READY FOR 24 BITS?
ACCUPHASE DP-90 CD TRANSPORT & DC-91 D/A CONVERTER

INTERVIEW
LEN FELDMAN
MR. HI-FI

TESTED
NO-HASSLE A/V OPTIMUS RECEIVER

CREATIVE TOOL
CROWN SASS MIKE

US $3.50
UK $1.95
CAN $3.95
Cinema DSP blurs the line between what

Yamaha Cinema DSP gives dialogue more definition. Music, more dimension. And sound effects, far greater realism, more graphic detail and superior placement. This breakthrough in realism is no small feat. It's accomplished by multiplying the effects of Digital Sound Field Processing and Dolby Pro Logic.

Digital Sound Field Processing is Yamaha's unique technology that electronically recreates some of the finest performance spaces in the world. While Dolby Pro Logic places sound around the room, matching the dialogue and sound effects with the action on the screen. Together, these two technologies allow Yamaha to offer a complete line...
A movie and actually being in one.

of home theater components that outperform other comparatively priced products on the market.

After reading this ad, if you get the feeling that watching a movie with Cinema DSP makes a world of difference, you're absolutely right.

But don't just take our word for it. Hear it for yourself. Stop by your local Yamaha dealer for a demonstration today. It's one demo that's bound to change the way you look at movies forever. Or at least for a very, very long time. For the dealer nearest you, call 1-800-4YAMAHA.

Yamaha Electronics Corporation, USA. P.O. Box 6660, Buena Park, CA 90622.
TWO REASONS TO DRIVE THE NEW NEON ARE RIGHT UNDER YOUR NOSE.

Driver Side Airbag

Passenger Side Airbag
Those two standard airbags may be the best reasons to drive a Neon. But they certainly aren’t the only ones.

Under your right foot, there’s another great reason: the passing power you get with a 132 horsepower, sixteen-valve, single overhead cam engine. Behind you, there’s an available integrated child safety seat. Beneath you are four specially-designed tires that benefit from Formula One racing technology. And there’s room all around you. More room, in fact, than you’d ever expect in a car like this...thanks to Neon’s cab-forward body design.

Automobile Magazine found so many reasons to like Neon, they named it “Automobile of the Year.” And once you see your Dodge or Plymouth dealer, you’ll no doubt come up with your own reasons to drive one.

$8,975 FOR STARTERS. $12,500 NICELY LOADED. ONLY FROM PLYMOUTH AND DODGE 1-800-NEW NEON

MSRP excludes tax & destination charge. Enter No. 10 on Reader Service Card

Always wear your seat belt.
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?

It's What You Don't See That Counts.

It just so happens that cables are the part of your system which can help or hurt the performance the most... and for the least money. Whether you have two-channel stereo or multi-channel stereo, you have to have cables. You can't completely fix a bad system with good cables, but you can seriously degrade a good system with badly designed cables.

You won't see the cables and you won't see the sound - but you will experience the difference!
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 and sold and worked and travelled and joked and taught and did his usual scores of and sold and worked and travelled and joked and taught. And now forever. He meant to each and all of us at this magazine.

If a sensitive, caring sort of interview Lander specialized in would be a way to show Uncle Len how much he admired his work, 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 I was proud of the association with Audio, and 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,

S

A

U

D

O

I

N

E

F

D

E

N

I

T

O

R

O

N

G

R

E

W

W

O

R

D

Foreword
Where Else Can You Find a $10,000 Speaker For Less than $2,500?

Since 1983, Legacy Loudspeakers have provided thousands of music lovers factory direct savings on the world's finest speaker systems.

By purchasing direct from the factory in Springfield, Illinois, you can take advantage of the latest advances in speaker technology long before it hits the dealer's showroom. You can select from more than a dozen models available in premium Rosewood, Walnut, Ribbon Mahogany, Oak or Black Lacquer.

Choose the world famous FOCUS (left) or the new Signature III Tower requiring only a single square foot of floor space. Our Home Theater Collection (below) debuts our kevlar Cinema Center Channel, an awesome 200 watt powered subwoofer with dual 12" drivers and the finest full range Dipolar ambience speakers.

