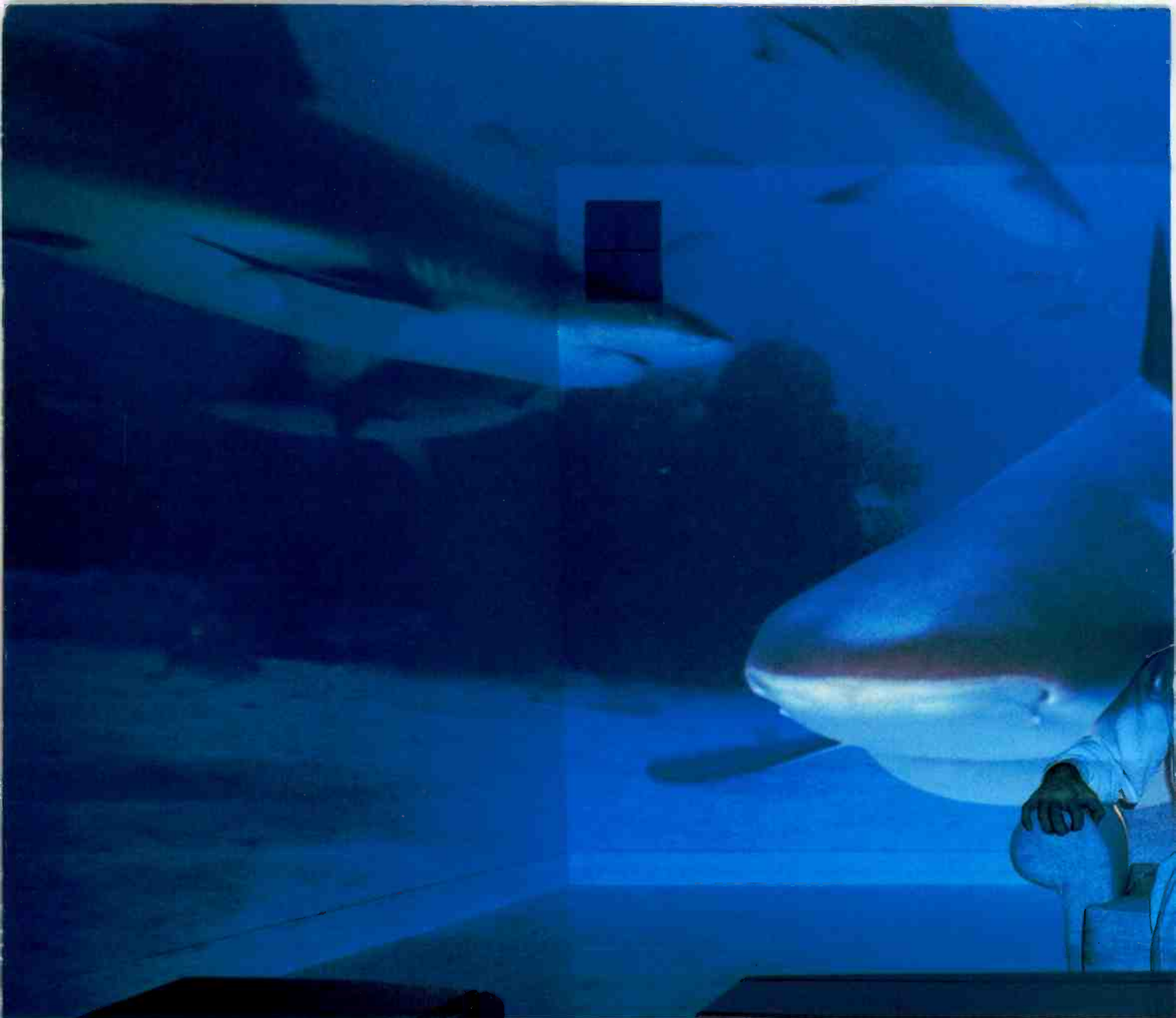
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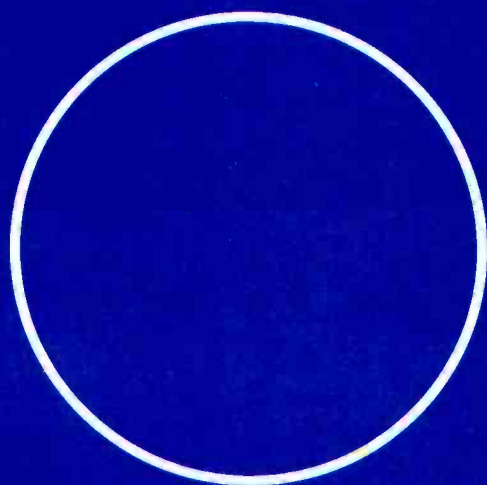
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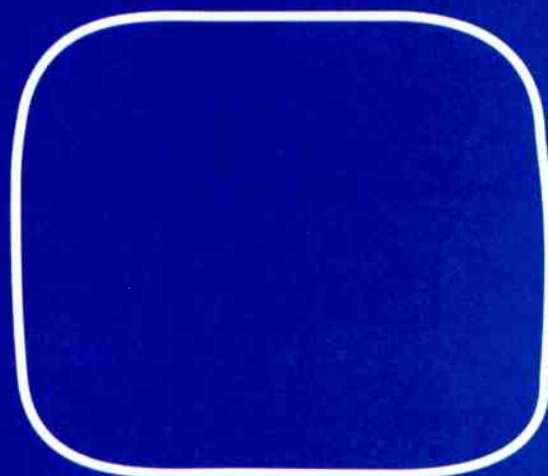
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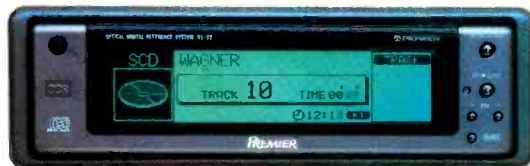


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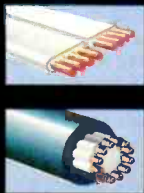


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Which scares you more, a horror film with the sound turned off, or a horror show on the radio? The answer is easy because it is the movie's soundtrack which carries the pathos and emotion. You can enjoy sound without pictures, but who wants pictures without sound?

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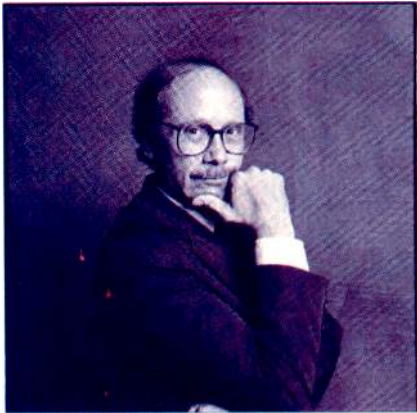
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Senior Editor Len Feldman died during the early morning hours of Monday, February 14, losing finally his two-year-plus battle with cancer. He was a week short of his 67th birthday, but typically during this period he wrote and tested and worked and travelled and joked and taught and did his usual scores of other generous things until just after the Winter Consumer Electronics Show this past January. There will be a few equipment reports of his later on this year, one of the ways his work survives him.

After a difficult period last year, David Lander, another Senior Editor at *Audio*, suggested that we ought to "honor one of our own," that indeed the sensitive, caring sort of interview Lander specialized in would be a good way to show Uncle Len how much he meant to each and all of us at this magazine and, more widely, in the hi-fi world. The resulting feature, which starts on page 30 of this issue, shows how this engineer, who was good enough at that trade to invent patentable ideas, became a writer and thereby a teacher. In this later role, he grew in many ways to become a commanding figure in the industry. Colleague Ivan Berger said yesterday that Len was a giant in this field, but he never made the error of using a giant's powers on the rest of us. David's work is a memorial to Len, a giving of thanks for his help in making this magazine successful these past decades, and details several topics where Len's work survives.

Len Feldman was associated with *Audio* about five years longer than I have been. I began here as the Assistant Editor and was pret-

ty raw both in editorial technique and knowledge about hi-fi equipment and engineering. Simply reading his articles and equipment reviews each month has been a wonderful opportunity for an audio education. Editing them, that is translating them from manuscript to printed magazine page, has been even better. In spite of this long and warm association, and no matter how much talk there was between us by phone, Fax and in person, I never really told Len how important he was to the magazine. I am taking this opportunity, then, to write an open letter to Uncle Len, to say things I ought to have told him long ago:

Oh friend, we miss you, and your passing leaves big, raw-edged holes in the magazine and in our hobby and field. While others may do some of the work you did, I don't think that any of us can replace the wonderful caring spirit you brought to this field.

I was very touched by the service yesterday. How literate and eloquent your friend Rabbi Waxman was, calling you a high fidelity man—without the hyphen—to call attention to your constancy to family, faith, and friends, as well as your profession. I loved his Biblical reference to the shofar getting louder and how the worth of your life sounded more loudly with the passage of time.

Your son-in-law gave us a wonderful example of your warm kindness, telling how you gave a "Best Nurse" award to your granddaughter when she visited you a few weeks ago. Our friend from the industry, Marc Finer, called you "the man for all seasons" in talking about how far your talents reached. An accurate judgment, I think.

I have recently been told again by colleagues that you were proud of the association with *Audio*; I was proud to have you as part of our team.

And thank you for suffering fools like me gently—as an opportunity to teach and pass on your knowledge. So full of life you were, friend. May your spirit continue to inspire us.

With love,

AUDIO

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AUDIO Magazine

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Audio Observatory #5, 1993

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The Sensible Sound Issue #47

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Lirpa's Lasting Impression

Dear Editor:

I have a problem with which I hope you can help. Last year, I bought one of the Lirpa Labs U8-IT2 sound processors, based on your listing of the unit's outstanding capabilities in the 35th Equipment Directory. The processor seemed to be performing up to its rated specs until recently. Suspecting the worst, I took it to a major manufacturer's audio clinic, and their instruments confirmed that my U8-IT2 had begun to slip well below its advertised specs.

It seems my unit's narrow channel separation of 1/2 dB was forcing my eyes to cross when listened to through my favorite headphones. There were other problems, too, such as simply finding the component on its assigned shelf when I wished to use it, but they are comparatively minor, and I am willing to tolerate them.

So, I guess my question is, "Can you help me?" Lirpa Labs has impressed me ever since their introduction, and I would hate to give up on their products. Thanks!

*Rd. Giarc Llerrem
Anytown, U.S.A.*

Editor's Note: The test results you got are typical of those that Lirpa products get at competitor's clinics; Prof. Lirpa cites this as proof of the widespread plot against him. He also comments that the same psychic pressures that cross your eyes will also pressure-clean your sinuses, a worthwhile trade-off. As to your last request, there is no help for those who are already Lirpa owners, though we understand that Lirpa Labs' Customer Salvage Division is working on a 13-step program for them.—I.B.

Muddle A

Dear Editor:

There is an error in the January "Spectrum": The A below middle C vibrates at 220 Hz—440 is the A above.

Hermann Helmholtz's *On The Sensations of Tone* indicates the highest A above middle C as 567.3 Hz (North German Church Pitch, 1619) and the lowest as

373.1 Hz (Delezenne pitch, no date given); 567.3 is higher than our approximated C# of today (550) and 373.1 is very close to today's F#. So "standard" A has ranged over a perfect fifth (seven half-steps) but was never as low as that indicated on page 33!

*Rodger Vaughan
Placentia, Cal.*

Dear Editor:

Re the January "Spectrum": A 440 is A above middle C—even for a Russian basso-not-so-profondo...

*Lorenz Rychne1
Sherman Oaks, Cal.*

Editor's Note: To Messrs Vaughan, Rychner, and the 440 others who wrote in: I feel a lot lower than middle C myself, now that I've had this goof pointed out to me. I guess I should be dipped in boiling pitch.—I.B.

Phone Tones

Dear Editor:

The "precision dial tone" used with any exchange that is equipped for Touch-Tone is a mixture of 360 and 440 Hz.

*Gilbert A. Johnson
Minnetonka, Minn.*

A Wealth of Audio Information

Dear Editor:

One of the U.K.'s leading authorities on disc recording, Don Aldous, editor for *Hi-Fi News & Record Review*, passed away on March 26, 1990. He left behind a garage filled with audio equipment, with numerous items still new in the box. He also had accumulated a storage area of sound and audio books, as well as many magazines, catalogs, product literature, and personal correspondence from the early days of high fidelity. I purchased the library and am offering these items in my Audio Catalog #1. Readers interested in this unique and comprehensive library may send \$2 (\$4 foreign) to: New Wireless Pioneers, Box 398, Elma, N.Y. 14059; 716/681-3186.

*James Kreuzer
Elma, N.Y.*

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Hear the music, not the machine.



Has listening to music recorded on CD's become an uninspired routine instead of the releasing experience it once was? Maybe it's because you're hearing more of your digital playback machinery and less of the music. In an era when most CD players and transports offer the same bland, assembly-line sonic experience, Audio Research is proud to announce two new products which serve the music instead of digitally enslaving it. The CDT1 compact disc transport and the CD1 compact disc player both use innovative engineering—along with patented Audio Research circuits—to bring you higher resolution from the compact disc medium than you've ever encountered before. This new standard of performance is due in part to more effective mechanical isolation and electronic elimination of digital jitter—the electronic entropy that drags on laser servos, error-correction circuitry and power supplies to hold back the full reproduction of a life-like musical experience. (Hence the flat, dimension-less sound of much previous CD sound.)

Add Audio Research's advanced, highly regulated power supplies and, in the case of the CD1,

an innovative analog stage with low-impedance output drive, and you have two machines which honestly advance the state of the art in music reproduction from CD sources.

Both transport and player offer a full complement of digital output options, including ST-standard glass optical, FNC-coaxial, AES-EBU (XLR) and TOSLINK. The CD1 also includes analog outputs for both balanced (XLR) and single-ended (phono plug) connection to your preamp. In short, both CDT1 and CD1 are equipped for easy incorporation into any music reproduction system. And both include remote control, standard.

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WHAT'S NEW

Celestion Sub/Sat System

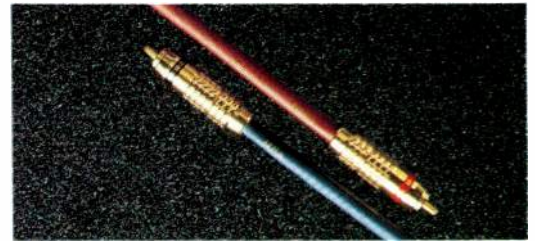
The three compact pieces of the Trinity system are a pair of Celestion 1 loudspeakers and a CS-135



subwoofer. Each Celestion 1's vented cabinet houses a 4-inch woofer and a 1-inch titanium-dome tweeter, while the CS-135 uses a dual-chamber enclosure, sealed in front of the 8-inch driver and vented to the rear. The system is finished in simulated black-ash veneer. Price: \$399. For literature, circle No. 100

Esoteric Cables

Signals do not travel through the outer shields of the Esoteric Primus and Artus Hyper-Balanced interconnecting cables, to reduce noise pickup. In addition, the Artus has silver-plated conductors. The phono plugs shown



collets and split center pins, for better contact; fully-balanced versions with XLR plugs are available. Prices per

1-meter pair, with phono or XLR connectors: Artus, \$595 per pair; Primus, \$395 per pair. For literature, circle No. 101



CEC Belt-Drive CD Player

Instead of a high-torque, direct-drive servomotor, the TL 1, from CEC, uses a

low-torque motor and belt drive, with a large flywheel to smooth out rotation.

The smaller motor also reduces electromagnetic noise. A second motor drives the laser pickup assembly. The unit has four outputs: Toslink and ST Link (AT&T) optical, and BNC and RCA coaxial. Price: \$4,650. For literature, circle No. 103

Fultron Car Crossover

Fultron's Little Black Bass Box (Model CX10) is a compact subwoofer crossover with adjustable (± 12 dB) bass level at 45 Hz and selectable crossover frequencies of 70, 90, or 120 Hz. Output voltage is 2.5 V, and S/N is 100 dB. Price: \$49.95. For literature, circle No. 102



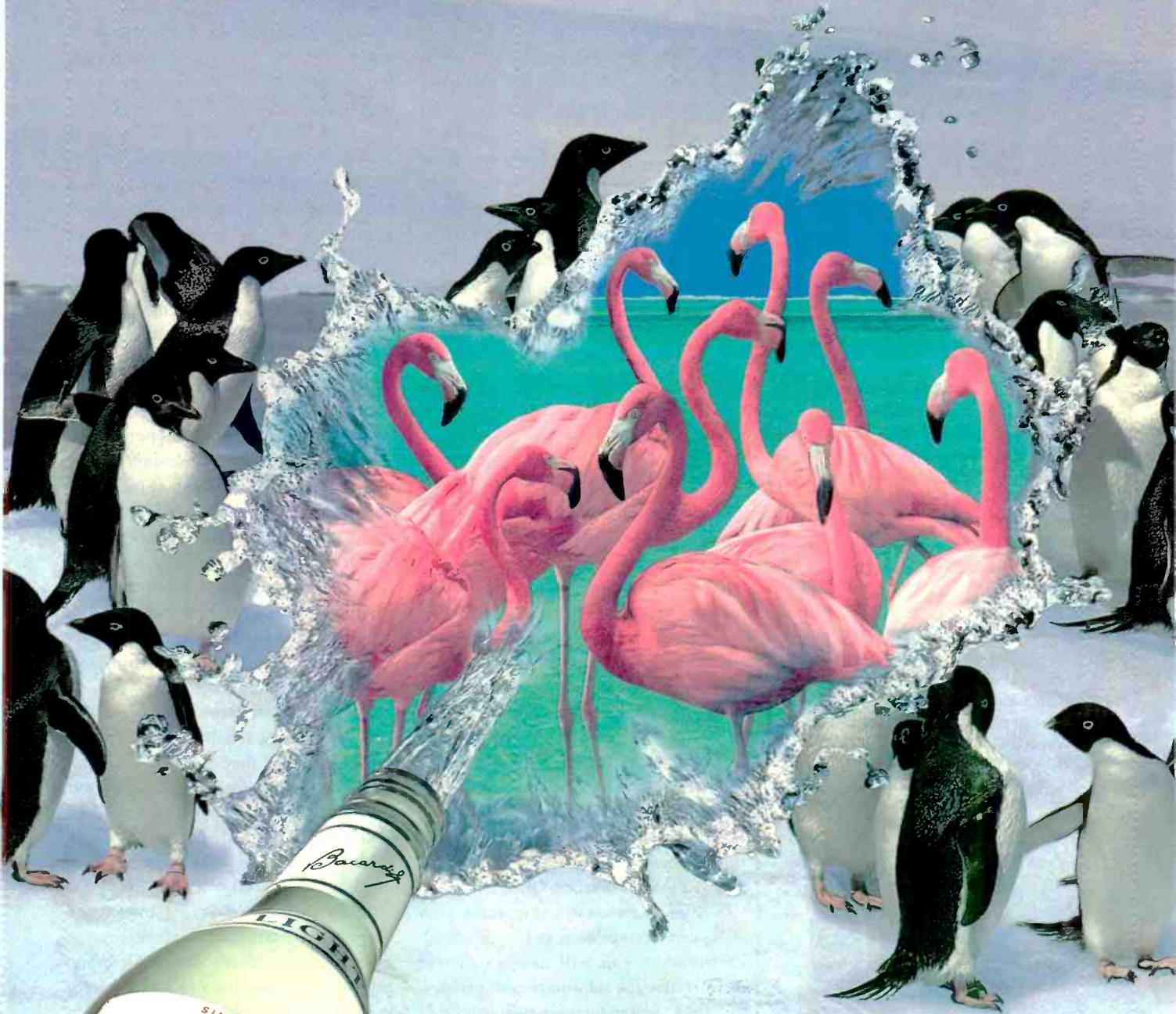
Counterpoint CD Transport and D/A Converter

The DA-10 D/A converter from Counterpoint has six digital inputs, including two digital tape loops with full dubbing. A choice of

decoder sections is available, all on interchangeable cards; current options include Analog Devices, Crystal Semiconductor, Philips, and UltraAnalog decoders. The DA-11 CD transport has a front-loading transport with a machined aluminum tray and a low-jitter master clock. Glass and plastic ("Toslink") optical outputs, two BNC coaxial outputs, and an AES/EBU balanced output are included. Prices: DA-10, \$1,695, plus \$255 to \$995 for the decoder card; DA-11 \$1,495. For literature, circle No. 104



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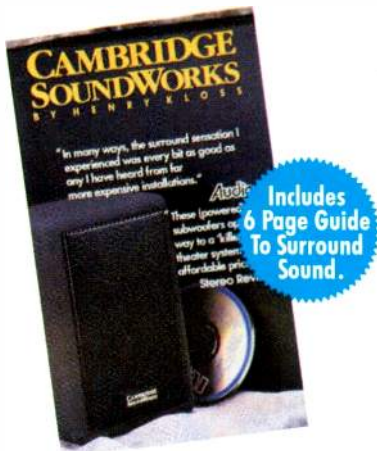


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AUDIO CLINIC

JOSEPH GIOVANELLI

Bi-Wiring: Yea or Nay?

Q. I fail to see the advantage of bi-wiring speaker systems. I know that some reviewers and speaker manufacturers recommend this, which is supposed to eliminate crosstalk between drivers. What difference does it make if you run two wires and join them at the amp output or jump the woofer and tweeter terminals directly at the speaker terminals?—Name withheld

A. Bi-wiring refers to the use of separate cables from one set of amp terminals to the high-pass (midrange/tweeter) and to the low-pass (woofer) sections of a crossover, instead of running a single cable to both. So far, I can't see any advantage to bi-wiring. Crosstalk problems should be taken care of by the crossover networks.

Before bi-wiring became popular, speakers normally had one set of terminals leading to both halves of the crossover. Occasionally, separate terminals were provided for the woofer, to allow bi-amplification (driving the woofer with an amp of its own). Today many speakers have external woofer and mid/high input terminals connected together with jumpers that can be removed for bi-wiring or biamping, if desired.

Driving a Center Channel and Subwoofer

Q. Can I use one side of a stereo amp to drive a center-channel speaker and the other side to drive a subwoofer?—Kevin Potts, APO San Francisco, Cal.

A. I see no reason why you cannot use a stereo power amp as you described. Presumably, you will need crossover networks for the subwoofer and, perhaps, the center speaker; however, such crossovers are often supplied with speakers that need them, and, in the case of subwoofers, are often built into the speaker.

Subwoofer Addition and Impedance

Q. I am considering adding a subwoofer with a nominal 6-ohm impedance (minimum, 4.5 ohms) to my audio system using a crossover. My main loudspeakers are

8-ohm models. With both my main loudspeakers and the subwoofer connected to my amplifier, will I damage my power amp?—Richard A. Prentice, Charleroi, Pa.

A. I believe that you can use the subwoofer you are considering. If you connected both the satellite speakers and the subwoofer directly to the power amp, you might have too low an impedance for safe operation of some amps. But you won't actually have a direct connection because the crossover will isolate the subwoofer from the satellites. After all, its job is to send bass to the subwoofer and all other frequencies to your main speakers. So, at frequencies above and below crossover, your amp is mainly driving either the subwoofer or the main speakers but not both at once. The real purpose of this is, of course, to obtain smoother response, by letting each speaker handle the frequencies it's designed for and minimizing overlap between the subwoofer's output and the satellites'. And an incidental benefit is that the crossover keeps the load impedance within your amp's safe operating range.

The crossover frequency should be high enough that the satellites don't have to work so low that they distort or that their bass falls off significantly. The crossover should also be low enough that the subwoofer won't handle frequencies too high for it. In many cases, a crossover frequency of about 90 to 150 Hz will work fine.

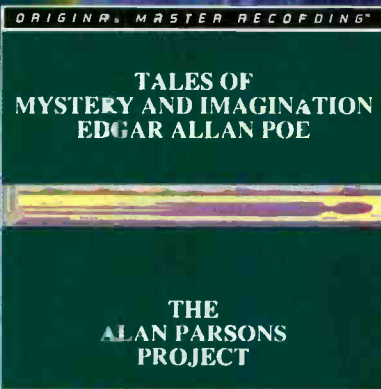
You will also want your subwoofer to have more or less the same acoustical output as your satellite systems. This will help you get smooth integration of sound between the two systems. Unless the subwoofer, satellites, and crossover are specifically designed to work together, a crossover with variable level will help you achieve this. **A**

If you have a problem or question about audio, write to Mr. Joseph Giovanelli at AUDIO Magazine, 1633 Broadway, New York, N.Y. 10019. All letters are answered. In the event that your letter is chosen by Mr. Giovanelli to appear in Audioclinic, please indicate if your name and/or address should be withheld. Please enclose a stamped, self-addressed envelope.