Our unique in-home audition policy assures complete satisfaction. Our quality is backed by a ten year warranty. We provide free delivery on most purchases.

For a FREE color catalog, call 1-800-Audio-Hi

or write us at Reel to Real Designs
3021 Sangamon Ave.
Springfield, IL 62702
1-800-283-4644 217-544-5252
FAX: 217-744-7269

"Magnificent. The epitome of the full-range loudspeaker."
BOUND FOR SOUND 10/92

"There are many loudspeakers in this price bracket, but none of them offer this level of hardware and craftsmanship. . . Very highly recommended."
The High End Quarterly

"Convergence's low frequency capability exceeds that of any speaker or subwoofer that I have tested."

... A very good choice."
AUDIO Magazine

"FOCUS really caught me by surprise with a very transparent and effortless sound. This is a speaker that truly reveals the essence of a recording."
Audio Observatory #5, 1993

"Laser-discs were delivered with stunning clarity, precision and realism . . . handclaps sound like real applause, not like lead shot on a tin roof . . . Convergence is a very, very good speaker."

The Sensible Sound Issue #47
Enter No. 27 on Reader Service Card
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. Giac 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!

Roder Vaughan  
Placentia, Cal.

Dear Editor:

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

Lorenz Rychnel  
Sherman Oaks, Cal.

Editor’s Note: To Messrs Vaughan, Rychnner, 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.

AUDIO/APRIL 1994
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, ENC-coaxial, AES-3BU (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.

So, the choice is yours. For superb performance with any outboard digital-to-analog processor it's the CDT1 compact disc transport. For all-round musicality in a single chassis (with the option of later use as a transport), it's the CD1 compact disc player.

Some audio critics have said that digitally encoded music has finally come of age. We say it's been reborn. Experience it soon at your nearest authorized Audio Research retail specialist.
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 have tapered, locking 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

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

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.

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. 103
JUST ADD
BACARDI

TASTE THE FEELING.

**FREE Audio Catalog**

Our 64-page catalog is loaded with components and music systems from Cambridge SoundWorks, Pioneer, Philips, Denon, Sony and others. Because you buy factory-direct, with no expensive middle-men, you can save hundreds of dollars. For example, a Dolby Surround system with Ensemble II speakers, rear speakers, Philips Dolby Surround receiver, CD player and system remote is less than $1,000. Call today and find out why Audio magazine said we “may have the best remote is less than $1,000. Call today and find out why Audio magazine said we “may have the best.

- Call toll-free for factory-direct savings.
- Save hundreds on components and systems from Cambridge SoundWorks, Pioneer, Philips, Denon, Sony and more.
- Audio experts will answer your questions before and after you buy. 8AM-12PM, 365 days a year—every holiday.
- 30 Day Total Satisfaction Guarantee on all Cambridge SoundWorks products.

**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 biamplification (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 speakers 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.
The Sweet Sound of Vinyl is Back!

- Original Generation Master Tape Source
- Half-Speed Mastered with The GAIN System™
- Specially Plated and Pressed on 200 grams of High Definition Vinyl
- Dust Free – Static Free Rice Paper Inner Sleeves
- Special Protective Board
- Heavy Duty Protective Packaging
- Super-Fi Super Stars Limited Edition

NEW RELEASE

MUDDY WATERS
FOLK SINGER

1. My Home Is In The Delta - 3:58
(McKinley Morganfield)
2. Long Distance - 3:30
(McKinley Morganfield)
3. My Captain - 5:10
(White Devils)
4. Coal Mining School Girl - 3:12
(Marilyn Calloway)
5. Now Daddy Needs My Help - 3:09
(McKinley Morganfield)

Analysed and distributed by MFSL, Inc., under license from MCA Special Markets. © 1954
All Rights Reserved

MCA

THE TRADITION CONTINUES AT MOBILE FIDELITY SOUND LAB.