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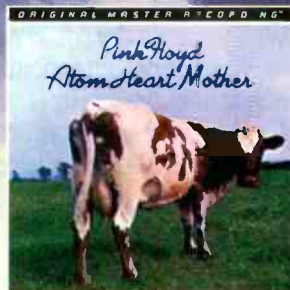


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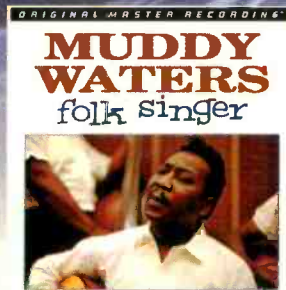
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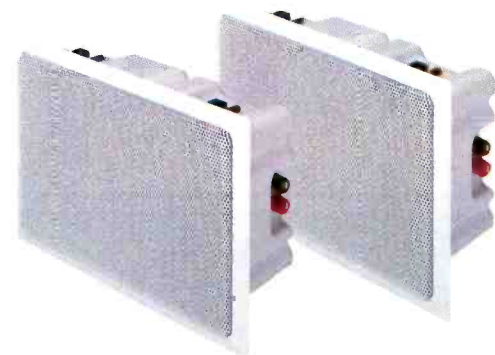
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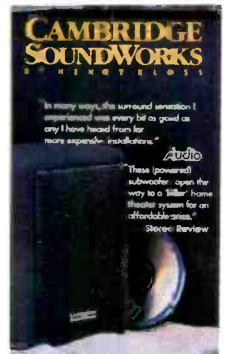
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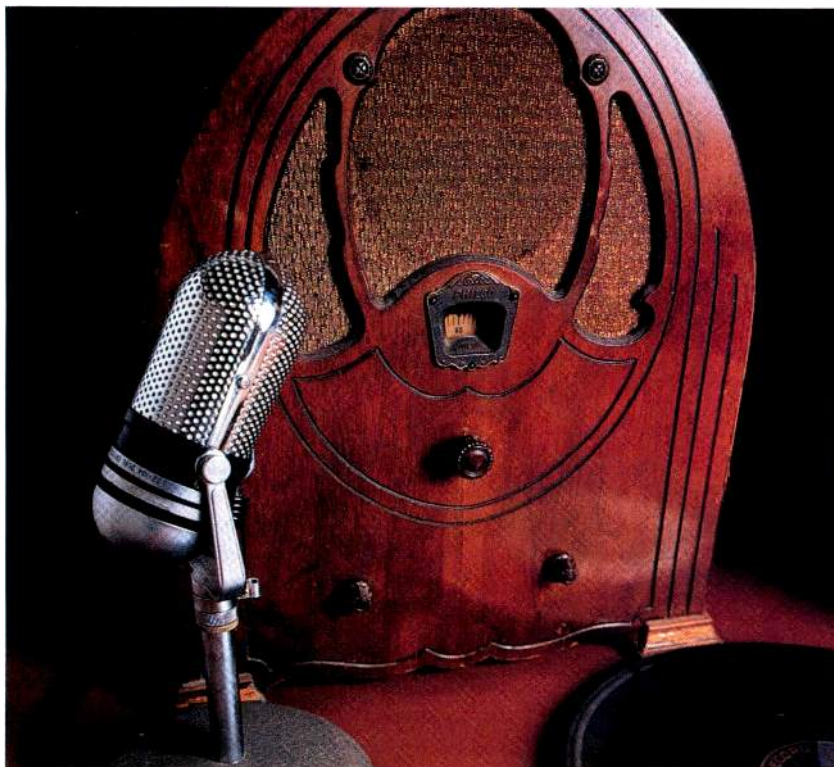
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EDWARD TATNALL CANBY

'ROUND THE RADIO



Suddenly, as I looked through the pages of our opulent publication the other day, a thought came upon me. *Loudspeakers*, speaker systems, page after page. They are the meat and potatoes of our business, in spite of all other diversity. It seems to me, thinking back, that they always have been. And so I asked myself: *When did I hear my very first loudspeaker?* For I have been around since before there were any. Generally, it was a speakerless world I first lived in. Can you imagine it?

The year 1913 comes to mind, after one of our articles. Jensen. No—I was not listening very closely at that date, but I began to wonder, and wonder some more. Give me 1923 or so, and I am with you.

As I remember, 1913 was a year to remember for those in audio. The vacuum tube! Amplification of a signal—the very essence! Tube circuits that took radio straight out of the hobbyist class into practicality. The superhet. From around 1913, electronics burgeoned in one of those explosions of fundamental progress. By the time I mention, 1923, the foundations were well laid. My family bought its first radio, a stand-up console. It had a loudspeaker—it *had* to have one. It stood in my father's little downstairs study in our new house on the outskirts (now very much the inner skirts) of New Haven, Conn. No one but Daddy was allowed to touch the precious thing. Kids, neighbors' kids, held it in awe, though Mr. Billings, next door, a show-off if there ever was

one, had an even bigger radio. He would! He spent hours and hours making huge charts of every football game he could hear, play by play. My father listened to higher things, but not too often. Coming from a Quaker background, he was very much conditioned against ostentation. (Ask any Quaker.) He and Mr. Billings did not get along very well.

Our radio? It was a Kolster. Does anyone remember? It must have been battery operated—this was well before the advent of the handy a.c. line plugged into the wall. I fear that at that stage I was not too clear as to how radios worked. But I do know that we heard King George V on that radio all the way from England and, more to the point with me, the original and famous English Singers broadcasting Christmas music, maybe from Westminster Abbey. I was old enough, and musical enough, to appreciate *that* part of the radio's offering. Yes—the Kolster must have had a loudspeaker because it was a real radio. It played out loud.

My *very* first radio came a year or so earlier, on a visit to our grandfather's Victorian mansion in Wilmington, Del. In 1907 he took his large family to Europe for a tour in *two* automobiles. They were the first two in his city. In the earliest '20s he had to have a radio ahead of any-

Photograph: D. Spindel/Superstock

**I REMEMBER LOOKING UP
AT THE SPEAKER THE WAY
A DOG LOOKS AT ITS
MASTER—THAT'S WHERE
THE SOUND COMES FROM.**

body else, and he did. It was, I am sure, an Atwater Kent, the prestige brand of the day. I can see it now—one of those long black boxes on a table with big round tuning knobs, calibrated around the edges. *Three* tuning knobs. To pick up a station you had to turn all three and find the one spot, with three positions, where



At one time you understood how this worked.



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that station became faintly audible. Impossible ever to find it again. My brother and I were taken into the Wood Room, grandpa's capacious study, and left with the radio as a handy babysitter. Loudspeaker? There wasn't one. Only a pair of 'phones.

We were there for hours and hours (well, maybe minutes), and we tuned and tuned and tuned. Nothing but a faint hiss, mid-range, and an occasional click of static or snatch of Morse code. We would not give up, but it was all in vain. The magic sound of radio, through the ether, had to wait. Grandpa was not amused.

After the Kolster we had a more-famous and long-enduring type of radio, the mantelpiece or mantel model, widely sold for many years by that pioneer audio outfit, Philco, presumably based at the time in Philadelphia. (I think I visited Philco there at some later time for a press thing.) It was a short, upright model, quite innovative after the Atwater Kent-style black boxes, curving into a semi-Gothic arch on top. Yes, it had a speaker, hidden neatly behind the cathedral window (or approximation thereof). By that time I knew a speaker when I saw one. As in all radios, for a long period, you could see it inside the open back. No enclosure except the cabinet. At least the mantel radio did not, as I now realize, have any cabinet resonance problems! Curved surfaces with a focus point that would be outside. You put the Philco literally on your mantelpiece if there was enough of a shelf, and its sound was pleasantly eye level and ear level. Not a bad idea and, you must admit, right in line with our present huge array of tall, column-like speaker systems with the tweets on high. Good ideas sometimes come early.

That radio was no longer sanctified in Daddy's study. Radio was getting to be ordinary, and we kids were allowed to turn it on so long as Dad wasn't taking his afternoon nap on a couch in his study—or Mom the same, upstairs. Nor, of course, when guests appeared. But even with this great audio freedom I somehow still looked at a loudspeaker more or less the way a dog looks up at his master's face, and for the same reason: That's where the sound comes from. When the a.c. current (a redundant expression that still persists) came to radio, we learned quickly to keep our hands outside. There was dangerous high

voltage, at the ends of those accessible fat wires near the loudspeaker. Electromagnets. At that point I began to be aware of the speaker itself as having a separate identity, the way people discover the identity of their car's muffler when it begins to act up.

Nobody much thought about speakers until they failed to speak, or emitted scratchy sputters instead of intelligible audio. Then the fat was in the fire—for speakers, as I say, were dangerous. With all that voltage in the hefty magnet. And plenty of amperage out of the house wiring. Tinkers with soldering irons were known to have been quietly electrocuted—or so we heard. In all those years of my growing up, I never touched an actual speaker. Didn't dare. Didn't want to.

You must understand one big difference between then and later in what became audio (the word did not exist). Until the middle 1920s, sound reproduction for the

**THE PHILCO'S SPEAKER
WAS NEATLY HIDDEN
BEHIND THE RADIO'S
CATHEDRAL WINDOW.**

home was totally divided into two entirely separated areas, the radio and the phonograph. The older system was still alive; 78-rpm records existed by the millions and millions—for a while, even cylinders—and there were the requisite playing machines to produce the sound. Almost everybody had some form of "Victrola," or Vic, just as everybody had a Kodak. Not necessarily made by those two manufacturers, trademarks noted.

Nobody really thought that the phonograph was dying. My uncle, across the way, had a fancy console Victrola, as mentioned here before, which was held in awe by all children and played solemnly on special occasions. It may have stood up high, but the Victrola part was just the top—the rest was cabinet space for the records. Speaker? It spoke, it sang, but out of a rudimentary horn (not yet the folded exponential of the remarkable Orthophonic Victrola). We heard opera—that is, three-minute solos or duets with the hoked-up acoustic orches-



Odd as it may seem, most speaker companies don't make their own drivers, the fundamental components that produce the sound. Instead, they assemble their systems using other peoples' parts. Then, they try to compensate for the inevitable deficiencies and mis-matches.

For 70 years, Celestion has designed and built their own drivers and integrated them with straight-forward crossovers and proprietary enclosure technology. The result? Each system works cohesively as a unitary whole, rather than something that's been pasted together.

Audition any of the Celestion Unit Series Loudspeakers. Compare them to other speakers in the same price range. Immediately, you will hear...



CELESTION

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tra, and we heard "classical" symphonic music—Scheherazade, the Young Prince and the Young Princess, comes to mind as one of the *grrreat* masterpieces heard tinnily but reverentially on that machine. So, you see, there were fancy radios and fancy Vics, full of prestige and, equally, whole ranges of very plebeian and inexpensive machines. The Sears radio (later), a little box 7 or so inches square; the round kids' Vic that we owned, turntable size with kids' records to match. (I can still whistle my favorite tunes—"Over There" from World

War I with Caruso and "The Whistler and His Dog." I loved it when the loud whistler just at the end whistles his dog to his side and it goes "WOOF WOOF.") You see how it was—complete lines of goods on each side of the gulf, phono and radio, and never the twain could meet.

So it went until after the first electrically recorded 78s, beginning in 1924 but not impinging on our consciousness until much later. In 1930 I rented a leather-bound *electric* portable phonograph for my room at school, a.c./d.c., of course. We still

had d.c. everywhere, a great impediment to electrical audio of any sort. A phonograph, not a radio! The gulf was closing. It had a genuine speaker at one end, maybe 3- or 4-inch. It sounded awful.

Nevertheless, I already owned 78s of the Bach B Minor Mass, its very first recording, or, rather, segments thereof, along with other highbrow goodies. I must repeat what happened one day that year. We still owned an "acoustic" phono of some sort at home, and I wanted to try a momentous experiment—combining the two. My idea was to remove one of the "tone arms" and mount it behind the other arm to play the same record on one machine. It had to be the electrical arm I removed, a magnetic pickup, 4 ounces, and fastened to the

I FIRST BECAME AWARE OF THE SPEAKER HAVING AN IDENTITY OF ITS OWN BECAUSE OF DANGEROUS HIGH VOLTAGE NEAR IT.

acoustic machine behind its own arm. For this destructive, scandalous mutilation I hauled the portable (it was big and *heavy*) by public transportation all the way home.

It worked! Instantly, the most heavenly Bach I had ever heard floated out of the same little study, no longer used by Dad, into the front hall and upstairs to the higher regions. What I hadn't thought of was the separation between the two heads on one record, a time lag just right to blend in with the natural reverb in the Bach recording, electrical—a large orchestra, chorus, and soloists in a spacious hall. It was like the "echo" from later Ampex tape machines using both record and playback heads.

Ecstasy! It was a marvelous sound, super-stereo before its time. I was dancing with pure joy when I faintly heard a scream. My grandmother, upstairs in her own room. To my horror, she shouted, **WILL YOU STOP THAT AWFUL NOISE THIS VERY MINUTE!!** I stopped. I was crushed. So much for Music Appreciation.

But after all, hadn't I bridged the great gap, all by myself? More (for younger readers) in a later installment. **A**

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**BP-20: redesigned
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Bryston's new BP-20 line level preamplifier offers a significant step forward in capturing the subtleties, nuances and emotions of recorded music. **R**edesigned inside and out to reflect the improvements in the entire Bryston line, the BP-20 is a perfect match to the new NRB series of amplifiers. All aspects of the signal flow are much improved, with lower noise and distortion figures, and higher overload levels. **Y**ou will find no internal wiring in Bryston preamplifiers. Components plug directly into glass-epoxy circuit boards, eliminating variations in signal travel and wire interaction. Intermodulation distortion has been reduced to typically .0025% from 20 to 20kHz. The noise floor has been significantly improved, reducing background hash to far below audibility. Input-to-input crosstalk is essentially nonexistent to eliminate signal bleed-through from one source to another. Channel-to-channel interaction has been improved significantly, reducing any possibility of component crosstalk. **S**ignal switching and audio connections utilize heavy gold plating to provide long-term trouble-free connections. Two pair of XLR balanced inputs and one pair of balanced XLR output connectors are standard as well as five pair of unbalanced inputs, 2 pairs of paralleled unbalanced outputs and one processor loop. This provides total flexibility for integrating other balanced or unbalanced audio equipment into your system. **T**he power transformer is mounted externally to eliminate power-supply noise and interference. The BP-20 is housed in a steel cabinet for shielding to reduce electromagnetic interference effects. Buffered inputs provide for lower distortion and improved linearity from source components.

A ground plane has been incorporated in this new design to further reduce crosstalk and noise throughout the internal circuitry. **O**ur feeling is that Bryston's BP-20 is one of those fortunate circumstances when the long hours and extended listening pay off. The sense of transcending the recording medium and experiencing the original performance is captured with exceptional realism. **N**othing but a listening test will convey the feeling of musical perfection available in the Bryston BP-20. We invite you to audition one today.



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THE SYSTEMS APPROACH

Clarion's MDJ-474 doesn't look like a changer.



The mechanism of Sony's new MD changer is revolutionary: The cartridge sits still while the mechanism turns beneath it.



Sony's MDR-300 has independently loaded discs behind its flip-down panel.



udging from what I saw at the Winter '94 Consumer Electronics Show, the big news in car stereo is split between large systems and MiniDisc.

As predicted when MiniDisc was introduced, in-dash MD changers now abound; what's surprising is how fresh these designs are. While most car CD changers look more or less alike, the new offerings from Clarion, Sanyo, and (of course) Sony differ almost totally from each other and from their CD predecessors.

The Clarion and Sanyo changers, unlike CD units, require no maga-

zines. Clarion's Pro Audio MDJ-474 four-disc changer (\$999.95) doesn't look like one. It uses a single loading slot, sized to accept one disc at a time—Nakamichi's home Music Bank changers are the only parallel that I know about.

Sony's MDR-300 (\$1,499.95) has a separate slot for each disc, allowing two discs to be removed and replaced while the third is playing. Unlike the Clarion, it's a complete

receiver, with AM/FM tuner and a four-channel amp rated at 20 watts per channel (9.5 watts/channel at 1% THD). It also has control links for Sanyo CD changers, a dot-matrix display that can show track titles or other info about an MD, a removable front panel (which must be flipped down to change MDs or read the titles on their spines), selectable green or amber lighting, and a clock.

Sony's two changers use a unique square magazine about the size of a CD, with single-MD slots on all four sides of the square. The mechanism turns 90° to play each disc, while the magazine stands still. One model, the MDX-400 (\$1,299.95), includes an AM/FM diversity tuner and allows station call letters and other info to be stored and shown on the display. The faceplate is removable, and a joystick-like remote control is supplied. The MDX-40 (\$999.95) is a component changer, compatible with any controller or head unit using Sony's Unilink control system. Sony also showed a single-disc MD receiver, the MDX-100 (also \$999.95), rated at 20 x 4 watts (7 watts/channel at 1% THD). Like the MDX-400, it has diversity tuning and a programmable display.

The only CD head unit that seemed to break this much new ground was Blaupunkt's RCM 303A Berlin. Its display is a separately mounted, 6.4-inch color LCD that can double as a video screen, a vehicle navigation system, and a cellular-phone interface. The radio section goes beyond dual-antenna diversity,

working with a four-tuner Auto Directional Antenna (ADA) phased array. A fifth tuner, which handles Radio Data System

(RDS) broadcasts, is always on—even when the car and stereo are off—to store recent traffic bulletins for replay when everything's turned on again. But because U.S. video

AS WAS SHOWN
AT CES, THERE'S MORE
THAN ONE WAY
TO BUILD AN MD
CHANGER.

A photograph of two men fishing. The man in the foreground is wearing a plaid shirt and has a wide, joyful expression. The man behind him is also smiling and holding up a large fish. They are both holding fishing rods. The background is a bright, slightly overexposed outdoor setting.

**Work, Work,
Work, Work,
Work, Work,
Work, Work,
Fish.**

Take it easy.





The Blaupunkt Berlin's independent display can double as a video or navigation screen.

The visible parts of Pioneer's Optical Digital Reference system.



sition of soloists. Programmable time delays in the crossover compensate for offset positions of speaker drivers, a feature previously introduced in Sony's ES Mobile system (which has optical and analog connections) and Alpine's DigitalMAX system.

Eclipse now has two CD/tuners that control and are linked by fiber optics to a DSP unit. That unit, the EQS-2000, combines a digital preamp, low-pass filter, sound-field processor, and D/A converter. Adding Eclipse's EQR-2140 controller adds a spectrum analyzer and parametric equalization (three bands for the front,

what young men (his target market) wanted from car stereo: "What did I hear? Bass, bass, bass! Some treble, maybe, but no midrange. You cannot hear the vocals, you cannot really hear the tune—but the bass? You not only hear but *feel* it. So why should young men waste their money on midrange drivers, crossovers, and more things they'll never listen to? Why pay for recordings full of lyrics and tunes they cannot possibly hear? They must not even *want* to hear these things, because they set their equalizers in a letter 'U'!"

The MobiLirpa I therefore has no midrange drivers and no crossovers beyond a bass-blocking capacitor in the tweeter line. The resultant savings allow a higher output subwoofer and more powerful amp than have been seen before in Lirpa's price range. The woofer gradually rolls itself off at midrange frequencies, so there is no low-pass needed. In place of expensive tape or CD transports and tuners, the MobiLirpa I has a rhythm machine which can reproduce the beat of any music, saving software costs. Treble comes from a diode in the tweeter line, which clips the signal to generate the necessary high harmonics.

An optional flexor arm makes the bass visible as well as audible, by bulging the car's sheet-metal in and out with the music. "And since MobiLirpa I owners

and cellular standards differ from European ones, it will have to be reworked for the U.S.—if it comes here at all.

Unique as it is, the Berlin exemplifies a hot new trend, towards fiber-optic digital links between in-dash units and trunk-mounted amplifiers and other components. This gets easier to do when the dashboard player handles a digital source such as CD or MD, so no A/D conversion is needed. (Since DCC players also play analog cassettes, they would need A/D sections in this kind of setup.) Fiber links eliminate many noise and ground-loop problems. And a signal that's already digital encourages the use of DSP.

So the Berlin system's amplifier, for example, includes an adaptive digital processor that measures both the car's acoustic character and the road and chassis noise. It then adjusts equalization to offset some of the car's acoustic problems and to make sound audible in frequency bands where ambient noise might mask it. The trunk-mounted DSP units in Pioneer's Optical Digital Reference (ODR) system handle equalization and control of spaciousness, acoustic simulations, and the apparent po-

four for the rear) to the EQS-2000's capabilities. A plug-in module, the EQU-8040, adds more bands.

Clarion's \$3,500 Active Digital Control System (ADCS-1), introduced last year, also has a CD/tuner unit controlling a trunk-mounted processor. The latter component has equalization, sound-field, and crossover functions (including time-compensating delays as part of the crossover) plus a D/A converter. Additional D/A converters can be added for multiple-amp systems. Something this complex is no cinch to set up by ear, so Clarion offers a real-time spectrum analyzer with signal generator, built onto a laptop computer, for \$8,400 (computer included).

While you'd expect similar technical innovation from Lirpa Labs' first car stereo system, the MobiLirpa I uses proven, off-the-shelf technology in order to keep prices down. With offices at the corner of Main and Elm Streets in New York City, Prof. Lirpa became almost painfully aware of

**THE ONLY CD UNIT THAT
BROKE NEW GROUND
THE WAY THE MD UNITS
DID WAS BLAUPUNKT'S
BERLIN RCM 303A.**

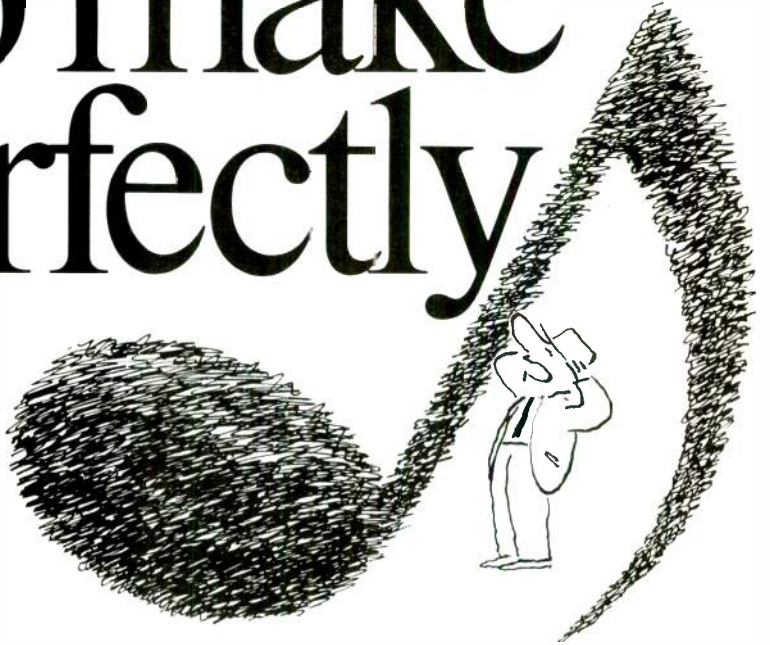
will sometimes crave anonymity," says Prof. Lirpa, "we offer a smoke screen (developed by a political consulting firm) that obscures their license plates."

Although brand-new, the system has achieved tremendous popularity. You've doubtless heard one rumble by your home already.

Bank on It

Late flash: The magazineless Nakamichi CD changers that may have inspired Clarion's new MD car unit (see story above) have now been joined by three Nakamichi CD models for the car. The Mobile MusicBank models offer fast disc replacement and changing and have lights for easier loading and unloading at night.

Adcom would like to make this perfectly clear.



Again, The Critics Agree

"Electronic equipment (especially digital audio gear) is vulnerable to both annoying and catastrophic power-line problems. Your stereo gear should have line spike and surge protection, with hash filters thrown in too. Line protection—you can pay a little for it now, or you can pay a lot for it later."

—Ken Pohlman, *AUDIO*, November 1987.

For a modest investment, the ADCOM ACE-515 enhances both audio and video clarity while protecting your equipment from damaging line voltage disturbances. Once again, ADCOM lives up to its reputation of offering superior performance at a reasonable cost. For complete technical data, please visit your Adcom dealer. You'll discover the ACE-515 is more than an accessory. It's a necessity.

Regardless of how sophisticated your stereo and video system is, it may never achieve its full performance if plugged directly into an AC outlet. Raw and unprocessed AC power can severely diminish the clarity of audio signals and reduce the resolution of your video picture.

ADCOM's ACE-515 AC Enhancer significantly improves the performance capabilities of your system by filtering and processing raw AC power, unveiling a pure, noise-free power source.

Listen To The Critics

"...the effective suppression of AC 'RF hash' by the ACE-515 improved clarity and lowered noise in all three CD players. . . .the significant improvements in instrumental and vocal harmonic retrieval and hall ambience are superb. . . . it simply appears to allow musical information to be passed through to the listener with less veil and electronic 'haze.'"

—Lewis Lipnick, *Stereophile*, Vol. 11 No. 4, April 1988.

Recommended accessory in *Stereophile*, Vol. 12 No. 4, April 1989.

Line Protection: It Pays For Itself

The ACE-515 also protects your valuable equipment from harmful high-voltage spikes and surges. And, its sequential turn-on/turn-off control circuit guards your speakers from disturbing, damaging thumps.



ADCOM®

details you can hear

BART LOCANTHI

Bart Locanthi, AES Fellow, Silver Medalist, and former president of the Audio Engineering Society, died January 9th in Glendale, Cal., after a long bout with cancer. Bartholomew Nicholas Locanthi II was born in White Plains, N. Y., in 1919. His studies at California Institute of Technology were interrupted by the war, and he returned there to graduate with a B. S. degree in physics in 1947. Bart was certainly one of the most versatile audio engineers of his day, with a distinguished career that spanned the development of analog computers, acoustical transducers, audiophile amplifier design, and digital techniques.

From 1947 to 1953, Bart was associated with an analog computer development group at Cal Tech. It was during this time that he published a seminal paper on modelling loudspeaker performance via electrical equivalent circuits. This paper (later reprinted in *JAES* in 1971) has become the foundation of most of the loudspeaker driver/enclosure programs available today.

From 1953 to 1960 he was a partner in Computer Engineering Associates, a com-



pany specializing in large-scale analog computers and engineering services. In 1949 Bart had begun a long consulting association with William Thomas and James B. Lansing Sound Inc., and was later vice president of engineering at JBL from 1960 to 1970. Those of us at JBL are reminded every day of Bart's contribution to the art; such cone transducers as the LE-10, LE-14, and a host of large-format compression drivers were all Bart's handiwork, and their progeny are mainstays in the present JBL

catalog. He also developed the acoustical lens products, long a hallmark of JBL.

It was in the late '60s that Bart developed the "T-Circuit," an output configuration for solid-state power amps that has become a standard in the industry. Some of the original 20-year-old JBL consumer amps embodying his circuitry now command collector's prices, especially in Japan.

I met Bart in New York during the late '60s, and it was my pleasure to be his colleague at Altec Corp. when I moved to California in 1971. He later was associated with Cetec Gauss, a company that manufactured high-quality tape duplicating products and professional sound components.

In 1975, at the invitation of Takeo Yamamoto, Bart joined Pioneer North America as vice president of development. Out of this association grew the notable HPM series of consumer speakers and TAD series of professional transducers. Bart was also involved in digital development at Pioneer during the early years of the Compact Disc. He retired from Pioneer in the early '90s and founded BNL Research Associates. Pioneer remained his principal client.

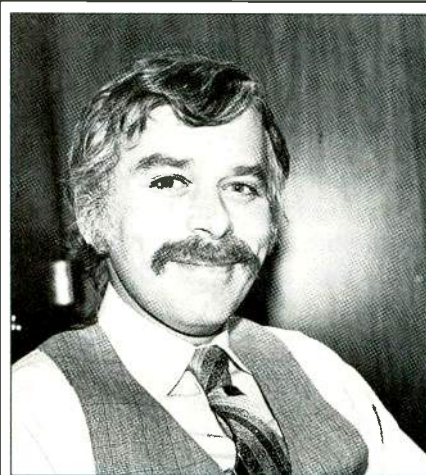
Bart was active in AES affairs, having served as papers chairman for conventions, member of the Board of Governors, and as president in 1986 and 1987. His major AES activity in recent years was chairmanship of the technical committee on digital audio. The significant role that AES plays today in standards in this area is a result of Bart's determination and enthusiasm.

His other technical affiliations included memberships in the Acoustical Society of America (fellow), the Institute of Electrical and Electronic Engineers, and the Society of Motion Picture and Television Engineers. He was also a member of Hollywood Sapphire Group, an association of audio and recording engineers.

Bart is survived by his wife Dorothy; daughters Carol Wainwright and Jeanne McLaughlin; son Bart III; sister Rose, and seven grandchildren.

Among Bart's passions were automobiles and airplanes. He was also a superb teacher. He knew his technology cold, and when you approached him with a question he would not simply give an answer; instead, he would lead you by example and analogy to your own answer. This we shall miss most of all.

John Eargle



RALPH HODGES

The audio industry lost one of its true Golden Ears and finest critics and writers January 7th when Ralph W. Hodges passed away from cancer. He was 50. Ralph joined the industry in 1969 when he became Associate Technical Editor of *Stereo Review*. He remained with the magazine for 10

years and was named Technical Editor in 1977. After a few years at Dolby Labs in San Francisco, he turned to free-lance writing and reviewing and in 1984 became a regular *Stereo Review* contributor with his monthly column, "The High End." His final contribution was completed shortly before his death. Ralph was born in Hartford, Conn., and educated at several West Hartford private schools. He went on to graduate with the 1965 class of Columbia University. His wit, style, and penchant for debating obscure points of audio reproduction were well known among his peers, and his kindness and generosity were legendary. He is survived by his wife, Maria, of Hoboken, N.J.; his parents, of Groton Long Point, Conn.; a daughter, Justine, now a student at Brown University, and a sister, Pam Myers, of Coral Gables, Fla. Donations can be sent in his name to the AES Scholarship Fund, 60 East 42 St., New York, N.Y. 10017.

Jim Horstman



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The Audio Interview

LEN FELDMAN

Mr. HI-FI

DAVID LANDER

January and early February brought numbing temperatures, with a glut of snow and ice, to Len Feldman's part of the country and mine. Events in other parts of the nation included the devastating Los Angeles earthquake and were often as bleak or more so. Clearly a winter of discontent was underway for many in America.

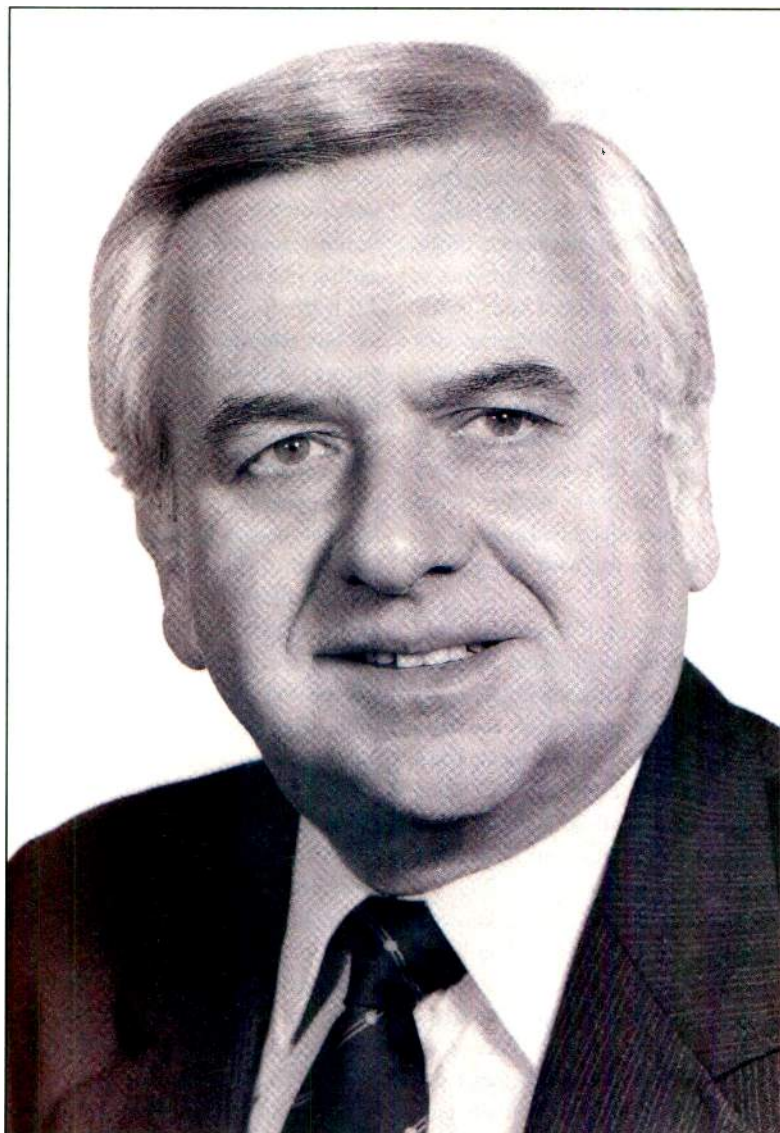
Unfortunately, Len was among them. After battling cancer for some two years, as of late 1993 he had been experiencing gratifying results from an experimental chemotherapeutic program. Then, as if his personal weather patterns had succumbed to the forces controlling the environment, chemotherapy became ineffective. The disease began to rage anew, and Len was finally forced to

retire, a step he had resisted as long as he maintained the strength to do at least some work. On February 14, just a week before his 67th birthday, Len Feldman died.

Len's long career in audio led him along some of its most interesting avenues, and, as one of high fidelity's most staunch advocates, he returned a great deal to the industry that provided his living. A longtime contributor to *Audio* and numerous other consumer and trade magazines, much of his writing was tutorial, devoted to explaining technology to readers with widely varying levels of expertise. Along with hundreds of magazine articles, he wrote seven books.

Len was also an enthusiastic lecturer. Many attendees heard him speak at the consumer shows that were given for many years by the Institute of High Fidelity, a manufacturers' organization that

LEN



he served as Technical Director. More recently, on several tours sponsored in part by this magazine, Len travelled to some two dozen U.S. cities and explained digital audio—including the Compact Disc, digital signal processing, and other developments—to groups of prospective home-electronics purchasers.

Several years ago, after the Institute of High Fidelity was absorbed by the Electronic Industries Association, a more broad-based trade group, Len became an EIA Technical Consultant. That led to service on the Audio-Visual Systems Technical Committee of the International Electrotechnical Commission. (An organization with representation from most industrialized countries, the IEC works to set worldwide standards for electronic and electrical products.) Len also testified before legislative committees on sev-

eral occasions when laws detrimental to the interests of hi-fi buyers were being considered.

Last summer, Len and I began discussing his experiences and recording them on cassette. For his part, he was an eager participant in this interview. For mine, as one of many younger colleagues who, in spite of Len's busy schedule, were always able to count on him for help with a project, I was honored to have the assignment.

Naturally, Len's condition, which included all-too-obvious symptoms of discomfort, was highly distressing. But he also displayed an irrepressible sense of humor, and, when reviewing the tapes for the first time, I was immediately struck by how clearly his love for his work and this industry shone through. Perhaps I should have expected that, since the high-fidelity industry has had no better friend than Leonard Feldman. *D.L.*

You apparently made up your mind to pursue a career in audio while still a student at Brooklyn Technical High School.

My interest was piqued by an appearance at an assembly there by none other than Major Edwin Armstrong, who was demonstrating his recent invention, FM radio. That inspired me. I'd always been a music fan and had all kinds of contraptions at home for listening to music. I built crystal radios, the whole works—what most kids do who ultimately want to be in science. It was a far cry from any audio fidelity; it was just sound. But his appearance and his demonstrations at that assembly really awakened me to the possibility that sound could be better than what I'd heard.

From Brooklyn Tech, you went directly into the Navy.

That helped my career, because I got into what was called the Radar Radio Program and had 11 months of schooling in and around the Chicago area, mostly on radio and electronics and radar. I had passed what they called the Eddy test. A Captain Eddy devised this math and science test, and, if you passed it, you went in with the guarantee of 11 months of schooling. By the time you finished the course, you were a petty officer. I went in at age 18 in '45. A few months later, the war was over, but they let us complete the course. In fact, I remained as an instructor—in Chicago, on Navy Pier—for three months before I was discharged. I got out in August 1946, and, when the semester started in September,

immediately went to City College of New York—I had been admitted before I entered the Navy—and took a Bachelor of electrical engineering with an emphasis on communications. It should have taken 4½ years, but because of credits for courses I took in the Navy and the fact that I took summer courses—I was in a hurry, I was getting older, I wanted to get to work—I did it in 3½. I was married in '49 during my last semester. My wife was also completing her education, but they had the G.I. Bill, and we had a little \$45-a-month apartment in Brooklyn.

Did you get into audio immediately after graduation?

My first job was in TV. I worked for Madman Muntz. [Earl Muntz, a highly promotional California car dealer and repainter of cars, was also heavily involved in cartridge tape players and, for a time, television.] He manufactured a very cleverly engineered TV set that had fewer tubes than anybody else's. He had a service center in Jackson Heights, Queens.

You worked as a serviceman?

An in-house serviceman for TV sets. In 1950, jobs for engineers were few and far between, and it was the only thing I could find. I got it because my brother, an attorney in Chicago, had handled Earl Muntz's divorce. That was my first experience with unionization. Before long, because of my experience and education, I was turning out more repairs than anyone else in the shop, and I was warned by the shop steward to back off. That soured me. I got

23-tube sets. This was no longer servicing; this was actually design of new models. Sometime in '51, I heard about a job at a place called Fisher Radio. I already knew that was the epitome of audio quality. Television was okay, but my first love was audio, always, from that Major Armstrong experience.

You've already said that, prior to hearing Armstrong's demonstration, you had built such things as crystal radios. I assume that, like your fellow hobbyists of the era, you went on to work with kits and build more sophisticated audio components.

If you wanted to own high-fidelity equipment in those days—the mid-1940s, when I got out of the service, to the late '40s—you pretty much had to do it by kit building. Essentially, my first experience was with what was then the epitome of amplifiers, the Williamson amplifier. There was a manufacturer, I think it was Radio

Craftsmen, that put out this magnificent kit, which was built on a chrome-plated chassis and glittered when it was finished—it was beautiful. I built one of these and read all about the Williamson amplifier design. It was all of about 10 to 15 watts and was the first amplifier to use overall negative feedback to reduce distortion and to extend the bandwidth flat out to 20 kHz—up until then, for your typical amplifier, 10 was a lot. Although we discovered many years later that negative feedback is not all to the good, in those days it was the panacea—the more the better, to keep it flat and keep the harmonic distortion down. We didn't know then that there were other forms of distortion.



It took Feldman a while to work his way from radar, through TV-set design, into audio—but that's where he'd always wanted to end up.

• The Audio Interview with

disgusted with the attitude as far as turning out good work was concerned, and, after about three or four months, I got another job. I helped design TV sets for Garod-Majestic, previously Majestic Radio, a name that goes back to the '20s in radio. I was very interested in TV at the time. Obviously, everything was tubes. You had these enormous 20-

The alternative to building your own equipment was the console of the late '40s, notably the radio phonographs that Avery Fisher built. Their price tags, of course, put them well out of the reach of the average engineering student.

Interestingly, around that time, RCA introduced a line of consoles, the Berkshire line, ranging in price from \$2,000 to \$4,000. In the '40s! One of the things that came out of it was the very famous Harry Olson LC-1A

loudspeaker, which became a standard. It was a dual-concentric driver used in the Berkshire consoles, which, incidentally, marked the first of many, many live versus recorded events. It was held at Tanglewood, the music festival in the Berkshires, with a full orchestra on stage that pretended to play music actually played through speakers.

That technique was used to promote high fidelity by a number of companies, including Fisher. You said that you went to work there in 1951. What was the company like then? And what did you do there?

We were on Van Dam Street in Long Island City [an industrial section of Queens, just across the East River from midtown Manhattan], a tiny establishment. I don't think we had 10,000 square feet, in total—manufacturing and everything, including consoles, and consoles take up space when you're trying to put them together. I wasn't hired to do audio. My initial assignments were government subcontracts—electronics for aircraft, for radar, mostly subassemblies we were putting together according to supplied blueprints. Business in audio at that time was not that great, and the company needed cash flow. This went on for quite a while. In fact, we even did a project on



Top to bottom: Madison Fielding multiplex decoder, FM tuner from Madison Fielding by Crosby, and Electro-Voice Stereo-4 amp.

Len Feldman

color TV for Hazeltine, an experimental assembly of several prototypes. As these projects tapered off, I made my way into audio design.

The audio business began to grow.

The audio business did start to grow. One reason was that Fisher at that time moved into separate components as well as making consoles. And my boss, George Maerke—that's who I worked for at Fisher—was a remarkable man. George

Maerke was Chief Engineer, and had no engineering degree. He was self-taught, and he was one of the finest r.f. and audio engineers I've ever met, which to me was remarkable.

What did he have you work on?

I was involved in the design of some of the first power amplifiers and one of the first preamps ever to come out with levered positions for equalization. There was no standard equalization in phono; you had a dozen or more different curves. Well, we

came up with two six-position lever switches that gave you a combination of 36 possible equalization settings for different records. [Laughter.] Then I was involved in the design of several accessory products, scratch filters and rumble filters—in short, doing what was assigned to me. I didn't get too much into r.f., even though FM and r.f. were really my first loves in all of this. George basically did the designs of the tuners. He was a superb tuner designer, among other things. And Avery Fisher got into every bit of the act. He had to hear every product before it was approved, every prototype, every hand-built sample. And, of course, being a designer, he was very concerned with appearance. [Avery Fisher had been a book designer at Dodd, Mead and Company prior to launching his career in audio.] The Fisher bird, the logo still in use today, was his design.

You've said he was a strict taskmaster. Yet I can't imagine him acting in an undignified manner, shouting at people, for example.

He didn't, as far as I can recall, but he was critical. He very much wanted things his way, even when it came down to such things as

owner's manuals. I credit him with starting my writing career, because he would have me write some of the owner's manuals. We would go over them together.

And he would correct your punctuation.

Right. [Laughter.] That was typical Avery Fisher.

Nostalgia leads some of us to think of early high-fidelity design as a search for the Holy Grail. Yet there must have been some marketing ploys involved.

There was some gimmickry, I have to admit. In about 1954, George Maerke came up with an amplifier circuit we dubbed Z-Matic. A little knob changed voltage feedback to current feedback. In retrospect, it was a dumb thing to do, because it loused up the damping factor.

What was the object?

It changed the nature of the sound. You could hear a difference when you went

from one extreme to the other—in continuously varying degrees. [Laughs.] I became the lecturer on Z-Matic at the consumer hi-fi shows. I had a big pointer and diagrams, and Avery Fisher used to say, “Take it away, Professor.” I would go through this routine and demonstrate this Z-Matic, and the public was enthralled. “Hey, here’s something new. Here’s a variable we can control.” And he sold slews of these amplifiers. Z-Matic stayed in the line for several years. In fact, it was an improper treatment of an amplifier, totally improper. You wouldn’t do this today. I remember he also tried to use the Fisher-Lincoln changer, the

I’ve heard countless exhibitors at more recent trade and consumer hi-fi shows complain about room acoustics. Did that go on when you were at Fisher?

No, not to the degree that it does today. But I’ll tell you what did go on—at least in the case of Avery Fisher. After we thought we had the room all set up, all the signage and all the posters, he would come in, survey the room quietly, and, being a designer, say to one of us, “That sign is tilted one-eighth of an inch to the right.” He was always correct. He had an eye like nobody I know. [Laughs.] And it used to drive us crazy; we thought we had everything just so.

mandy turned around and looked askance up at me. Then the whole orchestra, at once, on cue, put down their instruments. The audience was aghast. The amazing thing was, we were dealing with mono. These speakers were all playing the same thing; it was not stereo.

You heard some of the first stereo demonstrations on open-reel tape. What was your feeling about the medium?

I was fascinated by it. I thought, this is the Great Coming; this has got to happen.

❁ *The Audio*

Didn’t some people feel three channels were necessary?

I think so. But we were conditioned into thinking the left speaker was for the left ear and the right speaker was for the right ear. Of course, that’s completely false. It would only be true if you were dealing with binaural, a form of multichannel that had been demonstrated, by the way, as early as 1933 by AT&T at the Chicago World’s Fair. All with headphones—you had to do it with headphones.

You left Fisher in late 1956 to form your own company, Madison Fielding, the name of which was your own—Anglicized—combined with the location—Madison Street in Brooklyn. Didn’t you start that with someone you had known at Fisher?

Steve Lipsky, an engineer, an eager beaver kid who was already fooling around with transistors—before anybody. We both left and put a small amount of money into this—because we had an angel, a company called Telematic. I was doing some work for them on the side. Steve Lipsky had a preamp small enough to hold in your hand. It was the first transistorized preamp, a microphone preamplifier that we called Mic Amp. From there we branched out and started building more conventional component products—amplifiers, preamplifiers. When they broadcast stereo with one channel on AM and one channel on FM, we built a tuner with a separate AM dial and a separate FM dial, two tuning knobs, and two outputs so that you could receive these broadcasts without a second unit. Then we did the same thing with a receiver. It had two amplifiers.



*Len Feldman
and Willy Studer
in the Studer-Revox
booth at an audio show.*

one that flipped records over and sometimes tossed them across the room. [Laughter.] Listen, not everything was a success. Just as later on, there were failures in the audio industry, many of them.

You were also involved in some live versus recorded demonstrations at Fisher. Do any stand out in your mind?

One involved the placement of about 10 huge Jensen speakers—taller than I am—along the back of the stage at the Academy of Music in Philadelphia and the entire Philadelphia Orchestra under the direction of Eugene Ormandy. I was sitting up in the box closest to one side of the stage with a preamp—a consumer preamp with one master volume control to handle all the amplifiers and speakers that were on stage. Of course, it was again a case of the orchestra pretending to play, and, at one point, when I got the volume up a little loud, Or-

Not long afterward, you formed an association with Murray Crosby, a talented inventor who developed a system for stereo broadcasting. Tell us about that.

In about 1958, I heard about this fellow, Murray Crosby, who had been working to promote stereo FM. I went out to his lab, which was in Syosset, Long Island, and he told me about his system for stereo broadcasting over a single FM station. It made so much sense to me that Madison Fielding became one of his first licensees. At this

Crosby system—with a warning to the consumer that this may or may not be the system chosen by the FCC—because stations such as WBAI in New York were already experimentally broadcasting with it. *You and a number of others in the industry felt that the FCC picked an inferior system because Crosby's would have prevented FM broadcasters from piggybacking the signals of background music companies*

Interview with Len Feldman

time, Crosby was about to merge with a company called Teletronics and, in fact, became Crosby-Teletronics. With that, there was a stock issue. At about the same time, Telematic was going broke trying to do too much, and our assets were sold to Crosby. The idea on Crosby's part was, "If my system gets the approval of the FCC, wouldn't it be logical to have a manufacturing firm to produce multiplex adaptors under the Crosby name?" It made sense to me as well; Steve Lipsky was out of the picture by then. So we became part of the Crosby family, and at first called ourselves Madison Fielding by Crosby. Eventually it just became Crosby. We continued pretty much to make the same products we had been making—preamps, separate amps, receivers, tuners—the usual array of components, but the major effort at that time was to promote Crosby's FM system.

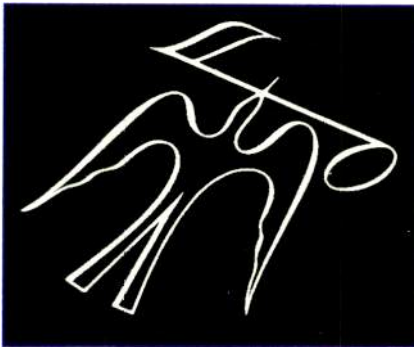
There were, of course, other contenders for the FCC's sanction.

By the time it got to FCC testing, there were five systems. The entire industry was convinced that the Crosby system was the best system. I say this without boasting; it was a fact. It was good stereo, it was good separation, and it was noise-free. In fact, the Crosby system would have yielded no more than a 3-dB degradation when you switched from mono to stereo under weak-signal conditions. The system we ended up with becomes horrendous if you're in a weak-signal area. There's a 23-dB loss, and you have to go back to mono. We were so sure of the outcome that, during the interim period, while the FCC was making up its mind, we actually sold adaptors for the

on their own. That would have deprived them of revenue.

That was never admitted, but it's my opinion. Muzak—I think they were in Kansas—had a senator. What more need I say? [Laughs.] The key was that our system required the entire spectrum out to 75 kHz, which was space assigned to those

Avery Fisher, a talented designer as well as a demanding boss, devised the Fisher Radio logo.



services. Our attitude was that they could go elsewhere, get themselves another piece of spectrum. Why latch on to the public FM band?

How knowledgeable did the FCC people you encountered at the time seem? Did they care about sound quality?

The FCC representative on hand in Uniontown, Pennsylvania, at the tests was asked, "What about multipath?" His answer, which was a classic, was, "We'll find out

The industry thought the Crosby FM stereo system was the one to beat, but the FCC decided otherwise.

about that later." We've been finding out about it ever since. To duplicate interference near the receiver, the official noise-maker used with each of the systems was this FCC representative's electric razor. The decision was a shock, a total shock to everybody. It came on April 19, 1961. That morning, my stock in Crosby Teletronics was worth \$15 a share. At 10 a.m., the announcement came that the FCC had selected what was now the Zenith-GE system—because those two contending systems were so close, they were combined into a single system. By that afternoon, my stock was $2\frac{3}{8}$. But the story doesn't end there, because one element of the system chosen, we felt, infringed on the Crosby patent—the very simple concept of sum and difference, L plus R being the main channel and L minus R being the stereo difference information. It's used everywhere today, but it was noted in Crosby's granted patent.

So what did you do?

We sued GE. That was our only hope, because the company had expended so much effort and money on promoting our system that there was little left. We won in lower court. Then they took it to appeal, and the decision was reversed. They invalidated Crosby's patent, citing prior art. That was the end of Crosby-Teletronics.

And, I gather, the end of a happy period in your career.

I was very happy with Crosby, because I was working with a true scientist, a great engineer who had 180 patents.

During the quadrasonic era, you developed a system for four-channel playback. Tell us about that.

Around 1968 or '69, word began to filter out that there was a guy by the name of Peter Scheiber who was claiming to develop four channels of sound from two channels. He started giving demos, but all he was

it was sensational with, literally, any stereo record. I knew Larry LeKashman at Electro-Voice, so we arranged an appointment there and flew out to Buchanan, Michigan. We demonstrated the thing, and, after some negotiation, struck an agreement on a royalty basis. They would produce the product as an adaptor; the name decided

And that created total confusion—for both the hi-fi component and record manufacturers. Not to mention the poor consumer.

Not only that, but the record companies, those that did get into it, used it to such an exaggerated extent that it was no longer musical. They had stuff coming out of places it had no right to.

But didn't early stereo recordings have a lot of ping-pong between speakers?

Yeah, but at least it was all up front. Here, all of a sudden, a trumpet is behind you that should be in the orchestra.

You've testified before legislative committees on numerous occasions. Some years ago, you were involved in trying to prevent a tax that the music industry wanted levied on blank tape. More recently, you fought the so-called Copy-Code notch, another music industry proposal. They wanted to insert a sonic gap in recordings and have a circuit built into all digital tape machines that would recognize the gap and keep them from recording when it did.

That was a really ridiculous situation. We've been fighting all these years for flat frequency response, and they were going to put a notch at around 3,840 Hz, right where our ears are most sensitive to sound quality. I can tell you about one very interesting tale connected with this. Quite by accident, the Electronic Industries Association learned that, in California, they were about to pass a law mandating this thing in all digital recorders that came in through the state. While we were worried about federal legislation, this bill secretly sneaked in. But we stopped it cold. We quickly got on a plane to Sacramento and presented our side of the case. With demonstration. We brought equipment and what we



*Rayma and Len Feldman
at his induction to the
Audio Hall of Fame by
old boss Avery Fisher, 1980.*

able to achieve was about 3 dB of separation all around. At just about that time, I was approached by a gentleman named Jon Fixler, out of Philadelphia, who claimed he had a quadrasonic system that could give much greater separation. All he had was a concept on paper. I worked on the mathematics a little bit and discovered a set of coefficients that, while not giving you great separation all the way around, gave you tremendous separation from front to back. To me, that seemed like a much more audibly exciting effect. I built a prototype decoder myself, by hand, with two inputs and four outputs. We tried it out, and, by golly,

upon was Stereo-4. And sure enough, at one of the next hi-fi shows, they had units available, and Stereo-4 was the theme of their demonstration. It was quite successful. They sold quite a few, and we began reaping royalties. They even had a second-generation model. Meanwhile, having signed with Peter Scheiber, CBS had come out with their own system, called SQ. With our system and SQ, you needed to make special records. Jon Fixler, who was my partner in this thing, decided that what CBS was doing might infringe on a patent application we had—it wasn't even a granted patent. So we sued CBS. They countersued us for a million dollars personally, and I didn't have a million dollars to give them if they won. [Laughs.] It was a very trying time.

How was it resolved?

Finally, as I recall, it was settled out of court. We did get a little something for our trouble from CBS. It wasn't a big amount, but, by this time, we just wanted out of the whole thing. In the meanwhile, other four-channel systems appeared on the scene.

The Audio

thought to be a replication of the Copy-Code system, so they could hear with and without it. There was one woman legislator, she was sitting on the end, and, when we played material with and without the notch, her eyes lit up each time: "I can hear the difference. I can hear the difference." That clinched it for us. We also testified against this Copy-Code notch in Washington. We made our points, and, essentially,

what Congress said to us was, "Go back and resolve this system in another way." The other way, of course, was the SCMS compromise, the Serial Copy Management System, which allows only one generation of digital dubs.

In general, when you've appeared before them, what have your feelings been about legislators hearing your testimony?