105 Morris Street • Sebastopol, CA 95472 • 800-423-5759
e-mail: mofi@mofi.com
Enter No. 22 on Reader Service Card
Hefty Kloss Speakers. Factory-

Our Center Channel speaker ($149) and our Center Channel Plus speaker ($219) are perfect for Dolby® Surround Pro Logic® systems. They offer very high performance, and are magnetically shielded. Center Channel Plus can fit under your TV.

Henry Kloss, creator of the dominant speakers of the '50s (Acoustic Research), '60s (KLH) and '70s (Advent), brings you Cambridge SoundWorks, a new kind of audio company with factory-direct savings.

Our surround speakers, The Surround ($399 pr.) and The Surround II ($249 pr.) use dipole radiator technology to reproduce surround effects the way they were meant to be heard. Non-directional ambient sound literally surrounds you.

NEW! The Cambridge SoundWorks Model Six continues a 40 year tradition of high performance, high value two-way acoustic suspension loudspeakers by Henry Kloss. The Model Six with its 8" woofer, delivers very natural, accurate, wide-range sound—for only $119 each, factory-direct. Your choice of three beautiful cabinet finishes.

The Powered Subwoofer ($599) and Slave Subwoofer ($299) by Henry Kloss provide room-shaking bass (over 100 dB at 30 Hz!). Great for pipe organs and effects in movie soundtracks. Built-in 200w amplifier. 15½" x 26½" x 10¾" (each model)

Ambiance™ In-Wall speakers ($329 pr.) offer an unbeatable combination of performance, value and ease of installation.
Direct Prices. 1-800-FOR-HIFI.

The Ensemble II subwoofer-satellite speaker system by Henry Kloss is one of the best values in the country. We think it's better than speakers costing twice as much. Because we sell it factory-direct, it's only $399. Stereo Review says it "performs far beyond its price and size."

With a Cambridge SoundWorks Charge Card, qualified customers can charge purchases from our catalog—with no payments and no interest for three full months. No annual membership fee.

Free Color Catalog!
If you have any questions...if you want the free catalog including components from Cambridge SoundWorks, Pioneer, Philips, Sony and more...or if you would like to order, call us toll-free, 8AM–Midnight ET. All products are backed by a 30-day guarantee.

Call 1-800-FOR-HIFI

We Know How To Make Loudspeakers.

The dual-subwoofer Ensemble® speaker system gives you ultimate room-placement flexibility for best real world performance. Audio magazine says it may be "...the best value in the world." With black-laminate subwoofers ($599), or black vinyl-clad subwoofers ($499).

Enter No. 7 on Reader Service Card
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 anyone 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.

Five blocks made a cottage, ten a castle, and a hundred your own private empire. With Linn components, it's just that simple. You can start out with the system that's right for you today and, using our building-block approach, improve and expand your system over time in affordable steps. Some steps will improve the performance of your system, others will expand your system throughout your home, but each and every step has one thing in common. It delivers more music. People need music. Music is important. Exploring the world of music in the comfort of your own home is therapeutic. It will help you relax, stimulate your imagination, change your mood, and provide entertainment and pleasure for your whole family.

A sound investment. At our innovative factory in Scotland, we produce the most advanced and best sounding hi-fi. Skilled and dedicated people and our unique single-station-build philosophy ensure a standard of construction and reliability simply not possible on a production line. And, with your Linn retailer on hand to provide assistance long after your initial purchase, you can expect your hi-fi to last a lifetime. People who love music have built our business, so we look after them. Music for your life. To learn more about Linn Hi-Fi and the many ways in which Linn can make music a more important part of your life, phone Audiophile Systems, Ltd., our U.S. distributor, at 1-800-546-6443.
WIN A FERRARI!

For details see the current issue of CAR and DRIVER or ROAD & TRACK at your newsstand now.

You could be driving your very own RED HOT FERRARI 348ts this summer!

No purchase is necessary, and you’ll also qualify for special BONUS GIVEAWAYS if you enter early.