I was impressed. You know, you go in there thinking, "What are these people going to understand about such technological things?" But they ask probing questions, and they do get pretty knowledgeable by the time you're finished. Of course, they always have the assistance of technical aides. I'm favorably impressed. Now, when you get them on TV, it all falls apart, because they're all being showmen. What a difference. I hate watching what they do to themselves. They're running for office the minute they're on TV.

Still, it sounds like the legislators have listened. Have you found that industry manufacturers have listened—to the advice they so often solicit from writers such as yourself, and to feedback from hobbyists and other interested consumers? Or are they just building their dreams?

I think they're building their dreams—and have been. More so in the Orient than anywhere else, they have the attitude, "If there's a feature we can incorporate, let's incorporate it." Whether it's important or not. "Let's do it because we can do it." Some, of course, are more practical. On the American side, at the high end, you have another problem—pricing. I can understand some high-end pricing, because it's limited production, but most of it seems unjustified to me. In high-end audio, I

Have you been on press junkets you felt were ill-advised?

I'll tell you about two. One owner took a whole slew of us to an airport hotel and we spent, I believe, two days listening to "scientists"—there were at least four or five—that he supposedly brought from his facility to lecture us on how complex the product was. We never got to see his facility; the whole thing took place at the airport. It was a fiasco. More recently, we went to Europe for a one-day introduction elaborately staged at a theater. They didn't even take us to the company's headquarters. Why did they bother? They could have done this in a theater in New York or anywhere else. On the return flight, we had an engine failure—to add to our woe—but that's not the point. There have been many such press conferences where the ballyhoo was not worth the effort at all. Locally, too, and at shows. Perhaps a firm will spend a good hour lecturing you on the greatness of their new widget. They invoke the famous phrase, "Thank you for taking time out from your busy schedule," then go on and on and on, using one executive to speak after another. If there really is important information, put it in the press kit and let us go. Unless you can audibly demonstrate something.

They're usually not bylined, but I don't think anyone would be surprised to learn that you've been one of the writers documenting the achievements of the inimitable Professor I. Lirpa, which have been known to grace the pages of this magazine around April Fools' Day. Do you have a favorite Lirpa innovation?

You've talked about how much you enjoyed working with Murray Crosby when you were still in manufacturing. What have you enjoyed most about the consulting facet of your career?

I've very much enjoyed the work I've done for IEC. My first effort was in 1981 or '82, and it enabled me to visit many countries. To give you some idea, the places my wife and I visited as a result of this included Sydney, London, Paris, Frankfurt, Berlin, Prague, and Istanbul.

Do you recall how many trips abroad you've made in connection with your work over the years?

There have been 38 trips to Japan since 1972. I've kept track of that.

As an audio journalist, what has given you the most gratification? And, if you want to get into it, what have you least enjoyed?

As for what I've enjoyed least, those interminable press conferences that don't tell you anything and waste your time. But I've enjoyed the associations that I've had. I've made some good friends. And I've enjoyed what I think is the respect of the industry in general. It's always nice to hear good things about yourself, and I've had a lot of that. Some criticism, too, no question about it, but mostly it's been favorable. And for that, I've been most grateful. A

Interview with Len Feldman

think, there's a certain snob appeal in raising prices beyond reality.

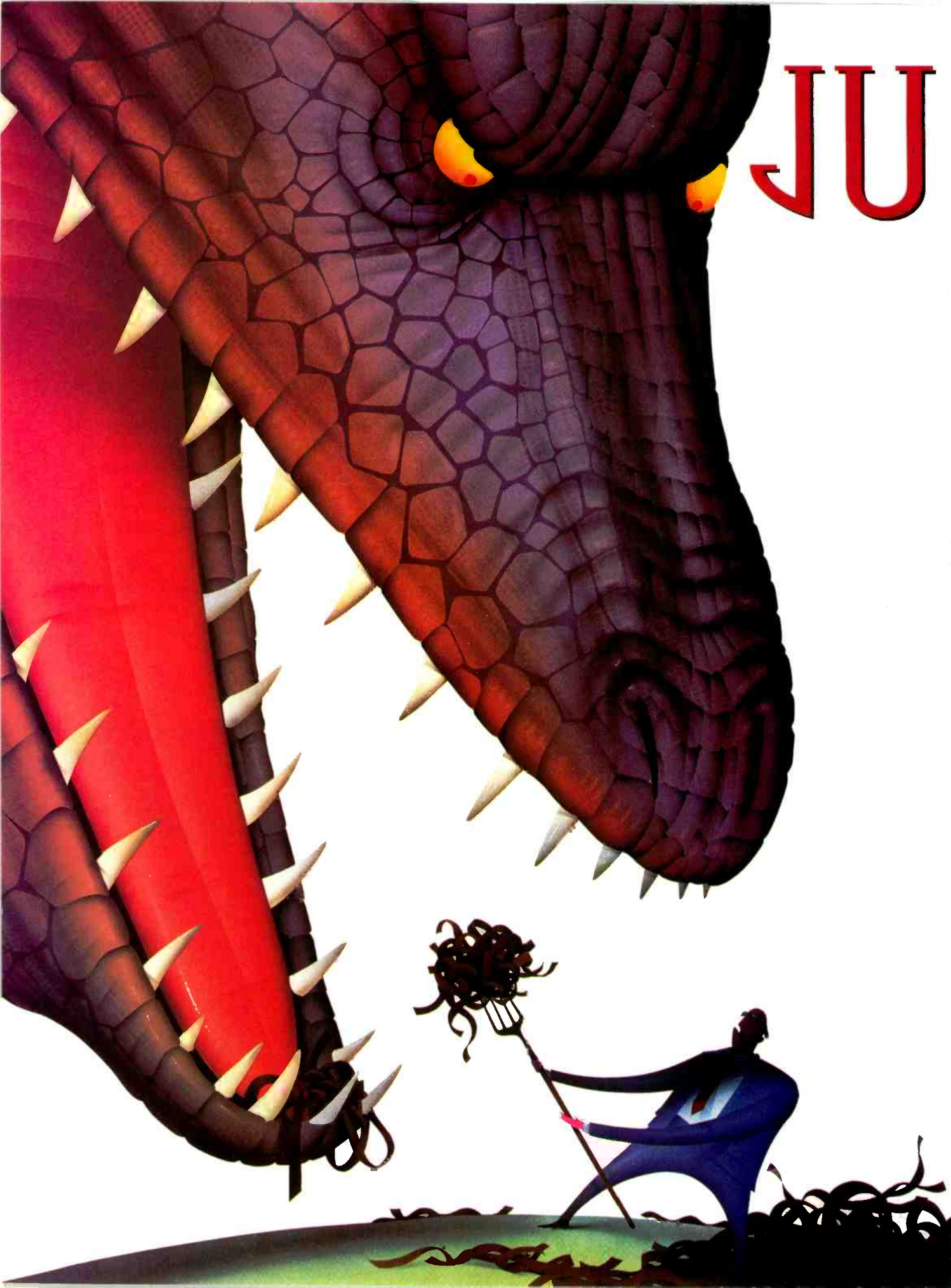
Apart from this, how do you feel industry manufacturers have treated the press?

Generally, pretty good. When times were better economically, they almost did too much for the press. The trips, the junkets that are arranged periodically for journalists, are expensive. Particularly if you go to Japan, where you're treated like royalty.

Two. There was a time before digital readout of frequencies when everybody was vying for the most detailed dial. I wrote about a receiver that had a yardstick stuck out beyond the side for the dial scale. There was also a complete rack system from the Soviet Union with a remote control larger than the system itself.

Feldman influenced many components, some laws, a number of audio standards, and about 40 years' worth of readers of *Audio* and other magazines.

JU



RASSIC TAPE

HOW TO BE A GOOD AUDIO DINO

DAVID B. CAMERON

Despite our whiz-bang digital age, in which most, if not all, forms of audio, video, graphics, business, communication, medicine, and even sex seem to be wed to one chip or another, there are still many reasons to support the old ways of analog media. The audio dinosaurs, among which I proudly count myself, are in possession of a great wealth of obsolete but still quite useful equipment, records, and tapes (that's hardware, firmware, and software to ye uninitiated) that for one reason or another we wish to retain. Some of us still create new programs by using the time-honored methods in which "cut," "paste," and "program" are *not* computer terms.

As a reader of this magazine, you are likely to have some cherished analog audio, and we are here today to discuss the care and feeding of quarter-inch reel-to-reel and cassette tapes. There are several reasons you may need to do this, including replacing old splices and leaders, replacing sections of worn or damaged tape, replacing a damaged or low-quality cassette shell, and, for the more adventurous, editing/creating new arrangements.

I edit audio professionally, but it makes up no more than 10% of my business. I need good quality but can't allocate a full-scale business budget to audio. Today's high-end consumer-level equipment affords many choices of recording gear, but even if you have been recording on reel-to-reel for a zillion years, you still may not have a machine that lends itself to repair or editing.

Any repair/editing deck needs some version of the following features: An open tape path (which offers easy access to

head and quick threading), a quick-acting pause (both in engage and release), and the ability to shuffle the reels in pause mode with the amplifiers on.

For obvious reasons, some great deals can currently be found in used high-quality 7-inch open-reel decks. Pawn shops, flea markets, classified ads, and individuals are good sources, but make sure you get some kind of working guarantee, even if it's only 24 hours, so you'll have a chance to put a deck through its paces. A machine that has been used and maintained will be better than one that has been sitting around. By all means look inside for large accumulations of dust. Stay away from any deck that has lots of dust or that appears "too clean" on the outside. If the rubber pinch roller is glazed, attempt a proper cleaning with a suitable conditioner (such as Realistic Non-Slip Fluid, Radio Shack #44-

1013, or a lint-free swab dipped in automotive belt dressing) or be sure you can get a replacement.

CUTTING TAPE IS AN IRREVOCABLE ACT, SO YOU MUST MAKE YOUR CUTS IN JUST THE RIGHT PLACES.

My system is built around quarter-inch reel-to-reel tape decks with 7 $\frac{1}{2}$ -ips capability. They are all 20+ years old, but I do my own maintenance and keep them up to spec. The main recording deck is the venerable Teac A6010, which has run (almost) flawlessly for 25 years. My favorite editing unit, a play-only Sony TC-155, has mechanical controls and the unique feature of retracting the rubber pinch roller in stop mode (which you can see in Fig. 3). This makes for totally open tape access, a "must" when editing. The Teac, with its Ampex-type transport, also provides good tape access, but it is easier for me to keep the Teac vertical and the Sony horizontal. The Sony's mechanical pause is quick and has a good feel (I replace the brake pad with fresh surgical tubing—every 10 years or so!), and the hubs do not have clutch pads to wear out.

ILLUSTRATION: BILL MAYER

AUDIO/APRIL 1994

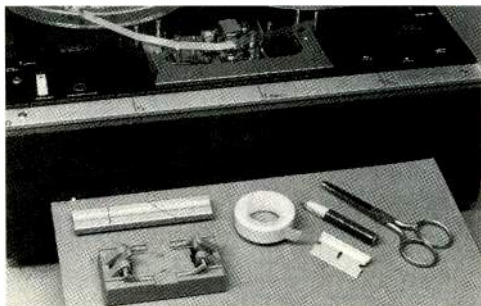


FIG. 1-TAPE EDITING AND SPLICING TOOLS

I recently acquired two old Akai/Roberts decks for \$75, and all they needed was a cleanup. On the down side, their two-handed controls are not convenient for editing; the space between a 7-inch reel and the rubber roller is less than the width of my thumb, and the tape path is circuitous. However, because these decks are excellent in playback, I use them for mix-downs and slow winding.

THE CUTTING EDGE

The highest quality way to do low-budget editing and repair is the old-fashioned way—by simply cutting the tape, rearranging the pieces, and splicing them back together. (The requisite tools are shown in Fig. 1.) Care has to be taken, both physically and audibly. You do not want to have scraps of odd lengths (or rolls) of tape lying around collecting dust and getting lost. And since cutting tape is an irrevocable act, you've got to be sure you cut in the right place.

Digital editing systems claim an accuracy of 0.0005 second. With an analog tape deck, the smallest distance

you can shuffle the tape past the heads (Fig. 2) and still hear something significant is about four times the thickness of a razor blade. At 7½ ips, that amounts to 0.005 second. For a "normal" edit, I'd challenge

FIG. 2-THE SHUFFLE



anyone to hear the difference between 0.0005 and 0.005 second, but there are limitations. Generally you can edit between words, but not within words. It would take digital gear, for instance, to make an unrecorded word from an assortment of sounds. However, a razor cut can go very nicely between sounds. Voice may be the easiest to edit, but it can

be tricky to disguise the actual sound change of an edit. Music, with its greater variety of sounds to choose from and hide within, may be a more difficult splice but is often a less noticeable one.

For repair you can generally do or redo splices as you get to them. The same goes for gross rearranging. Just splice, and then roll your selections onto the take-up reel in



FIG. 3-MARKING THE POINT OF EDIT

the new order. For editing in which recording a "master" tape is involved, simply record the segments in order with at least 1 or 2 seconds of silence between them. If

BY STRESSING ACCURACY, YOU CAN DO AMAZING TRICKS WITH A GOOD EAR, PATIENCE, AND A RAZOR BLADE.

you're editing music and have any doubts about where you may be able to make a cut, give yourself room to find the perfect spot by including more of the segment than you think you'll need, such as the next (or last) verse or instrumental reprise.

Your task is then to simply remove the unwanted blank segments by finding the perfect spot to cut your segments together. If repair is your goal, the decision of where to cut is often made for you.

TOOLS AND CUTS

The basic editing tool is a splicing block to hold the tape in place while

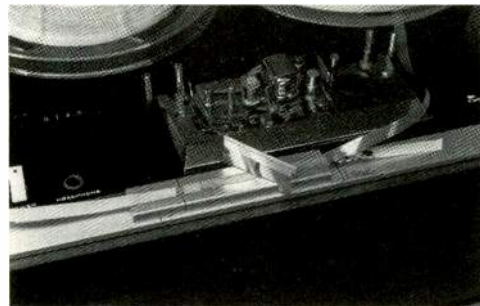


FIG. 4-CUTTING BOTH TAPES AT ONCE

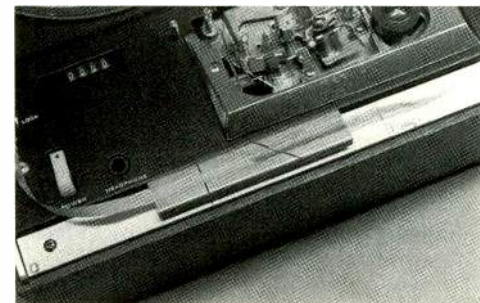
you cut it and apply splicing tape. There are several types; I don't recommend the guillotine-type devices that trim the splicing tape or that require using ¼-inch-wide tabs of splicing tape. The tapes may not line up properly; even worse, the blades can get too dull and become too misaligned before you notice, and they are troublesome to replace. The best splicing tools are a single-edge razor blade, the old-fashioned EDITall splicing block of solid aluminum, and a pair of fine scissors.

A diagonal splice is best for all non-critical unions, such as inserting leader, and the easy splices where there is actually a moment of silence. For a tight edit, the perpendicular splice is the only choice. You may have to listen to the "before" and "after" sounds several times before finding the perfect spot to make an edit. If there is an obvious beat or other right-on-the-spot sound, then your job is

easy. Cut the tape *just before* that sound—the aforementioned four thicknesses of a razor blade. You may also have to listen at full speed,

at half speed, or even at quarter speed if you can—and manually rock the reels to move the tape back and forth across the heads for a short distance. If there is not an

FIG. 5-REALIGNING THE CUT ENDS



easy, on-the-beat spot, look for a matching sound somewhere else nearby, like the odd cymbal crash between the second and third beats or some other very non-obvious place. You must make sure that the before-and-after sounds match in key, rhythm, and tonal quality. The splice itself can also make noise; a misplaced diagonal splice can make the sound “gurgle,” and a carelessly placed vertical one can cause an abrupt change that is discomfiting at best. Many vocal artists trail the voice on well after the last beat or even start before the first, so looking for an unexpected place to edit is frequently the only choice.

As vocalists or speakers open their mouths just before their vocal cords begin to vibrate, you will frequently hear the



FIG. 6—INITIAL BURNISHING IN THE BLOCK

sound of their lips parting or smacking. It usually sounds more natural if the “smack” is left with its matching word, but between the two can be a great place to hide a splice. Do try to leave a smack in, even if it is not the natural mate of the next word; to remove it entirely can sound unnatural.

Watch out for key changes. Don't assume you can make a splice anywhere you want. Many tunes go up a half note for the last verse (or so) in order to brighten the end of the song. To take the music down a half note, even if the splice is perfectly timed, will sound dull and draggy. Don't do it.

Stress accuracy, and you will be amazed at the tricks you can do with a good ear, a little patience, and a razor blade.

Of course, the best edit is one that is not heard at all. It is one of my greatest pleasures to tell clients exactly where an edit is and watch their faces as it goes by unnoticed. If you happen to have tape machines that run at 15 ips, you can ef-



FIG. 7—REBURNISHING, ON A NONMAGNETIC SURFACE

fectively double your accuracy to 0.0025 second, but remember, *all* your machines will need that speed. (In my case that would mean replacing four machines; 7½ ips does just fine for me.)

EDITING WITH A RAZOR BLADE

The following steps detail the mechanics of cut-and-splice editing and tape repair. For visual clarity, the demo splice in the photographs was made with two types of leaders.

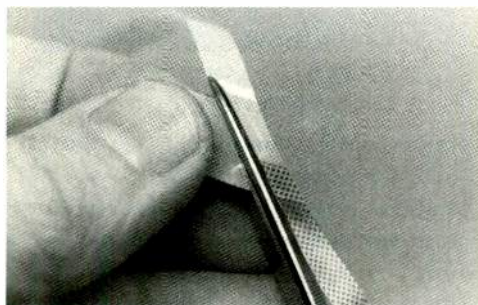
(1) For repair, get your tapes and sequences in order. For editing, record your sequences onto a master tape.

(2) For editing, find your stop-and-start points by listening repeatedly and at slower/shuffle speeds to make sure you have compatible before-and-after sounds. Mark them lightly with a sharp grease pencil directly over the head gap (Fig. 3). For repair you may not need to determine the splice location so precisely.

(3) If repairing, you may have to use an old splice location. Carefully peel off the old splicing tape by slipping the razor blade under a corner. It may break, but be consoled: Most situations can handle two layers of splicing tape.

(4) If editing, cut the tape about 2 inches *after* the first mark and 2 inches *before* the second mark. The 2 inches of tape is for handling, so you can avoid getting

FIG. 8—TRIMMING THE EDIT



fingerprints on tape that is to be kept. The intervening tape may be rolled off on the floor or stashed on a spare reel for recycling.

(5) In your EDITall block, place both tapes on top of each other, with the two marks exactly aligned over the appropriate (vertical or diagonal) slot, and cut through both tapes at the same time (Fig. 4). Remove the unwanted tape ends. Notice the little tab sticking out from the roll of splicing tape in Figs. 1 and 6: *Always* leave a tab. I even bend it back, which cleans my finger and also leaves some skin oils on the tab so it won't stick to the roll. The reason is simple: Splicing tape is very thin, and if it adheres to the roll it could take six weeks to get it back. (Use the razor blade.) This is why many people prefer a

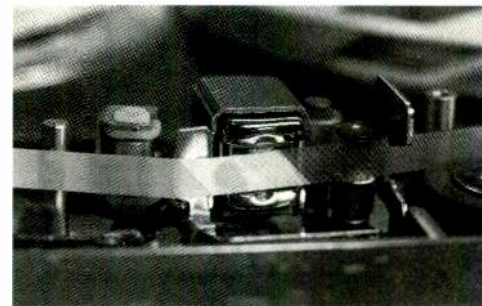


FIG. 9—CHECKING THE FINAL EDIT

tape dispenser, but using a dispenser is wasteful and slower than having the tape right there where you need it.

(6) If the good tapes did not shift *at all*, you may apply the splicing tape. For better accuracy, I usually realign the good tapes to one side of the cutting slot so that the optical blackness of the slot doesn't hamper the perception of alignment (Fig. 5). Repairs, if already suitably cut, may be aligned without trimming.

(7) Pre-cut splicing tabs are applied in line with the audio tape, being almost the same width. A length of bulk splicing tape (about 2¼ inches long) should be applied at a 45° angle, with the excess flapping to each side equally. (The flaps become handles in step 9.)

(8) Burnish the splicing tape lightly with your fingernail (Fig. 6) or a soft plastic stylus; the corner of an old credit card will also do.

(9) Being careful to touch only your splicing-tape handles and the edges of the recording tape, remove the tapes

from the editing block and relocate the splice to a clean, nonmetallic surface. Burnish the splice to the edges, checking that the splicing tape is sticking thoroughly (no white air bubbles) over its entire surface (Fig. 7).

(10) Trim the handles off with fine scissors (Fig. 8). The trim should scoop

in slightly: If you cut exactly along the edge of the recording tape, tape guides and rollers will be exposed to the gooey edge of the splicing tape. Obviously, you must not scoop in so far as to cut into the recording tracks. Guillotine-type editors will usually perform this trim; pre-cut tabs do not require trimming, provided they have been well centered on the recording tape.

(11) Inspect the final edit (Fig. 9), and test by listening.

(12) Start saving for a digital system. (Just kidding—or not!)

If you need to redo a splice, do it right away: Splicing tape “sets” and gets stickier with time, and after a lot of time it gets somewhat brittle. At no time should you touch the front or back of any tape that will travel over the heads. Touch the edges when you must, but remember that salt, perspiration, oils, and other unnamed grungies associated with human skin can ruin the tape and the tape heads. Some people use “lintless” gloves, but I find them cumbersome (and the typical cotton laboratory gloves are far from lintless). I intend to try some of the new synthetic high-tech gloves on my next audio job, but until then the best advice for making clean splices is the same as for working in a darkroom: Work in a clean, cool, static-free, and dry location.

EDITING CASSETTES

Cassettes also can be edited with a razor blade, but since it's impossible to mark the edit point or shuffle the tape past the heads, such editing is limited to gross manipulations of sequences with abundant space in between. A more likely reason to physically cut and splice cassette tape is repair, either of the tape itself or to replace a broken or low-quality (e.g., bonded) housing. A dirty rubber pinch roller can “eat” your tape, possibly creating the need to cut out a crinkled section or add leader. This is done in exactly the same manner as with

quarter-inch tape but requires extra care because of the thin and narrow material.

The sequence of steps will depend on what you're trying to accomplish: Saving

NATURALLY, THE BEST TAPE EDIT IS ONE SO WELL DONE IT CANNOT BE HEARD.

the tape or switching to a better housing. Editing is best done while the tape is still in the housing, since that is the only environment where there is axial stability. There are no reels in a cassette, only hubs. The cassette housing or, in some cases, its lubricating sheets are used to control the tape axially.

If possible, do your editing, tape repair, and leader-adding first. Leave the short end

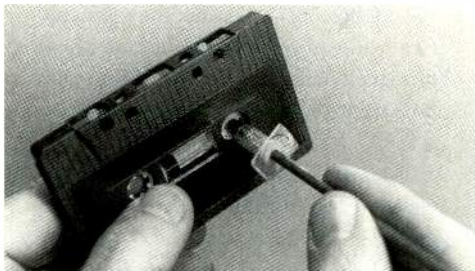


FIG. 10—MANUALLY WINDING A CASSETTE WITH A HOME-MADE TOOL

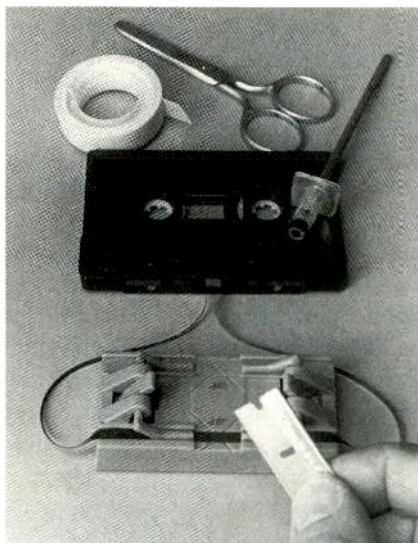


FIG. 11—CASSETTE EDITING

of the tape free, but wind it fully onto a hub. A handy manual winder can be any appropriately sized hexagonal (six-sided) shaft such as a pencil, an Allen wrench, or (my personal favorite) a short section of the ubiquitous Bic pen with a collar and a

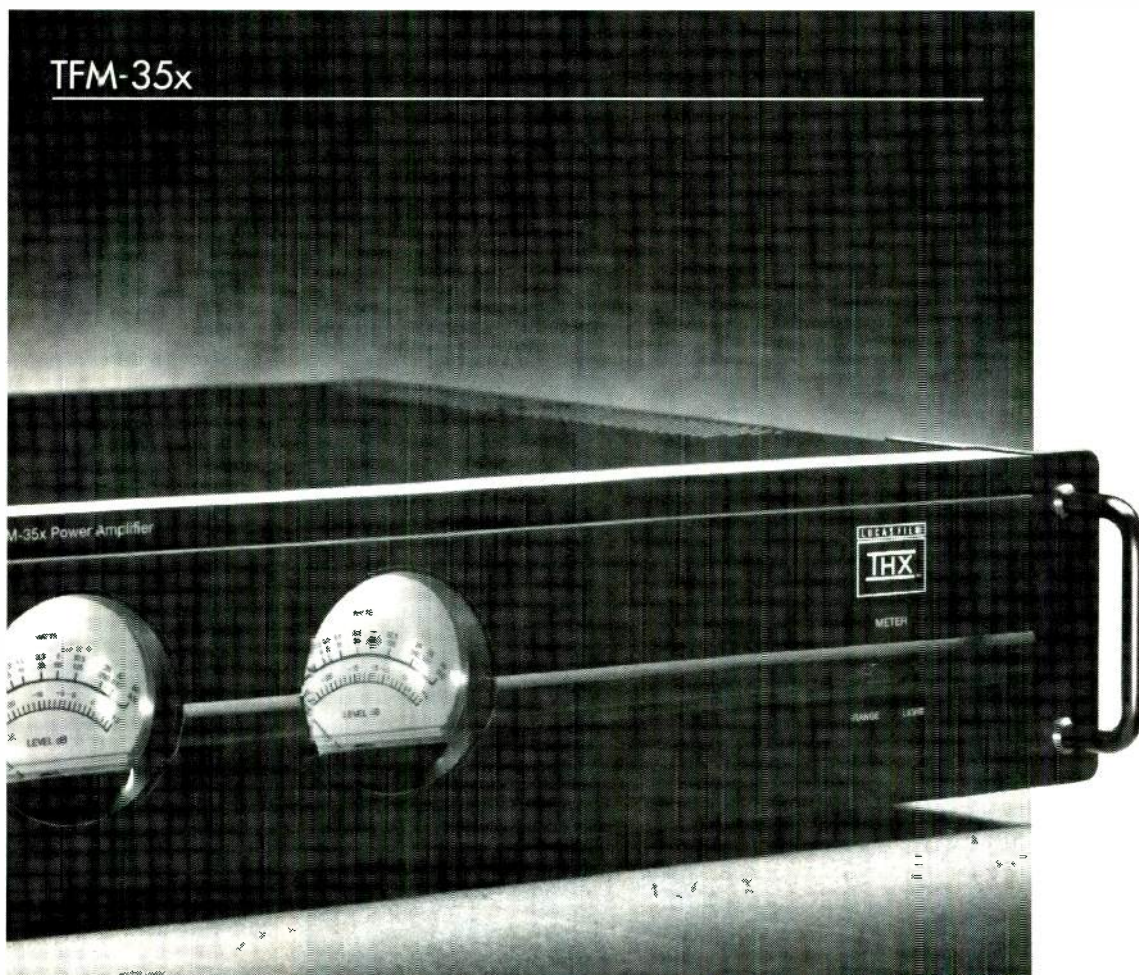
round handle to twirl between your fingers. (See Fig. 10.) Figure 11 shows the cassette-width slot of a dual purpose editing block in use. The process is exactly the same as with quarter-inch tape, but you may want to use 3-mm-wide editing tabs instead of bulk editing tape because the narrow cassette tape is more difficult to handle. The tabs can be applied while the tape is still held in place by the arms of the editing block.

Opening the cassette doesn't have to be a difficult task. If it is a bonded housing, the only real care that must be taken is to preserve the tape. Do not hold the cassette up in free space to pry open the housing, as this can easily lead to instant magnetic spaghetti. Put the cassette on a firm surface, and, with your fingers or tools, pry the top shell off. Breakage is fine, but do consider saving the lubricating plastic sheets; you may need them again. If you have a screwed-together housing, put it on a firm surface and remove the screws with a tiny Phillips-head screwdriver. Carefully lift the upper shell off, leaving the corner rollers in place, and then remove the top lubricating sheet, if any.

Before removing the tape and hubs, prepare the receiving housing/bottom half with lubricating sheet, corner rollers, and pressure pad. To avoid touching the tape with your fingers, slip small pieces of card stock under the tape, like two spatulas, and lift the tape and hubs up and out. Place them directly into the new cassette. Using tweezers or a straightened paper clip, route the tape along its intended path: From the feed hub, out over a corner roller, over the pressure pad, over the other corner roller, and to the take-up hub. If you need to attach (new) tape to a hub, do not use splicing tape directly on the hub. Either splice to a short leader, or use the slots or snap fitting in the hub to secure the tape end.

I hope that the cliché “Getting there is half the fun” applies to our current transition between the two great mistresses of the day: Annie Log and Di Gital. Princess Di is undoubtedly the Queen Bee of the future, but ol' Annie has been a loyal companion and deserves to not be shuffled prematurely into dinosaur-like extinction. Here's hoping, and good luck. **A**

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ACCUPHASE DP-90 CD TRANSPORT AND DC-91 D/A CONVERTER



deck, controller assembly, and other vital parts mounted on an internal structure of vertical, black-anodized plates, 8 mm thick. These interconnected plates give strength and stiffness to the structure and serve as shields and edge guides for the two vertically mounted p.c. boards. The overall result is a highly rigid structure that protects against vibrations generated by rotating parts and outside acoustic vibrations.

The various motor drive circuits (for the spindle, sled, focusing, tracking, and disc tray actuator) are all balanced, full-bridge designs, to eliminate current flow to ground. An ultra-small r.f. amplifier is built into the laser pickup of the DP-90 to eliminate noise pickup in the leads that connect the pickup to subsequent electronics—it's the same principle as putting a preamp in a microphone to raise its output to line level, well above the noise. An auto-lock mechanism clamps the disc loading

**THICK ALUMINUM WALLS
DIVIDE AND BRACE BOTH
THE TRANSPORT AND
PROCESSOR CHASSIS.**

tray to the chassis when the CD is in place, to prevent resonances during play. Two potted power transformers and associated d.c. supplies are employed, one for the digital signal processor (DSP) and display functions and the other for the motor circuits. The controller and transport circuits are mounted on separate p.c. boards that plug into a horizontal motherboard. These boards have not only gold-plated contact fingers but gold-plated traces as well—for better sound, according to Accuphase.

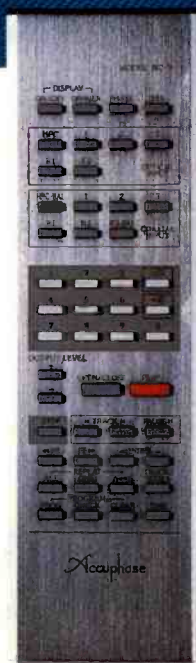
Front-panel attributes include the centrally located disc drawer flanked by separate displays for track and time. The power switch is to the left of the drawer, and a group of pushbutton switches to its right control the transport. The rear panel carries four types of signal output connectors: EIA optical (Toslink), ST optical (AT&T) for the S/P DIF format, coax, and an XLR connector for the balanced, higher voltage AES/EBU format. All in all, this is a very

Over the years, I have been aware of various Accuphase products. Generally, they have been of superb build quality and have had technical innovations that set them apart from their competition. In the DP-90 CD transport and the DC-91 D/A converter and digital processor, we have a pair of components whose beauty would be hard to beat. Some idea of the bulk and beef of these pieces can be realized by their weight, about 50 pounds each.

According to Jiro Kasuga, chairman and founder of Accuphase, the company name "is a combination of 'accu' (from 'accurate'), and 'phase,' a term of great importance to audio technology." Mr. Kasuga formed Accuphase in 1972 exclu-

sively for the development, manufacture, and sale of high-end audio products. He had been in charge of engineering development at Kenwood (which he also founded) for 25 years prior to forming Accuphase.

Starting with the DP-90 transport, we find the CD mechanism



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impressive transport that hopefully should produce a great signal.

The front panel of the DC-91 D/A converter looks similar to the DP-90's, without the latter's exposed control buttons. In place of the transport's loading drawer is a swing-down panel that holds pushbutton controls for selecting inputs (including any one of three digital recorders), switching output signal polarity, and setting output level.

The remaining button on this panel, labelled "SFA" (sampling-frequency accuracy), requires a bit of explanation. Sampling frequencies of digital signals vary somewhat from their nominal values. A processor's sampling rate should be as accurate as that of its input signal, to prevent sideband noise. But a processor built to really tight tolerances may fail to lock onto signals from sources with poor sampling-frequency accuracy. The DC-91 therefore provides for both automatic and manual selection of accuracy level: EIAJ level I (± 50 parts per million), level II (± 1000 ppm), and level III ($\pm 12.5\%$). The "SFA" button not only selects the accuracy setting but, in conjunction with other selectable circuitry, can be used to store the desired output polarity, output level, and playback-dither settings for each input. (While dither is normally used in A/D conversion, to increase small-signal accuracy, it can also be used, as here, to disperse the effects of digital filter errors.)

Above the DC-91's control panel are two small displays. The one on the left shows which input is selected. The one on the right shows relative output level, in 1-dB steps, from 0 to -40 dB. It also shows the status of the stored settings for each signal input and whether de-emphasis is in use.

All this is interesting, but the best part is the D/A conversion technique used in this unit. It is called MMB, which stands for multiple multibit converters. This will be

**TODAY'S MUSIC
SOURCES ARE 16-BIT,
BUT THE DC-91
IS READY FOR UP
TO 24-BIT SIGNALS.**

discussed more thoroughly under "Circuit Description."

The rear panel of the DC-91 abounds with signal connectors. Inputs are arranged in two rows, one for optical and the other for electrical signals. The optical group includes one AT&T and three EIAJ connectors. The wired input group consists of three RCA phono jacks for S/P DIF format and an XLR for balanced AES/EBU format. Two of the three input/output connections for external digital recorders offer a choice of RCA phono jacks or EIAJ optical connectors. The third recorder connection has two XLR connectors for the AES/EBU format. Whatever input source is selected is fed to the tape-out connectors. Two additional output connectors (one S/P DIF coaxial and one EIAJ optical) carry the currently selected digital signal. This is not a simple loop-through, however, as the signal at these outputs (unlike that at the

SPECS

CD Transport

Signal Timing Precision: Level I.

Optical Outputs: ST (AT&T), -19 to -14 dBm at 820-nm wavelength; EIAJ (Toslink), -21 to -15 dBm at 660 nm.

Electrical Outputs: AES/EBU balanced, 5 V, peak to peak, 110 ohms; coaxial, 0.5 V, peak to peak, 75 ohms.

Power Requirements: 12 watts at 100, 117, 220, or 240 V; 50/60 Hz.

Dimensions: $18\frac{3}{4}$ in. W x $5\frac{7}{8}$ in. H x $14\frac{15}{16}$ in. D (47.5 cm x 14.9 cm x 37.9 cm).

Weight: 45.2 lbs. (20.5 kg).

Price: \$7,595.

D/A Converter:

Quantization: 16- to 24-bit, linear.

Sampling Frequencies: 32, 44.1, or 48 kHz.

Timing Precision: Level I, II, or III automatically detected.

Frequency Response: 4 Hz to 20 kHz, ± 0.3 dB.

Digital Filtration: 20-bit, with eight-times oversampling.

D/A Conversion: 20-bit.

Digital De-Emphasis Tolerance: ± 0.001 dB.

THD: 0.002%, from 20 Hz to 20 kHz.
S/N: 120 dB.

Dynamic Range: 98 dB.

Channel Separation: 112 dB.

Optical Inputs: ST (AT&T), -30 to -10 dBm; EIAJ (Toslink), -27 to -15 dBm.

Electrical Inputs: AES/EBU balanced, 0.2 V minimum, 250 ohms; coaxial, 0.5 V, peak to peak, 75 ohms.

Analog Outputs: 2.5 V at 50 ohms, balanced or unbalanced.

Digital Output Level Control: 0 to -40 dB, in 1-dB steps.

Power Requirements: 42 watts at 100, 117, 220, or 240 V; 50/60 Hz.

Dimensions: $18\frac{3}{4}$ in. W x $5\frac{7}{8}$ in. H x $14\frac{15}{16}$ in. D (47.5 cm x 14.9 cm x 37.9 cm).

Weight: 49.7 lbs. (22.5 kg).

Price: \$13,495.

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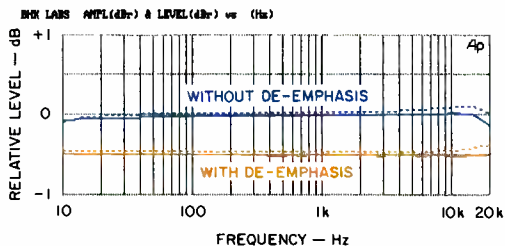


Fig. 1—Frequency response, DC-91 processor.

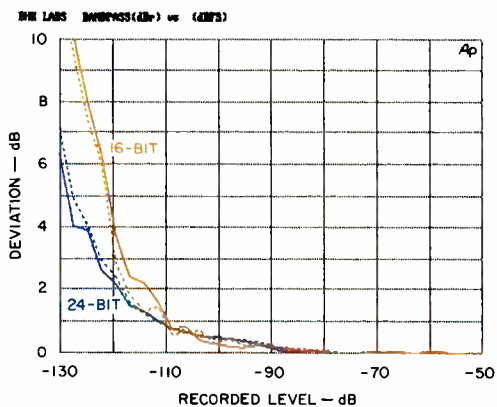


Fig. 2—Deviation from linearity with 16- and 24-bit data.

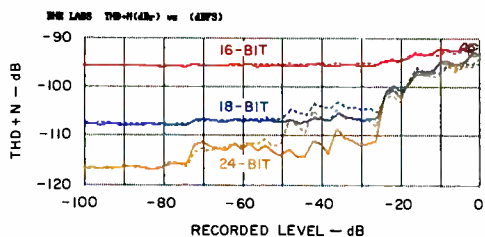


Fig. 3—THD + N vs. level.

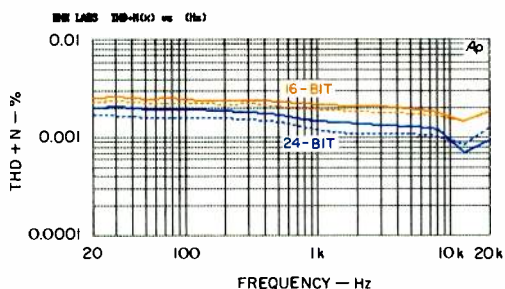


Fig. 4—THD + N vs. frequency for 0-dB signals.

recorder outputs) has first passed through a processor that sets its polarity and level in the digital domain. (The S/P DIF outputs are said to be in a 24-bit format, and the digital inputs are said to be “designed internally to handle 24-bit audio data” to allow for future developments.) The analog outputs include two pairs of unbalanced RCA phono and a pair of XLR balanced connectors.

Like the DP-90 transport, the DC-91 D/A converter is built around a motherboard and p.c. boards that plug into it, with the interior divided and braced by aluminum partitions, 8 mm thick. The partitions between the seven plug-in boards also act as shields and heat-sinks. Three potted power transformers and related d.c. supplies (with an impressive bank of electrolytic filter capacitors) are used, one each for the left-channel D/A converters and analog output electronics, the right-channel D/A converters and analog output circuitry, and all the remaining digital circuits.

The Model RC-9 remote supplied with the Accuphase pair duplicates all of the transport and converter controls mentioned above except the power switches. In addition, it permits track selection, track programming, and access to track index points. A most impressive remote, this.

The build and parts quality on these pieces is first-rate, as it should be for gear in this price and quality-aspiration range.

Circuit Description

Accuphase declined to provide me with full schematic diagrams for the reviewed pieces, so the following circuit descriptions of the DC-91 are somewhat brief and based on block diagrams and other technical information and on what I found out by examining the unit.

In the DC-91, signal selection and subsequent transmission of

the signal to the various tape outputs is done in the S/P DIF format. (As far as I can determine, no provision is made to prevent possible input/output loop oscillation in connected tape recorders if you select a recorder that is in monitor mode.) The selected signal is passed to an input receiver, whose output is passed to a DSP that controls the output level and phase in the digital domain. This is followed by an eight-times oversampling low-pass filter. The clock signal for the receiver, the processor, and the low-pass filter is regenerated by a phase-locked loop (PLL). The PLL's inputs include the unprocessed input signal and the outputs of seven voltage-controlled oscillators (VCOs) which control the sampling-frequency precision. Separate level I

**ACCPHASE DEvised
A WAY TO ENSURE THAT
SAMPLING ACCURACY
WOULD MATCH THAT
OF ANY DIGITAL SIGNAL.**

and level II VCOs are provided for each of the three sampling frequencies, as is a single level III VCO that covers all three sampling rates. When sampling-rate accuracy is not manually selected, the appropriate VCO is presumably selected by the input receiver or DSP. Following the DSP circuit that controls level and phase, the signal is fed to the S/P DIF output section mentioned above and, through three (apparently paralleled) optical couplers for each channel, into the D/A converter circuitry.

The D/A section has 16 multibit converters (Burr-Brown PCM63P-Ks) connected in parallel for each channel! The theory is that errors produced by a number of converters fed the same input will not be correlated with each other. This technique has long been used in analog circuitry. When the outputs of multiple devices handling the same signal are summed, the actual signal outputs should add arithmetically and the device noises or errors should add as root mean squares. In theory, every time the number of devices paralleled is doubled, the S/N ratio improves by 3 dB, and so it seems to be with the 16 converters



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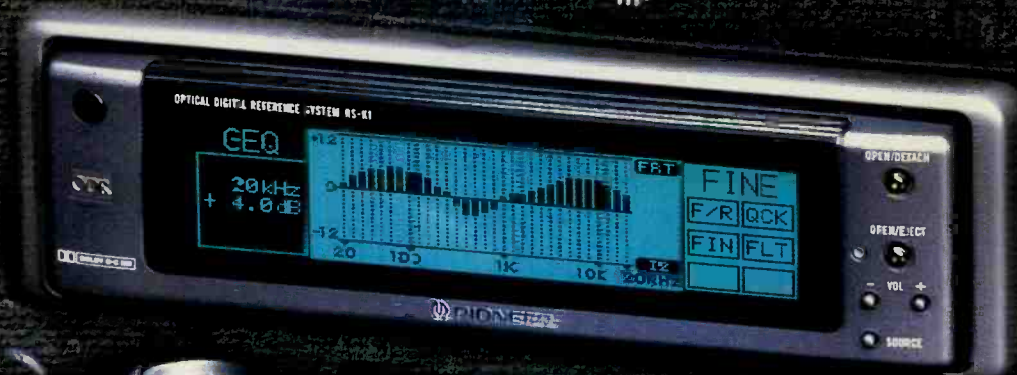
This question may confuse those who believe that the measure of a loudspeaker is the number of its drivers. It will also elude those who have never bothered to question conventional driver placement, which always separates the woofer from the tweeter.

In fact, the most acoustically correct location for the tweeter is precisely at the *center* of the woofer. This strategic placement creates a single sound source, allowing high and low frequencies to reach your ears at the proper time, regardless of where the speakers are placed or where you are sitting. (No wonder KEF's patented Uni-Q® is the technology of choice for advanced Home Theater applications.)

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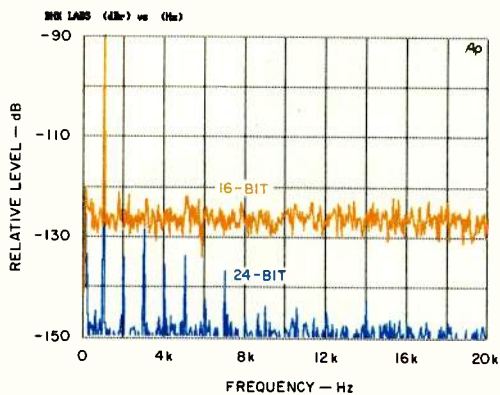


Fig. 5—Spectra of 1-kHz tones at -90 dB; see text.

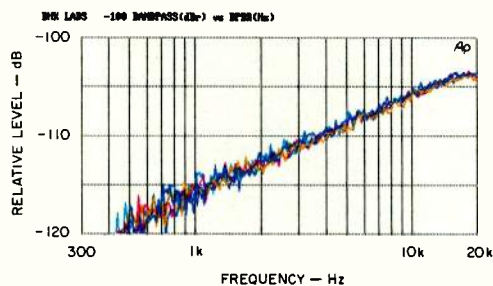


Fig. 6—Noise modulation; see text.

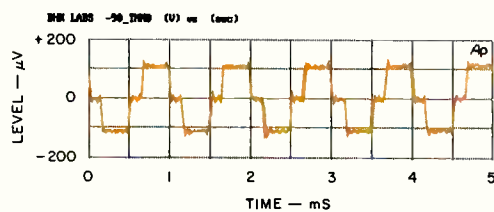


Fig. 7—Undithered 1-kHz waveform at -90 dB.

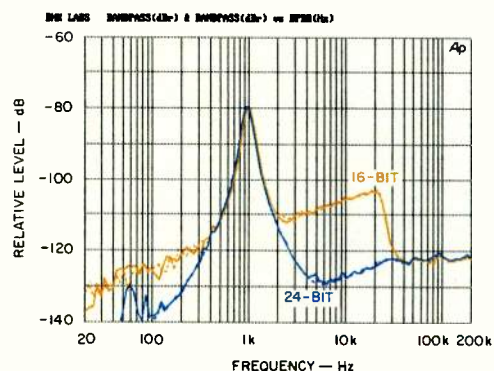


Fig. 8—Spectrum sweep with 1-kHz signals; see text.

paralleled in the DC-91. Distortion and noise are said to be improved by some 12 dB, which is like going from 16- to 20-bit resolution. (An engineer in a company that supplies multibit A/D converters to a number of high-end manufacturers told me he didn't think that the output errors would be uncorrelated, as the bit transitions occur at more or less the same time in all the converters. Nevertheless, I think it was a rather inspired design technique, paralleling D/As to improve linearity and noise.) Finally, the summing amplifiers that add all the D/A outputs for each channel pass their outputs to three-pole, low-pass filters and to output buffer amplifiers.

Measurements

All of the test results reported here are for the CD-91. Frequency response, with and without de-emphasis, is shown in Fig. 1. The curves are quite flat. Square-wave and impulse waveforms (not shown) were of the usual linear-phase, symmetrically ringing type. Square waves at digital full scale were not clipped.

Deviation from linearity is plotted in Fig. 2 for input signals ranging from -50 to -130 dB for 16- and 24-bit word lengths. Results shown are for the AES/EBU input; data for the S/P DIF input looked the same. Deviation when using the CBS CD-1 test disc with the DP-90 transport as a source was also similar. It would be easy to say that the positive deviation from linearity might be system noise, but it isn't. With a 24-bit signal at digital zero, the noise was about -140 dB (in the third-octave band of the analyzer filter at 1 kHz). These are really excellent results and are as good as or better than I have seen with other converters.

Total harmonic distortion plus noise as a function of level at 1 kHz is shown in Fig. 3 for data word lengths of 16, 18, and 24

bits. The reduction in distortion and noise going from 16 to 18 bits is about what it should be at lower levels; the 24-bit data is ultimately limited by noise. Note that distortion at and near full scale is not that much lower with the longer data words. These results look pretty good and certainly wouldn't look like this if analog output noise or other artifacts of converter noise were limiting the results, as is so often true of other converters.

In Fig. 4, I have plotted THD + N for full-scale digital signals with 16- and 24-bit word lengths. This is about the lowest distortion at full scale I've seen, especially at the high-frequency end of the audio range. Incidentally, I usually plot THD versus frequency with a 22-kHz low-pass filter, so as to reduce out-of-band noise and get the best in-band noise floor. With the DC-91, I could increase the filter bandwidth to 30 or even 80 kHz without materially changing the curve's shape in the last octave—which means that there was simply none of the out-of-band (above 20 kHz) harmonic generation seen in many converters.

Figure 5 shows a spectral plot of 1-kHz tones at -90 dB, with 16- and 24-bit word lengths generated by my Audio Precision generator and fed into the DC-91. With 24-bit words, the noise level goes way down, revealing a number of harmonic distortion components that, with 16-bit words, are covered by noise. How much of this harmonic content is in my Audio Precision generator and how much is in the DC-91, I can't say at this point. Do take note of how far down from full scale we are talking about here: -120 dB is one part per million! In the noise-modulation test, where a 40-Hz signal is present at levels of -60 to -100 dB below full scale and the noise is measured from 300 Hz to 20 kHz with a swept third-octave filter, the DC-91 turned in a fine performance: All the sweeps essentially overlaid each other, as can be seen in Fig. 6.

What about the performance of the output level control, which works in the digital domain? I ran a series of tests of output versus input (not shown), as a function of the output level settings of 0, -10, -20, and -40 dB, for input signals from -50 to -130 dB. In general, the attenuation steps were quite accurate. If you view the input level as the sum of the actual input level and the



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— STEVEN STONE, *STEREOPHILE*, MARCH 1994

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Table I—Signal-to-noise ratios of DC-91 for 16-bit signals. For left and right channels, respectively, quantization noise was -93.4 and -93.5 dB, and dynamic range was 98.0 and 97.8 dB.

Bandwidth	S/N, dB,	
	For Signals at -120 dB	
	LEFT	RIGHT
Wideband	94.9	94.6
22 Hz to 22 kHz	95.5	95.3
400 Hz to 22 kHz	95.6	95.3
A-Weighted	97.5	97.2

Bandwidth	S/N, dB,	
	For Signals at Digital Zero	
	LEFT	RIGHT
Wideband	107.4	107.0
22 Hz to 22 kHz	118.0	118.4
400 Hz to 22 kHz	118.5	118.5
A-Weighted	121.1	121.0

Table II—Signal-to-noise ratios of DC-91 for 24-bit signals.

Bandwidth	S/N, dB,	
	For Signals at -140 dB	
	LEFT	RIGHT
Wideband	107.4	107.3
22 Hz to 22 kHz	117.3	117.3
400 Hz to 22 kHz	117.8	117.9
A-Weighted	119.9	119.9

Bandwidth	S/N, dB,	
	For Signals at Digital Zero	
	LEFT	RIGHT
Wideband	107.2	107.0
22 Hz to 22 kHz	118.0	118.2
400 Hz to 22 kHz	118.6	118.6
A-Weighted	121.1	121.1

attenuation (e.g., -90 dB if the input level is -50 dB and the output level is set at -40), linearity was good down to at least -120 dB for output level settings near 0 dB and good to more like -130 dB for settings down at the -40 dB end of the range. Looks pretty darn good to me.

Interchannel crosstalk versus frequency was very much the same in both directions and was outstandingly low, better than -125 dB up to 3 kHz and decreasing to an excellent -108 dB at 20 kHz.

Tables I and II list S/N ratios for different bandwidths and data word lengths, along with EIAJ quantization noise and dy-

amic range for 16-bit words. Results are among the best, if not the best, measured in my lab thus far. As an indication of how quiet this converter is, Fig. 7 shows a -90 dB, undithered, 1-kHz signal. Note how well defined and free of noise the three output states are at 0, +1, and -1 least significant bit (LSB). A dithered, 24-bit, 1-kHz sine wave at -90 dB (not shown) was equally impressive. Fig. 8 is a third-octave spectrum from 20 Hz to 200 kHz in the presence of -80 dB, 1-kHz signals with 16- and 24-bit data word lengths. Note the sharp reduction of noise above 20 kHz in the 16-bit curve. This indicates that a sharp low-pass filter at this frequency is attenuating the out-of-band noise of the 16-bit quantization noise. It doesn't have this effect with quieter, 24-bit, data words. This figure illustrates the very low wide-band noise levels listed in Tables I and II.