ENTER TODAY!
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 30 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 Industries, Inc. 33 Doug Brown Way, Holfston, MA 02745 (508) 429-6706 Fax (508) 429-3436

Enter No. 9 on Reader Service Card
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 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.
Bryston's new BP-20 line level preamplifier offers a significant step forward in capturing the subtleties, nuances and emotions of recorded music. Redesigned 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. You 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. Signal 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. The 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. Our 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. Nothing but a listening test will convey the feeling of musical perfection available in the Bryston BP-20. We invite you to audition one today.
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.

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

judging 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 magazines. 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

Take it easy.
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 position 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, 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 MobileLirpa 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 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 MobileLirpa 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 MobileLirpa 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 MobileLirpa I owners 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.

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.
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.'"


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.

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.
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. His other technical affiliations included membership 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 Audio Societies, 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 Audio Societies. 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 Audio Societies.

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 modeling 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 company 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
PUT US ON THE STAND AND WE'LL TELL THE WHOLE TRUTH.

Ask any other company what they're doing about loudspeaker distortion and they'll take the fifth. But we object. That's why Velodyne's engineered the new DF-661, a remarkable loudspeaker that reduces distortion by a factor of ten.

So what's reproduced is purely music, with all the integrity and beauty the artists intended you to hear.

Check out the evidence. Audition a pair today. Call 800-VELODYNE for the location of a convenient Velodyne dealer.

Velodyne
1070 Commercial St., Suite 101 San Jose, CA 95112 (408) 436-7270

Enter No. 30 on Reader Service Card
No compromise in a GMC Truck. Industrial strength or the handy take home size, you'll get full measure, full strength. Call it breeding or lineage or good family values, the simple truth is we have to our credit nearly a century of delivering – exclusively, single-mindedly – the strengths of trucks.

What have we done for you lately? The 1994 GMC Sierra. It has something you didn’t expect from a truck – manners. Ride character. What the English call “good form.”

You may be skeptical of a full-size pickup truck that promises luxury...
and handling. We understand. But check your doubts at the dealership door. A vibration-eating balance shaft and glass-filled polymer rocker covers quiet your fears. Independent front suspension, a shock-mounted cab, and throne-like seating do the rest. And finally, the *coupes de grace*—Sierra’s available V8 power and commanding view of the road make it decidedly uncar-like.

When you look into your next truck, or maybe your first truck, don’t compromise. Get the strength only GMC Truck can deliver. And get the road manners that, until now, have eluded you. To learn more about the GMC Sierra call 1-800-GMC-TRUCK.

OFFICIAL SPONSOR
WorldCupUSA94

GM, GMC, GMC Truck, Sierra and the GMC Truck logo are registered trademarks of General Motors Corporation. ©1993 GM Corp. All Rights Reserved.
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 under way 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
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 several 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 did it in 3/2. 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 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-

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 Jeiciman 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 Maerkle—that’s who I worked for at Fisher—was a remarkable man. George Maerkle 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 Maerkle 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 slew 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 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.

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.

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, Ormandy 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.

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.
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 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 around the same time, Telematic was going broke trying to do too much, and our assets were sold to Crosby.

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 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 had picked an inferior system because Crosby’s would have prevented FM broadcasters from piggybacking the signals of background music companies 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 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 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 1/8. 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 quadraphonic 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 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 quadraphonic 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, 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 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. 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 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 shownmen. 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 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?

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.

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.
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.

My system is built around quarter-inch reel-to-reel tape decks with 7½-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.
I recently acquired two old Akai/Roberts decks for $75, and all they needed was a cleanup. On the down side, their two-handled 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 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 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 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 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

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

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
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 discomforting 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 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-
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 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 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.
The Carver name evokes an almost mystical following among serious music lovers.

And justly so. Carver power amplifiers have generated critical acclaim year after year, model after model, with one – the TFM-35 – universally acknowledged as “one of the best audio amplifier values in the world.” Upgraded to the TFM-35x, with high fidelity enhancements so advanced, it also exceeded the strict specifications of THX® home theater.

One look, one listen, will confirm Carver’s passion for aural perfection. Gold plated input jacks, 5-way binding posts, dual analog meters. Expansive headroom that faithfully – no, stunningly – reproduces the dynamic peaks of digital music and movie soundtracks.

Witness the superiority of Carver separates: Flawless sound, low distortion, instant and authoritative response to octave fluctuations in the center channel. Note the abundance of power: At 360 watts per channel @ 4 ohms (triple that of a top receiver), merely one of the most powerful audio amplifiers available for both music and home theater.

With the infinite flexibility to accommodate system upgrades for years to come.

Yet, this is but a preview. For a feature length brochure, contact Carver today.
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 'acu' (from 'accurate'), and 'phase,' a term of great importance to audio technology." Mr. Kasuga formed Accuphase in 1972 exclusively 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, 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 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
"DOES THE STUDIO MONITOR MEET IT'S GOAL OF KEEPING UP WITH THE BIG GUY, HIGH-END SYSTEMS AT ONLY HALF THE PRICE? YOU BET! CHECK THEM OUT FOR YOURSELF."
D.B. Keele Jr., Audio Magazine

"THIS IS A TRUE MONITOR LOUDSPEAKER."
Andrew Marshall, Audio Ideas Guide

AudioVideo International
Grand Prix Product of the Year Award Winner.

HI-FI
GRAND PRIX
AWARD
FROM
AudioVideo

Sound&Vision Critic's Choice Award Winner.

Discover the Studio Monitor's compelling musical ability, superb engineering and refined elegance for yourself.
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 (±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 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 7/8 in. W x 5 7/8 in. H x 14 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 7/8 in. W x 5 7/8 in. H x 14 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.

**Company Address:** c/o AXISS Distribution, 17800 South Main St., Suite 109, Gardena, Cal. 90248.

For literature, circle No. 90
CONRAD-JOHNSON PF2 AND MF2300
Solid-State Components Without Solid-State Sound

Too often, solid-state audio components sound harsh, edgy, grainy, and dimensionless. This is so common among solid-state designs that audiophiles readily identify this unmusical sonic signature as "transistor sound". At conrad-johnson, we have long believed that these audible distortions are not inherent in solid-state devices. Instead, they are a consequence of circuit design and implementation. Through innovative circuit design and the use of highest quality parts, we have developed a range of conrad-johnson solid-state products that prove the point. They do not sound like solid-state. They just sound like music.
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 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...
WHERE DOES THE TWEETER OF A HIGH FIDELITY LOUDSPEAKER BELONG?

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.)

Perhaps the greatest benefit of the KEF Q Series speakers is that they sound as good in your home as they do in the showroom.
NOTHING DEFINES AN INDIVIDUAL, A GROUP OR A COMPANY LIKE ITS ACCOMPLISHMENTS.

Introducing the Premier® Optical Digital Reference System, the result of a passionate pursuit of performance.
Since its inception, Pioneer Electronics has been inspired by the dream of reproducing music with all the passion and integrity of the original performance. For four years, Pioneer has diligently pursued a goal no other manufacturer had ever accomplished: pure and natural sound quality in the car.

The Premier Optical Digital Reference System is the result of that pursuit. It is simply the finest system of advanced, integrated audio components ever crafted for the automobile. But more importantly, it represents what is possible when a company dedicates itself to a quest for the absolute best.

From the moment you first see the Premier Audio Commander, you get the sense the Optical Digital Reference experience is like nothing else. It gives you unprecedented total digital control of the sound, including precision sound field correction and 31-band EQ adjustment. In fact, at your fingertips are more audio control capabilities than are found in many small recording studios.

Every component in this system has been meticulously engineered to provide the purest sound quality ever experienced in a car. For starters, an optical digital link provides a connection that's impervious to a car's electrical interference. Moreover, Pioneer engineers have extended the optical digital connection further than it has ever gone before—from the source up to the output stage of the power amplifier.