How would some of these results look if I used the DP-90 transport as the source instead of my Audio Precision test system? I tried one such test, comparing the distortion spectra of full-scale, 1-kHz signals with various data word lengths from the Audio Precision with the spectra of full-scale, 1-kHz signals from the DP-90 and other transports playing various test CDs. No matter which combination of disc and transport I tried, the results were worse, in terms of inharmonic spectral content, than those with the test generator as the signal source. Aside from that, the signals

from the various test discs generally looked different from each other, but the results from each test CD generally looked about the same on each transport.

The a.c. line draw of the DC-91 was a healthy 360 mA. Most converters don't even budge the current meter on my General Radio Variac when it's set to the 2-ampere scale.

Use and Listening Tests

Ancillary equipment on hand during the review period included a Krell MD-10, Theta Digital Data, and CEC TL1 CD transports feeding Krell Studio 2, Theta

Digital DSP Generation III, and various experimental D/A converters. Preamplifiers used were a Quicksilver Audio, a First Sound Reference II, and a Forssell tube line driver. I also listened with no preamp at all, by feeding the D/A output into a Crown Macro Reference, which has volume controls. Other power amplifiers used were Quicksilver Audio M-135s. Loudspeakers used were B & W 801 Matrix Series 3.

When I made my initial listening tests prior to measurements, I used the DP-90 driving the DC-91. I thought that the resulting sound was rather good, though not

**THE DC-91 HAS ABOUT
THE LOWEST THD
AT FULL SCALE THAT
I'VE SEEN, ESPECIALLY
AT HIGH FREQUENCIES.**

on some plane far above what I had been experiencing with the other converters and transports that I had been using. After measurements were taken, I again listened to this Accuphase pair in order to further characterize their sonic attributes.

Overall, the sound was smooth and listenable, with a good sense of soundstage dimension and space. Bass impact, extension, and quality were very good and I rated the bass as "tuneful." Instrumental sounds were pretty much as they should be. The only sonic criticism I have concerned high-frequency transients and sibilants, which didn't sound quite right to me, perhaps not as real as with other combinations of the above-mentioned units.

The operation of the Accuphase equipment was without flaw throughout my testing and listening. Certainly, the measure performance was outstanding. I particularly enjoyed the feel of the transport mechanism when loading CDs—smooth and solid. I also liked the remote control for the pair, with its output level control and input switching features.

In conclusion, this Accuphase equipment is built to a very high standard. It should satisfy those who would use it as a digital control center for various digital sources and recorders. *Bascom H. King*

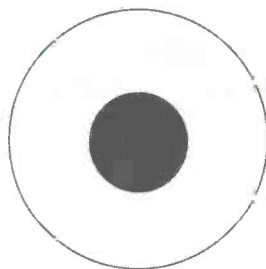
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OPTIMUS STAV-3400 A/V RECEIVER



Not very long ago, you could easily spend upwards of \$600 to get a stereo receiver that delivered 100 watts or more per channel. At just under \$600, the Optimus Professional Series STAV-3400 (available at your local Radio Shack emporium) delivers 110 watts per channel in stereo, plus offering audio/video switching, Dolby Pro Logic decoding, and five DSP-based sound-enhancement modes. True, when this receiver is operated in a surround mode the power rating drops to 70 watts for each of the three front channels (plus 40 watts x 2 in the rear), but that's reasonably adequate for use with fairly efficient speakers in a room of average size.

The STAV-3400's digitally synthesized AM/FM tuner offers automatic and manual tuning plus 30 presets arranged in three banks of 10. Presets can be grouped into five categories (Rock, Pop, Jazz, News, and Other) to facilitate scanning by program type, and the tuner permits direct station access by entering the frequency with the numeric memory-preset keys. Audio in-

puts are provided for a moving-magnet phono cartridge, a CD player, and two tape decks. You can either record on both decks simultaneously, dub from "Tape 1" to "Tape 2," monitor recordings being made on "Tape 2," or record non-tape sources on "Tape 1" while listening to a "Tape 2" source.

On the video side, the STAV-3400 handles five A/V sources ("VCR 1," "VCR 2," "Video," "LD," and "TV"), records on both VCRs, and outputs the selected video source to one monitor. Video signals are handled as NTSC composites via standard (RCA) pin jacks. The "Video" inputs are on the front to facilitate connections from a camcorder or other temporarily connected source; the rest are on the back, for permanent setups. You can select audio and video signals independently, either for recording or for simulcast listening.

The loudspeaker connectors are simple clamps, with two pair (A and B) available for front speakers. Preamp outputs are provided on each channel, so you can augment power with external amps. However, the STAV-3400 lacks inputs to the internal front-channel power amps so you can't use them for the rear channels should you choose to use a more powerful amplifier in front.

The Dolby Pro Logic decoder has three center modes (Normal for use with a small center speaker, Wide for use with a full-range center, and Phantom for installations without a center speaker), plus a "Dolby 3CH Logic" button (which "folds" the rear channels into the left/right front if you do not use rear speakers), and a "Pro Logic Theater" mode. Center and rear levels are adjusted from the remote control, with test tones available (also via the remote) for setting channel balance. Delay time in the Dolby Pro Logic mode is adjustable in 2-mS steps from 16 to 30 mS. For music, there's a choice of five DSP-derived ambience enhancements (Dance, Hall, Theater, Jazz, and Church) with 10-step, user-controlled "DSP Effect" level.

In addition to two permanent settings (Flat and Loudness), you can save five custom tone-control settings for quick recall. The receiver also offers two custom "Auto Source Controls" that, in addition to selecting the source, recall the tone-control, balance, surround mode, delay time, and volume settings you've chosen to associate with that source.

Control Layout and Remote

Main-panel layout is fairly traditional. Headphone jack and front-speaker push-buttons are at the lower left, followed by 10 well-sized source-selection pads for "VCR1," "VCR2," "LD," "TV," "Video," "Tape1/DCC," "CD," "Tape2/Monitor," "Tuner," and "Phono."

Two buttons, mysteriously marked "Acoustic" ("Select" and "Memory"), come next. These, it turns out, save and recall the custom tone-control settings. (Radio Shack's manual is one of the few I've seen that does *not* give a front-panel

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pictorial with callouts. To learn what these buttons did, I found the corresponding buttons on the remote and looked them up in the "Remote Control Functions" section. Radio Shack informed me later that they also were explained under "Using Custom Tone Settings." On the far right is the "Video Input" triplet; these are the only connectors that look to be gold plated, but their plating appears to be extremely thin and was worn off in spots on this reviewer sample.

Above the "Video Inputs" are a "Muting" bar (the muting is total when activated) and a "Return" that restores the receiver to its default settings. Tuning controls are arrayed above the main selectors. These include an "FM/AM" band selector, up/down "Tuning" bars, and 10 numeric

pads for selecting the presets and entering the frequency of the station you desire.

Beneath the display is the "Power" switch, three "Auto Source Control" buttons ("Memory," "1," and "2") and seven tuner-related controls: "Memory" and "Custom M-Select" to load the presets and customize the selection groups, "Scan," "FM Mono," "Tun Auto/Manual," "Direct Access," and "OTS." The latter stands for Optimus Tuning System which, as far as I can determine, is equivalent to a conventional "Search" function.

To the right of these small rectangular black pads is a line of nine round gold buttons. These select one of the surround modes—"Simulated Surround," "Jazz," "Church," "Dance," "Hall," "Theater," "ProLogic Theater," "Dolby ProLogic,"

and, slightly apart from the rest, "Dolby 3CH Logic." To the far left of the display is the "Video Signal Selector." Successive taps round-robin through the video sources; video is selected independently from audio. To the right is a small gold "Simulated Stereo" button and pairs of bars to adjust the "Balance," "Treble," "Bass," and "DSP Effect/Delay Time." At the far right is the motorized "Volume" and, just below the "Dolby 3CH Logic" button, a pinhole through which you can initiate a system "Reset."



The STAV-3400 comes with a universal remote control programmed with the TV and VCR codes of 18 major manufacturers. To select the codes for your equipment, enter the "Edit" mode, select the input to

**THE PRE-PROGRAMMED
REMOTE CAN ALSO
BE "TAUGHT" CODES
FOR UNITS IT WASN'T
PROGRAMMED FOR.**

which the equipment is attached, and punch in the appropriate code number from the chart in the manual. Unlike some preprogrammed remotes, the STAV-3400's also can be "taught" the commands of equipment not on the Radio Shack list. This is helpful when operating CD players, cassette decks, and LaserDisc players whose control codes are not included in the list. If you use Optimus "OSR" components, you can daisy-chain them via Control In/Out jacks on the back panel and eliminate control programming entirely. An optional MR-100 Multi-Room Remote Expander lets you control the STAV-3400 from another room.

The layout of the remote is nicely done. Amplifier controls are arranged on the lower half and include 10 source-selection

SPECS

FM Section

Mono Usable Sensitivity: 10.8 dBf.
50-dB Quietening: Mono, 15.3 dBf; stereo, 37.0 dBf.
S/N: Mono, 80 dB; stereo, 76 dB.
THD: Mono, 0.2%; stereo, 0.3%.
Frequency Response: 30 Hz to 15 kHz, +0.5, -2.0 dB.
Alternate-Channel Selectivity: 65 dB.
Capture Ratio: 1.0 dB.
Image Rejection: 50 dB.
Channel Separation: 45 dB (1 kHz).

AM Section

Sensitivity: 300 μ V/m.
Selectivity: 25 dB.
S/N: 50 dB.

Video Section

Composite Video Output Voltage: 1.0 V, peak to peak.
Input Sensitivity: 1.0 V, peak to peak.
Input and Output Impedance: 75 ohms.
Frequency Response: 5 Hz to 7 MHz, +0, -3 dB.
S/N: 55 dB.
Crosstalk: 55 dB.

Amplifier Section

Rated Power: Front channels alone, 110 watts/channel into 8 ohms, 20 Hz to 20 kHz; rear channels alone,

40 watts/channel into 8 ohms at 1 kHz; center and front channels driven, 70 watts/channel into 8 ohms at 1 kHz.

Rated THD: Front alone, 0.05%; rear and center 0.8% at 1 kHz.

Frequency Response, Front Channels: High-level inputs, 5 Hz to 100 kHz, +0, -3 dB; phono, RIAA standard curve, 20 Hz to 20 kHz, \pm 3 dB.

Input Sensitivity for Rated Power: High level, 150 mV; phono, 2.5 mV.
S/N (EIA, re 1 Watt): High level, 80 dBA; phono, 77 dBA.

Maximum Phono Input Voltage: 120 mV at 1 kHz (0.1% THD).

Tone Control Range: Bass, \pm 8 dB at 100 Hz; treble, \pm 8 dB at 10 kHz.

Loudness Compensation: +6 dB at 100 Hz, +3 dB at 10 kHz.

General Specifications

Power Requirements: 120 V a.c., 60 Hz, 260 watts.

Dimensions: 16⁹/₁₆ in. W x 6³/₈ in. H x 16 in. D (42 cm x 16.2 cm x 40.6 cm).

Weight: 22¹/₂ lbs. (10.2 kg).

Price: \$599.

Company Address: Radio Shack, A Division of Tandy Corp., Fort Worth, Tex. 76102.

For literature, circle No. 91



The soldier on the right has it.

So does the soldier on the left. In fact, all the soldiers in this picture have the

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in this picture?**

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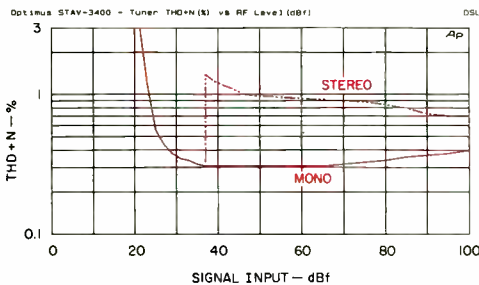


Fig. 1—THD + N vs. FM signal input level.

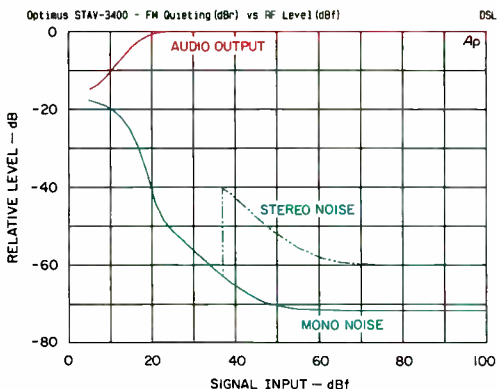


Fig. 2—FM quieting characteristics.

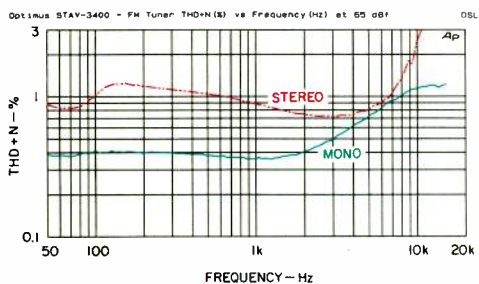


Fig. 3—FM THD + N vs. frequency.

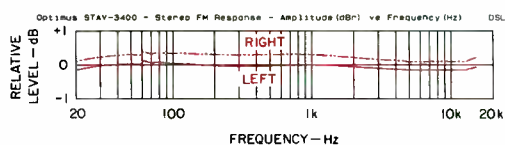


Fig. 4—FM frequency response.

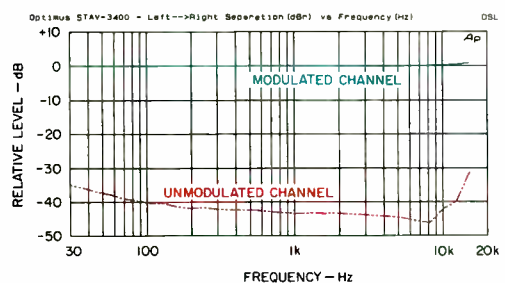


Fig. 5—FM frequency response and channel separation.

buttons, a "Receiver Power" switch and "Sleep" timer, two "Auto Source Control" buttons, a "Simulated Stereo" button, an "Acoustic" button to save and recall custom tone settings, the independent "V-Signal Select," a "Surr. Mode" button that cycles through all the possible surround-sound modes, "3CH Logic" and "Center Mode" which operate only when Dolby Pro Logic is selected, a "Test Tone" activator, and a diamond-shaped array to adjust left/right and front/rear balance. A small switch centered in the array permits the same pads to be used for adjusting center and rear level. "Volume +/-," "Delay Time," "+/- Effect," "Muting" and a "Return" pad complete the lower set.

Some pads on the remote's upper half are shared by the STAV-3400 and ancillary gear. The device they command at the moment is set by pressing one of the "Control Mode" pads on the left. Pressing a bar on the side of the remote illuminates the selector button of the device being controlled. To the right of the selectors are transport control pads (including skip functions), "Freq/Ch" scanning buttons, "TV Vol" pads, a 12-key pad and "+10" for numeric entries, a band selector, and "Disp."

Measurements

Since the STAV-3400 is an audio/video receiver, I made a few measurements of video performance, using the "LD" input and the "Monitor" output. Luminance (brightness) level was high by a negligible 0.5 dB, chroma (color) level was up by 0.2 dB, and chroma-phase (tint) accuracy was perfect. Nothing to worry about here.

Audio measurements were made at the front speaker outputs, with 8-ohm loads. I measured FM tuner performance from the 75-ohm "F" connector input. (The STAV-3400 also has binding posts for a 300-ohm balanced feed.) As shown in Fig. 1, with mono modulation, THD + N at 1 kHz dropped to 3% with a 21-dBf input which, by definition, is the

"IHF Usable Sensitivity." (Pundits often refer to it as "IHF Unusable Sensitivity.") The receiver attained 50-dB quieting (Fig. 2) with a 24.2-dBf input, at which point distortion was approximately 0.6%. With a 35-dBf signal level, distortion stabilized at 0.3% and quieting reached 60.8 dB. Noise continued to diminish with increasing signal level until ultimate quieting (-71.5 dB) was attained at 65 dBf. With very strong inputs, distortion edged up to 0.4% (at 100 dBf).

With stereo modulation, the tuner switched modes at 37.5 dBf so the quieting and distortion curves start at that point at 40.1 dB and 1.4%, respectively. The tuner lacks effective filters for the pilot and sub-carrier signals. These contaminants were down 34.7 dB and 36.8 dB, respectively; with cassette decks that lack good input filters, Dolby-tracking problems could arise when recording stereo broadcasts. To obtain the quieting and distortion data, I used an external, 19-kHz notch filter in tandem with a 15-kHz low-pass filter. The

FM STEREO SEPARATION IS AN IMPRESSIVE 40 dB—IN THE LESS FAVORABLE DIRECTION.

50-dB quieting point was attained at 47.8 dBf, by which point distortion had edged below 1%. Ultimately, stereo quieting hit 59.9 dB at 80 dBf with a 1-kHz THD + N of 0.85%. At high r.f. levels, stereo distortion dropped to 0.71%. The THD + N versus frequency at 65 dBf is shown for both modes in Fig. 3.

Figure 4 gives the tuner's frequency response for each channel. Ignoring the hum glitch at 60 Hz, response is within +0.05, -0.16 dB on the left and within +0.07, -0.21 dB on the right from 20 Hz to 15 kHz. The 0.25-dB channel imbalance appears to be caused in the preamp or power amp section. Figure 5 depicts left-to-right separation, which is an impressive 40 dB or better from 100 Hz to 12 kHz. Right-to-left separation is even better.

Capture ratio met Radio Shack's spec (1 dB) precisely, while alternate-channel selectivity was a modest 39.5 dB. AM suppression measured a solid 61.7 dB. On the

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"(MG 10's) have an elegant appearance of a product that has 'class'...you are propelled into a new dimension--a dimension of incredible finesse...a musical experience that was mystical for me...(for home theater)...it can create a better audio illusion for movies than the picture can create a video illusion"...

Fedelta Del Suono, Italy, January, 1994

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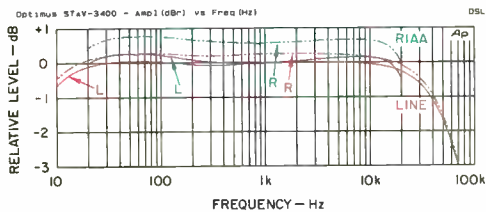


Fig. 6—Amp section frequency response, via “CD” and phono inputs.

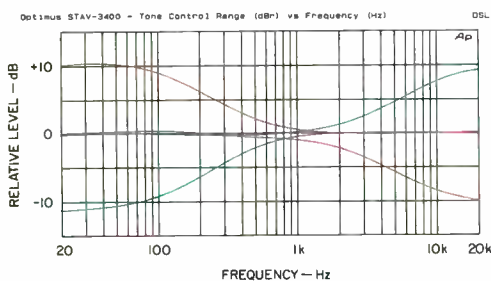


Fig. 7—Tone control range.

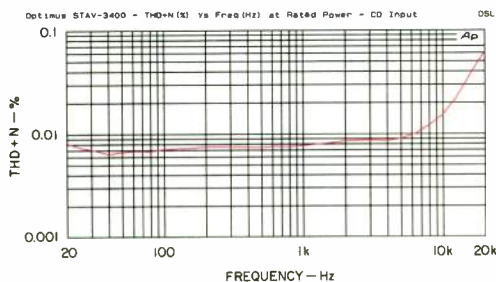


Fig. 8—Amplifier THD + N vs. frequency at rated power.

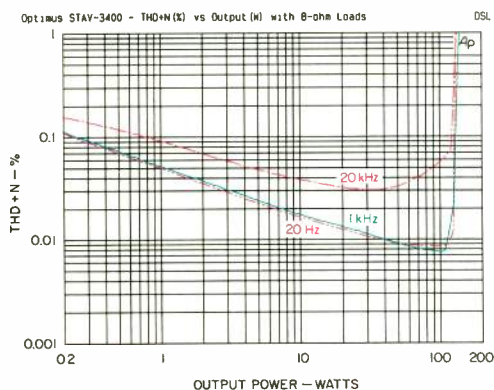


Fig. 9—THD + N vs. power output.

whole, the tuner should perform well in strong-signal areas. The sensitivity, selectivity, and distortion figures may garner no medals, but the response, separation, capture ratio, and AM suppression are impressive in a \$600 A/V receiver.

Figure 6 depicts the response of the CD and phono inputs. Again, we see some channel imbalance (more when using the phono stage) but the response is quite good: +0, -0.3 dB from 20 Hz to 20 kHz (-0.7 dB at 10 Hz) from the high-level input; +0.2, -0.6 dB (worst case) over the same range from the phono input. High-level response is down 3 dB at 69 kHz.

Figure 7 shows the tone-control range: Bass, ± 9 dB at 100 Hz, shelving to about ± 10 dB below 50 Hz; treble, +7.7, -8.4 dB at 10 kHz, increasing to +9.3, -9.9 dB at 20 kHz. The loudness contour (not shown) added 2.9 dB of boost at 10 kHz, 6.1 dB at 100 Hz, and 7.4 dB at 20 Hz.

Figure 8 plots THD + N versus frequency at rated power (110 watts/channel) via the CD input, in the conventional stereo mode. Distortion is under 0.01% from 20 Hz to 6.3 kHz and rises to 0.06% (a hair over spec) at 20 kHz. Figure 9 depicts THD + N versus output level at 20 Hz, 1 kHz, and 20 kHz. The congruent and steadily falling 20-Hz and 1-kHz curves suggest that the analyzer saw more noise than distortion at these frequencies, right out to rated power. Distortion at 20 kHz is greater and increases above 40 watts. Clipping at 1 kHz occurred at 140 watts, slightly less at the two frequency extremes.

Sensitivity for the EIA/IHF reference of 1 watt at 1 kHz measured 15.3 mV on high-level inputs and 265 μ V on the phono input. Referenced to rated power, the figures convert to 160 and 2.78 mV, respectively. The A-weighted noise, measured per EIA/IHF standards, was -76.3 dBW on the high-level input and -75.0 dBW on the phono for signal-to-noise ratios (referenced to rated power) of 96.7 dB and 95.4 dB

respectively. Noise spectrum analyses revealed a hum component of -80.7 dBW at 60 Hz but no other anomalies. Since the hum component was almost identical in level on the phono and high-level stages, I suspect it is introduced by the power amplifier or the last preamp stage.

Use and Listening Tests

I used the Optimus STAV-3400 both in my audio listening room and in my home theater. The acoustics of the two environments are different, as were the speakers

**FM CAPTURE RATIO,
RESPONSE, SEPARATION,
AND AM SUPPRESSION
ARE IMPRESSIVE FOR
A \$600 RECEIVER.**

that I used, so the two experiences are not directly comparable. I live about 60 miles from New York City and reception of Manhattan FM stations is none too strong. Although the STAV-3400 did not provide the low distortion and noise-free reception of my reference tuner, I expect it will prove reasonably adequate in better reception areas.

Compact Discs were the source for most of my non-FM music listening and, in the stereo mode, there's little to quibble about. The sound was clean and quite transparent for so modestly priced a receiver. I would have preferred that the loudness circuit confine its action to the bass and leave the treble alone, but I'm not a big fan of loudness controls to start with. The tone controls have a moderate range; this is advantageous, considering the relatively small number of positions (4 up and 4 down) that are available.

The surround modes are simple. If you like the characteristics provided, fine; if not, you have limited means of modification. The only control is of effects level; you can't change the delay or reverberation as you can with more flexible DSP-based ambience simulators. I, for one, am seldom satisfied with factory settings and regularly modify the characteristics to suit the recording I'm listening to. Not surprisingly, I found the STAV-3400 limiting in this regard; some others will find its simplicity a blessing.