The Optical Digital Reference System introduces the first digitally-integrated, "pure" Class A amplifier, which gives the CD sound a lifelike quality uncommon to digital sampling. The system also includes speakers that apply performance technology from Pioneer professional drivers, as well as innovations developed exclusively for this system. In short, the Optical Digital Reference network makes absolutely no compromises.

It's not surprising that Pioneer would go to such lengths to realize a dream. Because Pioneer wants the same thing from a car entertainment system that you do. Sound that stirs the emotions. And now that Pioneer has realized its dream of making the Optical Digital Reference System, it's time for you to realize your dream of experiencing the ultimate car audio system for yourself.

For more information or the Premier dealer nearest you, call 1-800-PIONEER ext. 01.
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 digital 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...
Sure, it's nice to be hailed as a "benchmark." But what, exactly, does that mean? Well, let's read the quote in context:

"While the HCA-2200" has virtually unlimited brute power, it has enough finesse to let the music come through largely unscathed. Over the last six months it has proven, with a variety of speakers in both my listening rooms, that it's a benchmark product against which other amplifiers can be measured. If an equally or greater-priced amp isn't at least as good as the HCA-2200", it doesn't cut it."

It's clear that Mr. Stone has discovered the virtues of our amplifier. And while we're pleased he found the process so enjoyable, we aren't surprised. It's all part of our design philosophy, whose essence he captures nicely when he says, "...middle-class audiophiles like myself no longer have to take out a second mortgage on their house to afford a musically satisfying amplifier."

"...A BENCHMARK PRODUCT AGAINST WHICH OTHER AMPLIFIERS CAN BE MEASURED."

– STEVEN STONE, STEREOPHILE, MARCH 1994

But what did surprise us, as well as flatter us, was being thrown into the ring with $12,000 monoblock behemoths. The result of this apparently absurd comparison? Not carnage, but rather: "...the Parasound HCA-2200" gives them all a run for the money, and even beats 'em in flexibility and price." He continues, "...a pair of HCA-2200's performed with Apogee full-ranges on a par with a pair of Boulder 250 AEs and four VTL Deluxe 300 amps. Dynamic impact and attack were excellent...Compared to the VTL 300, the HCA-2200" had a greater sense of extension..."

Enough quotes. It's time to experience one yourself. Just visit your local Parasound dealer and learn that "benchmark" is the expert's way of saying you don't have to break the bank to get the best. And you can quote us on that.
ly, quantization noise was -93.4 and -93.5 dB, and bit signals. For left and right channels, respective-

Table I—Signal-to-noise ratios of DC-91 for 16-bit signals. For left and right channels, respective-

<table>
<thead>
<tr>
<th>Bandwidth</th>
<th>S/N, dB, For Signals at -120 dB</th>
<th>S/N, dB, For Signals at Digital Zero</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wideband</td>
<td>LEFT 94.9</td>
<td>LEFT 107.4</td>
</tr>
<tr>
<td></td>
<td>RIGHT 94.6</td>
<td>RIGHT 107.0</td>
</tr>
<tr>
<td>22 Hz to 22 kHz</td>
<td>95.5</td>
<td>117.3</td>
</tr>
<tr>
<td>400 Hz to 22 kHz</td>
<td>95.6</td>
<td>117.8</td>
</tr>
<tr>
<td>A-Weighted</td>
<td>97.5</td>
<td>119.9</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Bandwidth</th>
<th>S/N, dB, For Signals at -140 dB</th>
<th>S/N, dB, For Signals at Digital Zero</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wideband</td>
<td>LEFT 107.4</td>
<td>LEFT 107.2</td>
</tr>
<tr>
<td></td>
<td>RIGHT 107.3</td>
<td>RIGHT 107.0</td>
</tr>
<tr>
<td>22 Hz to 22 kHz</td>
<td>117.3</td>
<td>117.8</td>
</tr>
<tr>
<td>400 Hz to 22 kHz</td>
<td>117.8</td>
<td>117.9</td>
</tr>
<tr>
<td>A-Weighted</td>
<td>119.9</td>
<td>119.9</td>
</tr>
</tbody>
</table>

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 dynamic 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 wideband 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 DSPro 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 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
Tom Miller's "Tweak of the Year"* is now on CD.
*(the absolute sound, vol. 17, #92)

The Sheffield/XLO Test & Burn-in CD

Demagnetizes your system.
Burns-in cables, components and speakers.