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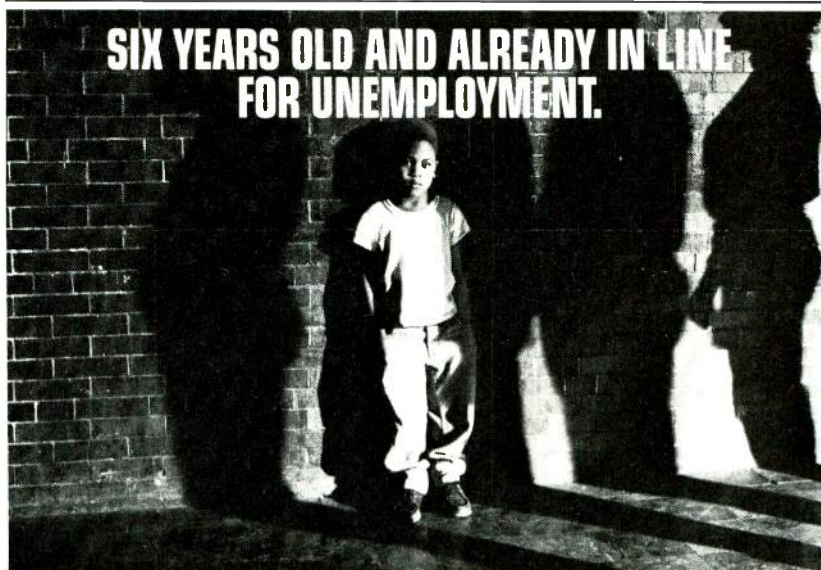
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**CHANGE THE WORLD OF A CHILD
AND YOU CHANGE THE WORLD.**

First-time home-theater owners should find the STAV-3400 enjoyable; it does a good job of decoding Dolby Stereo sources and provides adequate power for viewing rooms of average size. However, experienced home-theater fanatics will uncover limitations, especially when it comes to using a subwoofer—which is *de rigueur* for the true aficionado. The STAV-3400 has neither a filtered subwoofer line output nor a “mono” output to drive a powered subwoofer (which can be expected to have its own internal low-pass filter). I also found the channel-balance step size (2 dB) relatively crude for achieving ideal surround effects. The volume control is motorized and so provides a continuous adjustment range, but when it's operated from the

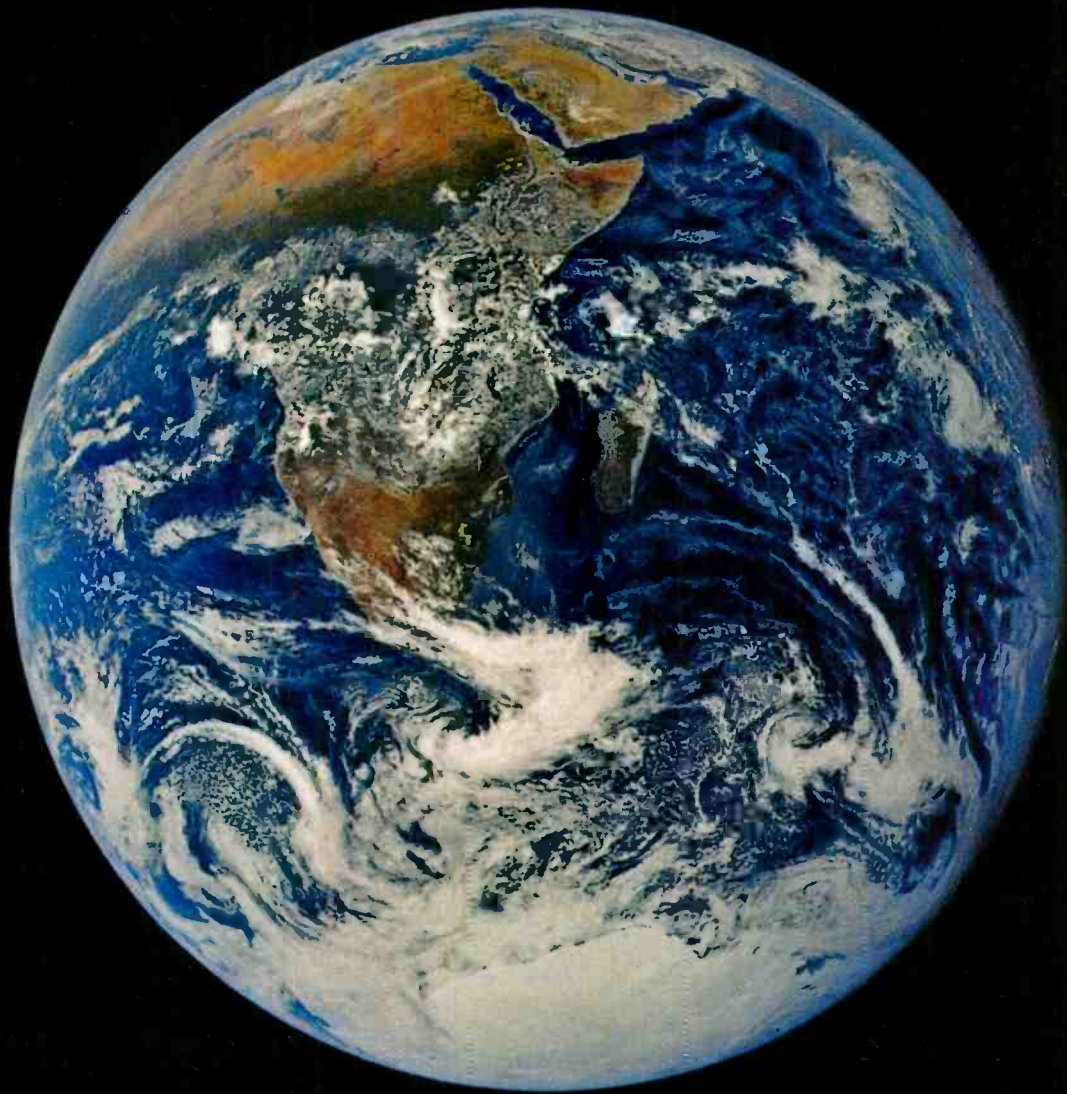
**THE OPTIMUS STAV-3400
IS RIGHT ON TARGET
FOR BUYERS WHO WANT
SURROUND WITHOUT
HASSLE OR BANKRUPTCY.**

remote, there's considerable overshoot, which makes it difficult to attain the precise level you want.

I'm impressed with the STAV-3400's display; it's clear, legible, and tells you what you need to know. When you change surround modes, the name of the new mode marches across the dot-matrix screen before the display reverts to the name of the source you're using. There's also a permanent indication of the surround mode, elsewhere on the panel, and another to indicate the center mode. When you mute the system, “Muting” replaces the source indication. Tone control settings are depicted graphically; rear, center, effects, and delay time numerically.

Although clearly never intended to be the ultimate home-entertainment control center, the Optimus STAV-3400 is competitive in its target market which I interpret to be the first-time home-theater/audio buyer who wants decent performance and a taste of surround sound with a minimum of hassle and without breaking the bank. In this arena, the STAV-3400 stands out for the number of audio-video sources it accommodates and its generous power performance.

Edward J. Foster



IF YOU'RE NOT RECYCLING YOU'RE THROWING IT ALL AWAY.SM

A little reminder from the Environmental Defense Fund that if you're not recycling, you're throwing away a lot more than just your trash.

You and your community can recycle. Please write the

Environmental Defense Fund at: EDF-Recycling, 257 Park Avenue South, New York, NY 10010, for a free brochure that will tell you virtually everything you need to know about recycling.



CROWN SASS-P MKII STEREO PZM MIKE

through phantom power, selectable by a switch on the back panel. The SASS-P may be permanently installed, with its switch set for remote phantom powering. The switch also provides a choice of flat or low-cut response for either of these powering options.

SPECS

Type: Stereo condenser.
Frequency Response in Reverberant Field: 20 Hz to 18 kHz.
Polar Pattern: Each channel omnidirectional at low frequencies and unidirectional at high frequencies.
Impedance: Nominal, 150 ohms; actual, 240 ohms; recommended minimum load impedance, 1 kilohm.
Open-Circuit Sensitivity: 6 mV/Pa (-44.5 dB re: 1 V/Pa).
Equivalent Noise Level: 20.5 dB SPL, A-weighted, re: 20 μ Pa.
S/N: 73.5 dB at 94 dB SPL.
Maximum SPL: 150 dB SPL at diaphragm for 3% distortion.
Polarity: Output-connector pin 2, positive; pin 3, negative; for positive pressure on diaphragm.
Powering: Standard phantom power (12 to 48 V d.c.; positive on pins 2 and 3 with respect to pin 1) or two 9-V alkaline batteries.
Current Drain: 1.1 mA per channel.
Materials and Finish: Molded high-impact, satin black and charcoal gray plastic.
Cabling: One two-conductor shielded cable per channel.
Connector: Three-pin XLR type.
Switch Positions: Phantom (flat and low-cut) and battery (flat and low-cut); battery off in phantom positions.
Dimensions: 11.5 in. W x 5.7 in. D x 5.3 in. H (29.2 cm x 14.5 cm x 13.5 cm).
Net Weight: 17 oz. (482 grams).
Price: \$899.
Company Address: 1718 West Mishawaka Rd., Elkhart, Ind. 46517.
 For literature, circle No. 92



Crown's Stereo Ambient Sampling System (SASS) is an array of two omnidirectional condenser microphone elements mounted on boundary surfaces and separated by a foam-covered baffle that is 6 inches wide. This setup, with the mikes located on either side of an acoustical baffle, re-

sembles a dummy-head or sphere-type stereo microphone. Dummy-head recordings are binaural and best heard over headphones. (Binaural recordings require special signal processing for loudspeaker presentation.) The microphone capsule mounting (or boundary) surfaces of the SASS-P MKII, plus the foam-lined central baffle, are said to provide the auditory clues for correct source imaging in loudspeaker presentation. The SASS is much less costly than head or sphere systems, which are in the \$5,000 to \$12,000 range.

The mike can be operated from an internal pair of 9-V batteries or



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— John Atkinson, *Stereophile*

High End Show
San Francisco, CA, March 12, 1993

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Referring to the 9300 THX "... image focus is exceptionally good. You get a wide deep soundstage, but it is not a vague presentation. Instrumentalists are precisely located. All very, very fine."

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Stereophile, May 1993
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Hafler

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Stereophile, April 1993
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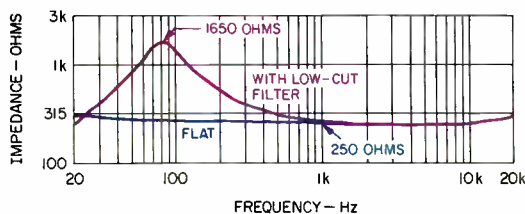


Fig. 1—Impedance.

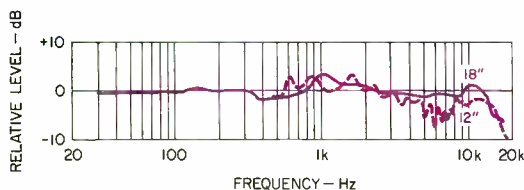


Fig. 2—On-axis response.

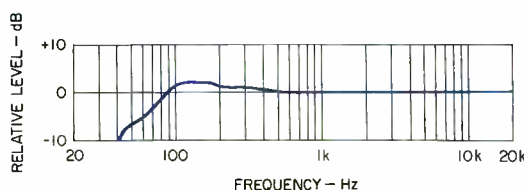


Fig. 3—Effect of low-cut filter.

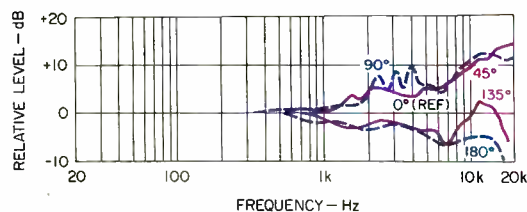


Fig. 4—Frequency response vs. angle.

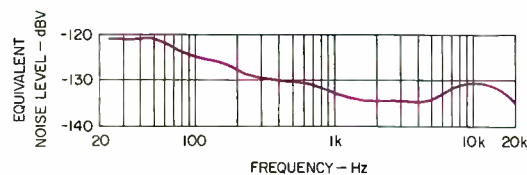


Fig. 5—Third-octave noise spectrum.

The SASS-P incorporates a pair of tiny condenser elements similar in size to those in the familiar PZM microphones. These condenser capsules are rectangular in shape, about 10 x 5 x 2 mm ($3/8 \times 3/16 \times 1/16$ inch), and contain both an electret element and an FET preamp. Like PZM mikes, the capsules are mounted facing the boundary surfaces, with a 1-mm space between the capsules and boundary surfaces. The latter are angled approximately 45° to the flat back surface of the SASS. The foam-covered baffle is situated between the slanted boundaries.

The tiny electret capsules have high signal-to-noise ratios for their size. The SASS-P's noise specification indicates that the mike would be useful for all but the most quiet locations, and, with internal battery power, could be used with recorders that do not have phantom power.

The SASS-P comes in a large and sturdy carrying case, easily worth \$100, and includes a wind-screen and handle (for use where stand-mounting is not practical, such as at outdoor events). By removing pre-cut blocks from the case's foam liner, I was able to pack a Sony DAT Walkman with charger, cables, headphones, etc.

A paper by Bartlett and Billingsley, "An Improved Stereo Microphone Array Using Boundary Technology: Theoretical Aspects" (86th Convention of the Audio Engineering Society, Preprint No. 2788 A-1), gives a good explanation of how the SASS works. The authors indicate that the auditory localization clues provided by the SASS consist of arrival-time differences below 2 kHz; above that frequency, localization clues are from intensity differences provided by the foam-covered baffle. Therefore, the SASS array would seem to be an improvement on head-spaced omnis because of the baffle and because of the boundary-mounted

capsules, which provide unidirectional operation at high frequencies. The authors indicate that the SASS gives better imaging than cardioid mikes in coincident X-Y or head-spaced arrays. For digital recordings, omnidirectional elements are preferred, due to their linear response down to very low frequencies. (Most directional condensers have poor bass response below 50 Hz, I have found.) A major point of the paper is that the outputs of the SASS mix well to mono.


Measurements

The SASS-P's output transformers allow its connection to balanced or unbalanced inputs and ensure that there will be no trouble from d.c. on the outputs when the unit is powered by its internal batteries. Therefore, I used battery powering for all tests. (A brief test with 48-V phantom powering showed that the mike gave the same audio output levels as with battery powering.) The slide-in battery holders were not foolproof: I managed to install one battery backwards, and since the two

**THE TINY ELECTRET
CAPSULES IN THE SASS-P
HAVE HIGH S/N RATIOS
FOR THEIR SIZE.**

batteries are wired in series, they cancelled each other and the mike went dead. I also encountered a mystery: Once, when the mike sat for a few days after use, one battery went completely dead but the other retained full voltage. Was this just a bad battery or a problem with a battery holder?

The measured output impedances (Fig. 1) indicate that, with the switch set for flat response, the outputs look like 250-ohm resistances. But in low-cut mode, the impedance of one channel rose to a peak of 1,650 ohms at 80 Hz. This is about the highest impedance I've measured on a "low-impedance" microphone. Therefore, to obtain the low-cut filter characteristic shown in Fig. 3, you should connect the mike to a load of at least 5 kilohms. In flat-response mode, of course, you can use loads of lower impedance, such as the rated 1 kilohm.



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The SASS-P and the organ of the Chapel at St. Joseph's University, Philadelphia.

From my reviews of PZM mikes in the March issues of 1983 and 1985, I recalled that test procedures were difficult and did not follow standard techniques for measuring conventional microphones. I had to furnish boundary or mounting surfaces of various sizes for testing PZMs. The SASS-P MKII has its own boundary surfaces, and so should be measurable like any other free-standing microphone. However, the frequency response curves published by Crown indicate that they are valid for sound incident on the boundary (about 45° off the major axis of the SASS-P), and for a diffuse field and for stereo listening. By "diffuse field" Crown means sound from all directions, a contradiction to the statement of sound aimed at the boundary. By "stereo listening," I gather from the AES paper, they mean that 3 dB was added to the low-frequency end of the published response curves. The small size of the SASS-P's boundary should result in a 6-dB step-down shelf in the response below a certain frequency; the bigger the boundary, the lower this frequency will be.

From past experience, I expected that the basic transducers would have flat response from 20 Hz or below up to 15 kHz or above. Therefore, the frequency response deviations from a flat line should be

mostly a property of the shape of the SASS-P's boundary. In previous tests of PZMs, I needed to use boundaries up to 4 feet square. Thus, accuracy demanded that I test them outdoors, 6 feet from the source, to get a sufficiently even sound pressure across the baffle. The SASS-P is not large enough to require outdoor testing, and its dimensions suggested that testing could be conducted indoors at 1 or 2 feet from my 2-inch precision sound source.

I discovered that the mid- and high-frequency response is ragged on axis (0°) at 12 inches but smooths out at 18 inches (Fig. 2). The latter curve was the flattest I measured with the SASS-P, and flatter than many of the PZM curves in past reviews. This demonstrates that the SASS-P must not be used any closer than 18 inches to a source, and preferably farther away, so as to

be in the diffuse field. (There is no diffuse field outdoors, but the SASS-P is recommended for outdoor use, where it should be used at a distance of 18 inches or greater so that the free-field responses are smooth.) The response of the SASS-P is linear down to very low bass frequencies, as is desirable for digital recording. The low-cut filter has a more rapid cutoff than is typical for such a filter in a microphone (Fig. 3), which helps reduce rumble and wind noise outdoors.

Figure 4 shows the deviation from 0° (on-axis) response of one channel at various angles of sound incidence in the horizontal plane, from about 350 Hz up; there are no such deviations below this frequency. Note that this is different from my usual custom of plotting response curves at each angle, starting with 0°. Since the 0° response at 18 inches (Fig. 2) is fairly flat, these relative responses are fairly close to the absolute responses at each angle. The plots give a good idea of the properties of the SASS-P's boundary geometry. Crown's data sheet indicates that the MKII version has more "brilliance," which may justify the rising responses at 45° and 90°. However, listening tests (see below) indicated that the SASS-P did not sound extra bright. The substantial spread in high-frequency re-

sponse between front and rear hemispheres indicates unidirectional properties, as specified. The responses of each channel, at 45° off axis in either direction, matched within 1 dB.

Our usual noise test was conducted by placing the microphone in a sound-retardant wood box. The third-octave band levels of microphone noise versus frequency are shown in Fig. 5. Usually, I convert the decibel scale to units of equivalent sound pressure level, using the measured output level (sensitivity) of the microphone at 1 kHz. This did not work well with the SASS-P, whose output at 1 kHz is not necessarily representative of its overall sensitivity due to the boundary-induced response variations seen in the dashed curve of Fig. 2. Using a figure of -46.5 dB obtained from a 45° off-axis curve (capsule

THE SASS-P'S RESPONSE IS LINEAR DOWN TO VERY LOW FREQUENCIES, WHICH IS DESIRABLE FOR DIGITAL RECORDING.

facing source and distance measured to capsule), I calculated an overall equivalent noise level of 20.5 dB SPL, A-weighted. This exactly matches the rated noise level, and both capsules exhibited the same noise as well as output levels.

Polarity of the SASS-P tested pin 2 positive, as specified. The magnetically induced 60-Hz hum was less than that of my RCA Lab Standard 44-B microphone, which was calibrated at a low -128 dBm for 1 milligauss. Therefore, the transformers in the SASS-P are well shielded.

Use and Listening Tests

Once again, I am indebted to my colleague Carlton Read, who recorded two test sessions on DAT with the SASS-P and other mikes. The first taping was of the 389th Army Band, playing in our Haddonfield (N.J.) Middle School auditorium. Fortunately, the room was not too live, and with the SASS-P in the front row center seat at ear level, the acoustics were dead enough to suit the band.

The band played a variety of tunes, from marches to George Gershwin and Cole

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Porter. I have not heard a finer band, and their precise playing was excellent for comparing microphone response and imaging. The SASS-P MKII easily outperformed a pair of Peavey omnidirectional condenser microphones, which were spaced about 6 inches apart. The latter were aimed upward because they are bright sounding, but the off-axis pickup did not soften them much, due to their very small-diameter capsules. Therefore, the SASS-P sounded natural and the Peaveys too bright. The nearby trumpets sounded harsh with the Peaveys. Bass sound was equally excellent with each mike.

Imaging, particularly on such high-pitched instruments as trumpets and cymbals, was more precise and well defined with the SASS-P. When I listened with headphones and quickly juggled the two earcups off and on one ear, it was easy to hear that intensity differences between channels of the SASS-P started with frequencies as low as that of a trumpet and became much greater with cymbals. In marked contrast, the intensity of all instruments in the Peaveys was similar in both channels. This simple demonstration showed how the SASS works and clarified the differences heard with speakers.

The second recording was made of the organ in the beautiful new Chapel at St. Joseph's University in Philadelphia. This instrument is a restored tracker-action organ and was built in the United States in 1868. It is a full-sized instrument, with pipes as long as 16 feet. In this session, the organist played Jeremiah Clarke's "Trumpet Voluntary" once for each set of mikes being compared: The SASS-P, the Peaveys, and RCA BK-5B uniaxial ribbons. (The latter have sharper patterns than a cardioid but no extra lobes, as hypercardioids do.) This organ did not have loud trumpet pipes, and the Peaveys initially sounded best. However, since the SASS-P and BK-5B microphones sounded similar, I concluded that the SASS-P had the correct balance of lows to highs. The imaging of the SASS-P seemed more exacting than that of the Peaveys, and the ear-spaced BK-5Bs gave a solid center image but a narrow, less reverberant soundstage, in keeping with their tight patterns.

I recorded two concerts in the Haddonfield United Methodist Church using the

SASS-P. The most spectacular of the two events included a large chorus and orchestra in the front of the church and a smaller chorus in the rear balcony. I used a Toshiba DX-900 VHS/PCM recorder, with an AKG C-422 stereo mike flown 16 feet above the orchestra and feeding the PCM channels. The SASS-P was suspended several feet in front of the balcony, facing upward, and feeding the two VHS Hi-Fi tracks, which were used as "surround" channels. The two stereo microphones were about 100 feet apart. The sound quality of the orchestra and front chorus reproduced by the Crown mike was surprisingly similar to that from the AKG, and not as reverberant as you might expect at such a great distance. The rear chorus was employed on two pieces by

**IMAGING WAS PRECISE
AND WELL DEFINED,
ESPECIALLY ON TRUMPETS
AND CYMBALS.**

Heinrich Schütz which required a second chorus to "echo" the first. This music was most beautiful when played back in surround.

All of the listening was done, as usual, in my 14 x 25-foot studio with "dead end" in the rear and modified, equalized Altec 604C speakers in the front. The surround speakers in the ceiling to my right and left, used in playback of the four-channel tapes, were RCA SL-12s (SL-12s were the surround speakers on the walls of theaters equipped by RCA for CinemaScope).

Last but not least, I made some DAT recordings outdoors with the SASS-P and the Sony DAT Walkman. The most interesting ones were made in conjunction with an investigation of home-owner complaints of industrial noise. The noise was annoying but not of sufficient sound level to break any regulations or even to be readily measurable. The SASS-P was able to capture these weak sounds in the presence of ambient noise from traffic, aircraft, birds, etc. If I monitored via headphones at live levels while recording, the experience was much like live listening, in that sound



quality and direction in the horizontal plane were preserved. Due to the microphone's flat bass response and the Fletcher-Munson loudness effect, the ambient rumble tended to mask the industrial noise (which was tonal in the region from 150 to 600 Hz) if the gain was turned up. Aircraft noise seemed to be coming from above (but perhaps we are conditioned in this respect). I found that sources behind the mike were poorly localized, perhaps because the SASS-P is unidirectional at high frequencies. The unusual foam and cloth windscreen was difficult to put on the mike, but it was needed for all outdoor recordings in light to moderate winds. With higher gusts, I heard some wind noise with the screen on.

These listening tests indicated to me that the Crown SASS-P MKII is a versatile microphone for indoor and outdoor pickup of music, voice, and ambient sounds. As with other PZMs, the acoustic response curves were difficult to measure and interpret. In actual use, the SASS-P had a fairly neutral sound, and there was none of the excess brightness hinted at by some of the off-axis response curves.

The field case and accessories are a plus for on-location recording. The cost is at the low end of the range of professional stereo microphones. I recommend the SASS-P for many applications, outdoors and indoors, where stereo pickup of sources more than a couple of feet away is required. Its light weight favors creative positioning, but the SASS-P is more bulky than conventional stereo mikes, so visual considerations may preclude its use at some live events. It appears to be physically more rugged than most condenser mikes and would probably survive well with touring musicians. I have come to regard the SASS-P as a dependable and useful tool.

Jon R. Sank

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CEDILLE CDR 90000 016
CD; 57:46



early 1920s—screamingly dissonant, acid, good humoredly shocking. But in all truth it isn't *really* like that—only, I think, to show he could do it. I enjoyed every minute—the guy is so good.

Well, what of No. 5, completed in 1990? Long, long time later. It is supposed to mark Blackwood's return to a semi-Romantic conservatism after assorted forays into

For anyone interested in American "classical" music, this is a revealing disc as well as good entertainment. Same man, two symphonies, 35 years apart. An oldie recording of the First Symphony, pre-1960 via RCA—as was, and a brand-new job of the Fifth, in digital, on a single CD from Cedille. Let me say at once that the audio differences between the two are simply not important—a compliment to the audio profession!

Easley Blackwood is the classic example of a highly gifted American musician faced with the anomalies of our century, a musical tradition

still very much involved with Europe and yet trying desperately to define itself. Blackwood composed his First at 18 in 1955, after thorough study with all the right people—Paul Hindemith at Yale, Nadia Boulanger (the mother-teacher of us all), and, off to one side, the mystical Olivier Messiaen. He was fully equipped and, more vital, highly talented. But what to write?

The First Symphony is fun, and very right in a centuries-old tradition of first major attempts—show up your elders, with both challenge and gratitude, and write "their" music all over again, if a bit late! This First is everything at once, brilliantly put together, uninhibited, helter-skelter, and joyfully out of date. 1955? Much of it reeks of the blatty

atonal Schoenberg and the like. What I hear in this later work is not so much either conservative or radical as, first, obviously, it is the same man, much further along, and then further, an uncomfortable lack of focus, a sort of indecision—again, *what shall I write?* But it's no longer youthful. It has its dissonance; it has its old-fashioned moments, notably a jaunty little tune in the scherzo right out of Mendelssohn. Why? For these two ears it doesn't jell, though impeccably built as expected. The American predicament.

By all means play the First Symphony first. Maybe play it again. Then go on to the Fifth, which is first on the CD simply because it is new and digital. See what you think.

Edward Tatnall Canby



Still looking for baroque? Plenty of it around, but more and more diverse. These two CDs belong to a definite intermediate category straight out of the '60s; it's streamlined, spare, and fast (not like the ponderous baroque of the pre-World War II period), using perhaps an actual harpsichord or organ for a continuo accompaniment—phew! Great innovation—but beyond this, sticking entirely to “modern” instruments (except an occasional recorder or such). As a matter of course. No “period” stuff here. But a proper-sized ensemble, *not* symphonic, and not a trace of ponderosity. It's the most popular baroque today.

Richard Kapp's *Virtuosi*, and frequent guests, are invariably the finest of their sort, and the music they play for him is exemplary. Nothing's faked up or out of style. One gets the feeling that these are top conservatory-trained musicians who are happy for a chance to play outside of the symphony-orchestra repertory for which they were mostly trained. Kapp in a way is one of them too, but he has a natural and lively feeling for things baroque, not only for good, innovative music but for sensible and expressive tempi—relaxed, easy, yet precise. The music here includes two splendid examples of Georg Philipp Telemann at his best and a brace of lesser but interesting works, reaching back into the 17th century and “middle” baroque, bringing in the inevitable Vivaldi only as the final piece (and *not* “The Four Seasons”).

Too much high-power trumpet sound? Modern trumpets at their



Baroque Trumpetissimo
David Bilger, Stephen Burns,
and Edward Carroll, trumpets;
Philharmonia Virtuosi,
Richard Kapp
ESS.A.Y. 1035, CD; 57:10



A Baroque Celebration
New York Kammermusiker,
Ilonna Pederson
DORIAN DOR-90189, CD; 61:26

most potent! To my surprise, no. Only in the earlier fanfare-like music are they a bit too much, without enough musical variety to sustain the physically limited harmonies. The later composers do help us understand, by providing quieter contrasts in their slow movements.

What really tops this record off is on the audio side. The finest, sharpest, clearest trumpet sound I have ever heard on records. An absolutely stunning job, with a perfect ambi-

ance, an ideal sense of space. You don't have to love baroque to appreciate this, but maybe you soon will!

So how about the other disc? Curious. In essence, the Kammermusiker is one of those all-of-a-kind ensembles that play arrangements of music never written in such a format. (My favorite example: Mozart for tubas!) Much is said in the notes about double reeds going back thousands of years. True, true. But *these* reeds, playing music earlier than Kapp's, mostly 17th century, are strictly “modern” and in no way “authentic” nor much like any conceivable sound originally intended. I was especially appalled at a snarling suite of movements from Handel's familiar “Water Music.” Indeed, Handel used masses of oboes, some 30 as I remember, (mainly because they were waterproof) for a rainy excursion on the Thames with the King. The sound was never like this one, I'll bet.

Ilonna Pederson, founder of this group about 20 years ago, is the final factor in the equation. Her style has the bite and efficiency of the late '60s—tense, extremely fast, melodically unyielding. Her players are good on their modern instruments—lots of them, by the sound; they are as virtuoso as Richard Kapp's and (with Pederson's help) considerably more at ease with baroque ornament, notably in the ornate French music of Jean-Baptiste Lully, composer to Louis XIV. But the teeth-grinding tension—the edgy, squally sound—never lets go. Give me trumpetissimo any day.

Edward Tatnall Canby

Richard Kapp's Virtuosi are invariably the finest of their sort and the music they play for him is exemplary.

Manuel Barrueco Plays Albéniz & Turina
Manuel Barrueco, guitar
EMI CLASSICS CDC 7 54382 2, CD; 64:30

Another “Leyenda” and “Fandanguillo”? For those jaded by decades of the same music, the thought of hearing these war-horses yet again might be enough to send feet fleeing the record rack if it weren't for one simple fact: Manuel Barrueco is one of the best classical guitarists on the planet, and when he chooses to reinterpret standard repertoire, rather than explore new works, as many of his contemporaries have done, he demands attention. Here, the Cu-



ban-born guitarist continues his affection for Hispanic material, offering transcriptions of Albéniz' nationalistic “Suite Española,” in the posthumously extended version with four additional movements (as

resequenced by Barrueco), and Turina's complete flamenco-influenced works originally composed for guitar.

Despite the overfamiliarity of tunes such as “Granada” and “Homenaje a Tárrega,” Barrueco's readings set new standards for musicianship: He achieves an almost pianistic vocal and dynamic balance and unexcelled technical control. With the sweet, voluptuous tone of his Ruck guitar brilliantly captured, Barrueco defines the delicate modern counterpoint between classical precision and romantic emotion, and leaves us hoping for new and unfamiliar material from him.

Michael Wright

Vivaldi: Concerti for Strings
L'Europa Galante, Fabio Biondi
 OPUS 111 OPS 30-86, CD; 72:55

Lordy, more Vivaldi? Will it ever stop? The spate is endless and the supply too, mostly all "new." What we need, then, is a fresh new voice, off somewhere from the standard international, quite excellent but all too uniform from Singapore to Chicago, from New York to Hong Kong. Here it is! Where else but from Italy, within miles of the source some 250 years back.

It is indeed fresh, new Vivaldi, subtly different and full of Italian verve à la Toscani-



ni. But also an unusual all-Italian performance (one Austrian, with an Austrian portable organ). Moreover, all the "period" instruments are home-grown, whether old

or new, most from a single town—Parma—over centuries. (Yes, Parmesan cheese is there too.) How remarkable! Indeed, astonishing. We don't do things this way any more.

Nineteenth-century opera excepted, Italian playing of the enormous Italian heritage of music has not lately been notable. Others, all over the music world, do it better, at least for international ears. Here, finally, the Italians catch up! Right-sized orchestra of strings, period configuration throughout, an organ to add to the (Italian) harpsichord in the continuo, highly lively tempi, and much drama—as Vivaldi himself might have had it. He was, in his time, a startling innovator. Dramatic in the right places too, the unusual sound pictures, the innovative harmonies, the odd instrumentations. All in all, this is exciting playing straight through, both solos and the group tutti. *Edward Tatnall Canby*

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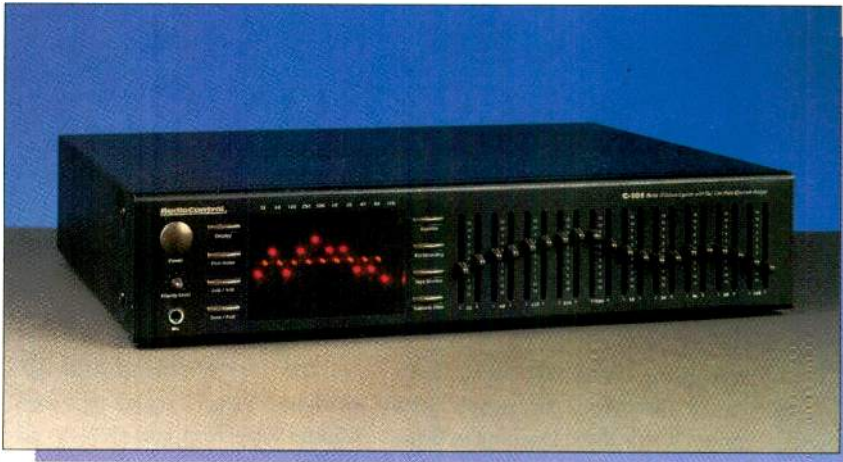
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 KICC 76, CD;
 DDD; 55:36

These two symphonic poems are full of rich and somehow emotionally moving orchestral sounds on themes of nature. The music will be new to most ears, but it is completely tonal and traditional, superbly performed and well recorded in a church in Vilnius, Lithuania. (This church is also used by flutist Paul Horn due to its highly reverberant character.)

Mikalojus Konstantinas Ciurlionis was a turn-of-the-century artist as well as a composer. In both the visual and aural fields, he showed an interest in philosophical, folk, and mythological motifs, combined with a thoroughly cosmic attitude. The composer's own words about "The Sea" are perhaps most to the point: "I want to compose a symphony from out of the rolling waves, mysterious talks of the secular woods, twinkling of stars, of our old songs, and my boundless longing." *John Sunier*

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LUCID DANCING:



CURRENTS IN ELECTRONIC MUSIC

JOHN DILIBERTO

At a symposium for the Synclavier computer/synthesizer a few years back, someone in the audience asked performance artist/electronic musician Laurie Anderson if she ever considered doing dance-mixes of her music. With her typical twist on reality, Anderson replied, "Well, I just wish people would learn to dance differently."

Laurie Anderson may have gotten her wish. People are dancing almost imperceptibly, in the spaces of their heads, to a new electronic sound called "ambient house." It's the yang to the hydraulic yin of techno dance music heard in "rave" dance clubs. Initially produced by deejay/musicians such as Alex Paterson, Moby, Aphex Twin, and others, it was played in "chill out" rooms, sanctuaries from the dancing frenzy. It's

now rising out of that environment to be discovered by people who would normally be listening to Brian Eno, Tangerine Dream, or . . . John Cage.

Alex Paterson worked for a few years at E. G. Records, the home of ambient music's godfather, Brian Eno. Eno finds his discovery by a new generation amusing. "My work was revived," he laughs "and recognized for its true value. I keep wanting to make music where you are not sure of the edges, where the edges fade into sounds that could be in the real world."

Paterson's group, The Orb, takes that even further. With his partner, Kris Weston, formerly known as Thrash, they sit in a London studio loaded with vintage synthesizers and state-of-the-art computers. They mix and match sampled sounds, synthesizer drones, and snippets from TV and radio. It all merges into seamless excursions like "The Blue Room," released as a 40-minute single in England. The Orb aren't concerned with songs, melodies, and sometimes even rhythms. Their lat-

est, *Orb Live 93* (Island Red), is a swirling collage of reggae bass lines, Minnie Ripperton and OXY-10 advertisement samples, and floating electronics.

"You are not talking about structured music; verse-chorus, verse-chorus, bridge, end, double repeat, chorus, bye-bye," claims Paterson. "That's what we are trying to get away from, totally."

Groups like The Orb and Aphex Twin are the apotheosis of modern music, yet there is a quaintness to much of their sound. They deploy samples from TV and radio, recalling John Cage or Karlheinz Stockhausen tuning into radio broadcasts on Cage's "Imaginary Landscape" and Stockhausen's *Hymnen* (currently out of print) or the *musique concrète* manipulations of Pierre Henry and Pierre Schaeffer in the 1940s. Sections of Aphex Twin's *Selected Ambient*

AMBIENT HOUSE
MUSIC IS THE YANG
TO THE HYDRAULIC
YIN OF
TECHNO DANCE.

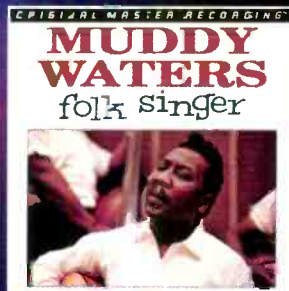
Works Volume 2 (Sire) could have been brought back from the Planet Altair and the 1955 film score of *Forbidden Planet*, which was composed by John Cage collaborators Bebe and Louis Barron.

Illustration: Victoria Kann

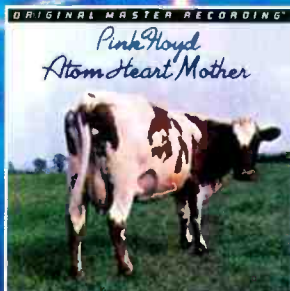
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Back then, the Barrons cobbled together their own electronic devices, and Aphex Twin does the same thing while also bastardizing modern synthesizers and altering their circuits. "I started off getting wierd-type synthesizers," says London-based Richard James, the person behind the name Aphex Twin, who also makes records under the names Polygon Window and The Dice Man. "I'd mess about with them, taking parts out of keyboards, joining them up. It was trial and error. And then I used it with standard and modified sounds."

With this kludged-together arsenal, Richard James creates the techno-pounding music of Polygon Window's *Surfing on Sine Waves* (TVT) and the ethereal, sub-ambient expanses of *Selected Ambient Works Volume 2*.

Just as the Barrons scored the "Monsters of the Id" for *Forbidden Planet*, Aphex Twin—Richard James—uncovers his own subconscious on his new album, which he says is derived from "lucid dreaming," the practice of controlling the direction of your dreams.

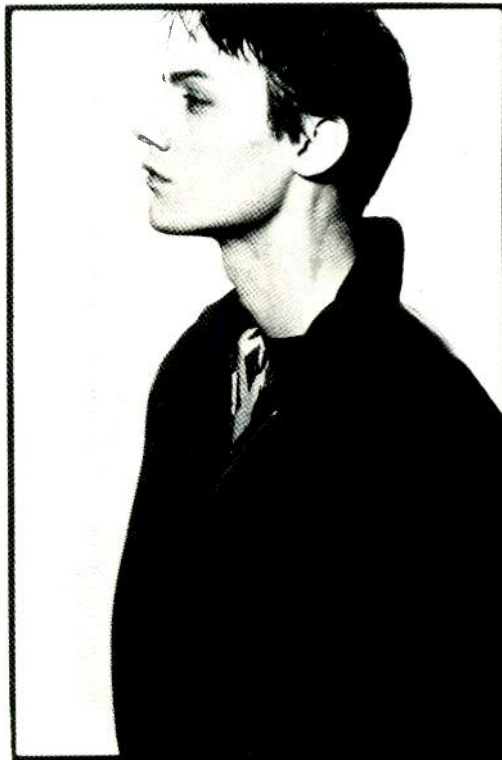
"I taught myself how to do it when I was seven or eight, and it's the single most excellent thing in my life," enthuses the composer, whose life at this point is all of 22 years. "I started to dream that I was in my studio, or a totally imaginary studio, or my studio with imaginary boxes in it, or a bit of each. I'd dream tracks instantly and at the end of it I was just sleeping in my studio, waking up, and actually doing it straight away."

The irony of much of this music is that it slips right out of what a few years ago would've been called "New Age," the last "lucid dreaming" style music. Parts of *Selected Ambient Works Volume 2* could've emerged whole-clothed from Steve Roach's 1984 classic *Structures From Silence* (Fortuna) and his more recent techno-primitive music heard on *Origins* (Fortuna). The paradox isn't lost on Roach. "[Ambient house] is

hip, whereas if it was tagged as new age, it wouldn't be hip," he observes. "They're doing what a lot of us have been doing for many years and that's creating a sonic sanctuary to ponder on whatever it is you need or want to do. When I was living in L.A., I always wished that there was a place you could go for a relief from the sonic attack."

Roach feels like he's already onto the next phase, infusing his music with global percussion and aboriginal wind instruments. "I feel like it's catching up and at the same time I feel like the tribal world influence which I'm infusing into these expansive, landscape-oriented harmonic bodies, this kind of sound or formula I'm seeing in a lot of places now," he reflects.

Ironically, Roach is out-growing his original influences—German



**THE IRONY OF THIS
MUSIC IS THAT IT
SLIPS RIGHT OUT
OF WHAT WAS
CALLED NEW AGE.**

space music—just as a new generation is claiming them. Citing Klaus Schulze, Cluster, Kraftwerk, and Neu as source points, composer/producer William Orbit calls it "the first trance music" and Mark Gage, who records as Vapourspace, creates a contemporary sound from influences that were recorded before Richard James was even born. "It always surprises me that a lot of kids involved with electronic music now have no idea who these people are," says Gage with disbelief. "I mean, this music has been going on for a while."

Gage, based in Rochester, New York, is part of an underground movement of bedroom synthesizer players. He began making music a decade ago, and now has his studio in an apartment where he made Va-

pourspace's *Gravitational Arch of 10: Magnetic Gravity Arc Suite* (ffrr). It's an epic composition by ambient or techno standards. Gage let several other producers re-mix his original piece, and then he sequenced those into an almost classical structure, moving through theme and variation.

His *Themes From Vapourspace* (ffrr) contains segments he first recorded back in 1983, mixed seamlessly with newer works. But unlike The Orb, it's more structured, more electronic, and less reliant on samples. "It's about melody and texture, and you can't really get those things out of samples sometimes," he says. "I like evoking mood through synthesizers. They're really expressive instruments."

William Orbit comes into techno sideways. He's recorded under the names Torch Song and Bass-O-Matic, and as a producer and engineer has worked with Peter Gabriel, among many others. His first ambient work came on a re-mix for a Belinda Carlisle track called "World Without You." "I switched all the drums out and all the vocals out and had just keyboard and guitars, and it

More than most ambient artists, William Orbit embraces melody and dynamics.

Photograph: Kevin Davies



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just struck me that this would make a great ambient mix and I just did it," he recalls.

Orbit's main work comes out under his own name in a series of albums called *Strange Cargo* (all on I.R.S.). They were originally categorized as New Age, but the latest, *Strange Cargo III*, verges toward techno and ambient house. More than most of these artists, his songs are tightly organized with dynamics that shift from pounding to drifting and even to some catchy melodies—an anomaly in the genre. Orbit says they're meant to be listened to. "Why do we have this boundary between dance and non-dance?" he asks. "I don't see it as a dance album at all."

It is if you dance in your head. Ambient house sometimes lacks the texture and organic quality of its psychedelic and space music antecedents, but it's tapping the same sources for the head music of the 1990s. One man who's been through them all is Steve Hillage. Formerly the guitarist with the 1970s space carnival called Gong, he now collaborates with Alex Paterson on records with his own techno group, System 7 (777 in the U.S., available on Caroline). "It's the new psychedelia," asserts the 42-year-old British musician. "Rock music is increasingly perceived as backward-looking and retrogressive and reactionary [in England], and most people with experimen-

tal, crazy, wacky ideas have gravitated into the dance area."

Whether it's in their heads or with their bodies, people are, indeed, dancing quite differently.



Rock Animals

Shonen Knife

Virgin 8 39063 2, 45:20

If *Godzilla vs. Mothra* could've had a New Wave house band doing its soundtrack, Shonen Knife be thy name. It's hard to believe but this all-woman Japanese garage trio has been together for a full decade with little recognition beyond a small but international following that gets larger with each record. Grittier than The Go-Go's and borrowing equally from The Beatles and Ramones, Shonen Knife affectionately embrace all that's kitsch about American culture. "Tomato Head," with its sinister guitar tones, conveys the confessions of a tomato juice junkie, while "Cobra vs. Mongoose" is grunge done Japan style. The bouncy "Catnip Dream," which contains lines like "catnip is a kitty cat drug," is simply hilarious. If you can get past the pidgin English and bad drumming, Shonen Knife's latest dose of kitsch will prove itself endearing.

Tom Ferguson

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FAST TRACKS

Elements: *Mike Oldfield* (Virgin 8 39089 2, 4:46:31). The crossed guitars that adorn this sumptuously filled (if sketchily annotated) four-disc box set remind us that Oldfield's main instrument is indeed the six-string, and to hear his lines in "First Excursion" acoustic runs and electric cascades in "Platinum," rippling figures in Vivaldi's Concerto in C, and still-fresh virtuosity in the complete *Tubular Bells* is to enjoy a master craftsman.

K.R.

Some Fantastic Place: *Squeeze* (A&M 31454-0140-2, 48:17). Their day as hip or "cutting edge" may be over, but Difford and Tilbrook continue to write better songs than almost everybody else. *Some Fantastic Place* adds some more great ditties to their songbook.

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MIDWEST SHUFFLE

BOBBY WATSON AND HORIZON



Midwest Shuffle

Bobby Watson and Horizon
COLUMBIA CK 57697, CD; 67:57
Sound: A, Performance: A-

A crowd member jumps to his feet and shouts, "Mr. Watson, I almost didn't make it here tonight, but I wanted to tell you, I'm glad I came." With that, alto saxophonist Bobby Watson and his quintet, Horizon, tear into "Blues of Hope," an extended piece that opens their new live album, *Midwest Shuffle*.

This exchange is emblematic of Watson's music: Direct communication, some sense of struggle, and shared joy. Nevertheless, several forces have come between Watson's

singular message and its audience. One is age; Watson had been widely touted as the leader of "jazz's lost generation"—those too old for "young lion" certification but too young for "legend" canonization. Another is jazz's ubiquitous "name game." Having first achieved recognition as musical director with Art Blakey's Jazz Messengers, Watson can't seem to shake the "hard bop" tag. "I don't enjoy that label," he says. "I want to go beyond it."

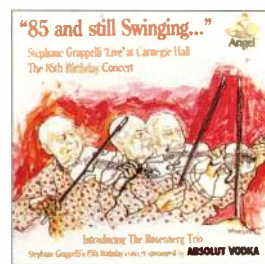
Midwest Shuffle documents four nights of a recent 16-city tour, recorded at stops in Pittsburgh, Louisville, St. Louis, and St. Paul. In tow were a tour bus and a 48-track mobile studio. With its spontaneous spoken interludes and laughter, the

album is revealing, not only about life on tour but also about Watson and his music.

On the title cut, Watson's free harmonic flights ride along a characteristically strong groove. On the ballad "I Love You Always," they swirl within a rolling, tempo-less structure. In both cases, as throughout, drummer and co-leader Victor Lewis' drums are steadfast companions, as they have been for years. Perhaps the most revealing cut is Watson's "Time Will Tell," a composition that dates back to his tenure with Blakey.

Watson left his introduction of Horizon's members on record but he needn't have, as their respective identities come across powerfully. Bassist Essiet Okun Essiet negotiates rhythmic traffic lines that sound electric yet bear a meaty acoustic tone. Pianist Edward Simon is a source of constant harmonic invention. And trumpeter Terell Stafford shines admirably amid shifting rhythms on "Mabel Is Able."

On *Midwest Shuffle*, there's a subtle yet undeniable presence (Watson calls it "the sound of surprise") that could only exist in a live context. It provides the vehicle for Bobby Watson to cut through the interference to get his message across. Here, he's packed up one of the finest working bands in jazz and taken us along for the ride. *Larry Blumenfeld*

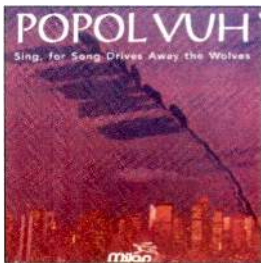


The 85th Birthday Concert
Stéphane Grappelli
ANGEL 7 54918 2, 57:32

The irrepressible Grappelli—world's greatest jazz violinist—is at age 85 playing like he's 20 on this

encore to his 80th birthday bash at Carnegie Hall. The 17 tracks are mostly classics ("Night and Day" and the madly swinging "Sweet Georgia Brown" among them) that he would have played with his legendary partner from the '30s, Django Reinhardt.

Following Django's death in 1953, Grappelli avoided working with guitars for nearly 20 years, yet eventually the instrument reemerged as prominent accompaniment (along with bass) for the violinist. Here, three guitarists help propel a bobbing rhythmic pulse. The great guitarist Bucky Pizzarelli joins bassist Jon Burr as part of the regular trio, but a number of tracks feature The Rosenberg Trio, of two guitars and bass. With Grappelli featured, the resulting quartet transports the listener back to the famous Quintette du Hot Club—sans the scratch. *John Sunier*



**Sing, for Song Drives
Away the Wolves**

Popol Vuh

MILAN 35655-2, 43:04

Taking its name from the Mayan equivalent of the Tibetan Book of the Dead, Popol Vuh is the band that scored a dozen Werner Herzog films, including *Aguirre, the Wrath of God* and *Fitzcarraldo*. In the 1970s, the group mixed Indian modalities with jangling electric guitar, sitar drones, and the ethereal piano melodies of founder Florian Fricke to create a sound that presaged the New Age of the 1980s. Popol Vuh has had some spurious and possibly deceptive collections in the past, often with new names attached to old songs. *Sing* is a curious collection primarily of remixes of work from the '70s, along with several new songs that show the influence of African and Middle Eastern music. The net result is a heady blend of music that's ecstatic in a spiritual sense but also edgy due to Daniel Fichstecher's ringing guitar lines.

John Diliberto

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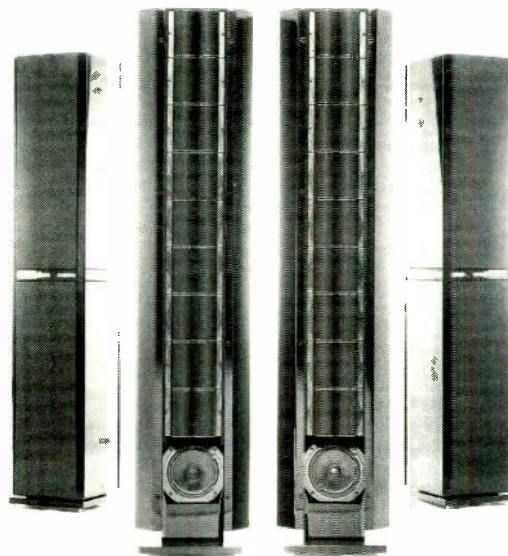
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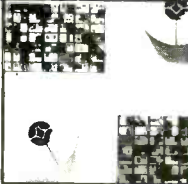
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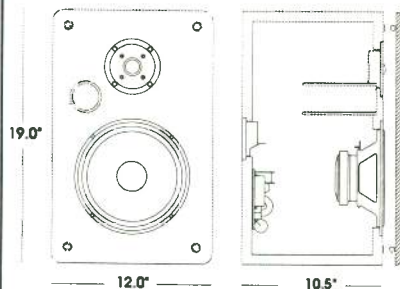
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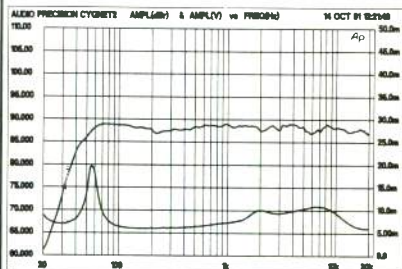
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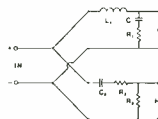
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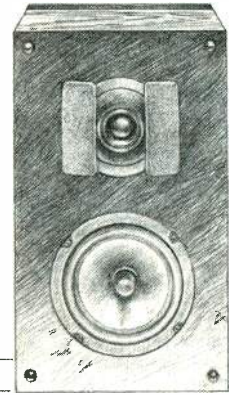
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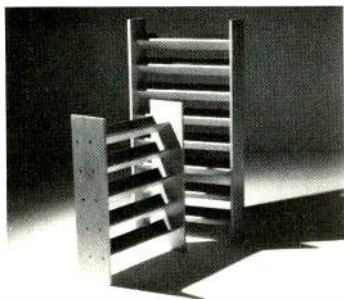
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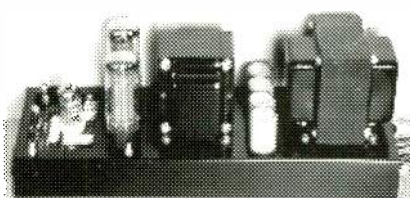
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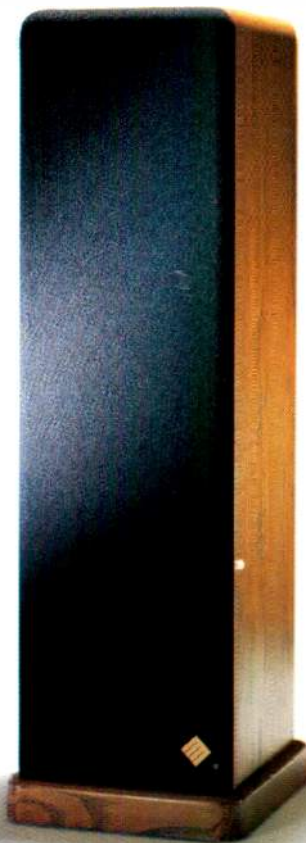
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Digital Phase™
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Prices per pair: AP-5 (bookshelf), \$449 • SM-1, \$649 • AP-1, \$899 • AP-2, \$1199 • AP-4, \$2199. Pictured, AP-1 in oak.
VISA, MC, AMEX accepted. For more info. call toll free or write P.O. Box 22813, Chattanooga TN 37422

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THE STYLOS

UNTIL NOW, high resolution sound reproduction meant sacrificing space. Until now, placing a speaker near a wall meant sacrificing the quality of sound. Who else but Martin-Logan could take electrostatic technology to a realm where music has never been before?



ON THE WALL

The standard wall-mounting kit includes brackets and a full-size poster of the Stylos that clearly marks the placement of the wall anchors (stud location is not necessary). A plumb alignment tool is integrated into the poster to ensure accurate installation.

AGAINST THE WALL

Using the optional base, the Stylos can stand against the wall, yet remain moveable. This is ideal for apartment living and allows easy repositioning as new demands arise. The Stylos is also the perfect addition to a home theatre system.

IN THE WALL

The Stylos can be built into a wall requiring vertical space of approximately 5 feet and a width of 14 inches. The designer scrim, which is included in the optional installation package, can be painted to match your decor.

**MARTIN
LOGAN**
THE LIFE-CHANGING TECHNOLOGY

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