The actual voices of Sheffield's Doug Sax and XLO's Roger Skoff give you the tools and instruction you need to really set-up and dial-in your system and listening room acoustics, including specific verifiable checks for realistic soundstaging, accurate imaging, and correct presentation of depth.

All this, PLUS five outstanding Sheffield Lab music tracks, and elaborate printed notes, for only $29.95 at your XLO or Sheffield dealer. There's never been anything like it!

Get yours NOW! It's an absolute ESSENTIAL for the best sound you can have at home!

Sheffield Lab Recordings
1253 Coast Village Road
Santa Barbara, CA 93108
Tel: (805) 969-4744
Fax: 1-800-576-5640

XLC Electric Company, Inc.
9480 Utica Street,
Suite 612
Rancho Cucamonga,
California 91730
Tel: (909) 466-0382
Fax: (909) 466-3662
of 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 inputs 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.

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 control. 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,” “LD,” “Tape1/DC,” “CD,” “Tape2/Monitor,” “Tuner,” and “Phono.”

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 Optimus Professional Series STAV-3400 is a high-performance receiver that offers a wide range of features, including Dolby Pro Logic decoding, five DSP-based sound-enhancement modes, and audio/video switching. Its AM/FM tuner offers automatic and manual tuning with 30 presets, and it can record on both VCRs simultaneously. The video section handles five A/V sources and provides connections for camcorders and other devices. The Dolby Pro Logic decoder offers three center modes and a “Dolby 3CH Logic” button, allowing for customizable sound settings. The receiver is a versatile choice for audio and video enthusiasts.
From 'The Big Bang' to 'Black Holes', take a quantum leap into a new galaxy of bass performance. Subwoofer technology so advanced, it leaves the competition light years behind.

Add Energy powered subwoofers to your home entertainment system and you have crossed the final frontier.

Contact your Energy Dealer today for a sound and feeling that will elevate your listening experience into a new dimension.

For assistance in locating your closest Energy dealer, phone 416-321-1800 or fax 416-321-1500.

Enter No. 14 on Reader Service Card.
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 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 Quieting: 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 µV/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, ±3 dB.
- Input Sensitivity for Rated Power: High-level inputs, 5 Hz to 100 kHz; center and front channels driven, 70 watts/channel into 8 ohms at 1 kHz.
- Maximum Phono Input Voltage: 120 mV at 1 kHz (0.1% THD).
- Tone Control Range: Bass, ±8 dB at 100 Hz; treble, ±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: 16 5/8 in. W x 6 3/8 in. H x 16 in. D (42 cm x 16.2 cm x 40.6 cm).
- Weight: 22 1/2 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 PRE-PROGRAMMED REMOTE CAN ALSO BE "TAUGHT" CODES FOR UNITS IT WASN'T PROGRAMMED FOR.**
Can you find the $30,000 in this picture?

You can too! All you have to do is qualify. The Montgomery GI Bill plus the Army College Fund are great ways the Army helps you save for college. Along the way, you'll also learn things like confidence, teamwork, and self-discipline. The things that will make you better prepared for college. And for life.

See your Army Recruiter. Or call 1-800-USA-ARMY. ARMY. BE ALL YOU CAN BE.
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 select- ed, 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 subcarrier 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 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
From the people with an eye for design...  

...and an ear for music

"(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

Thin-film speaker technology never looked better. The 10-1/2 inch wide Magneplanar® MG 10 is a sleek, diminutive dipole speaker that uses quasi-ribbon technology.

Circle the reader service card for reviews on the MG 10 and find how it's possible to satisfy an interior decorator, movie buff and audiophile with the same speaker.

MAGNEPAN
1645 Ninth Street, White Bear Lake, MN 55110
Enter No. 20 on Reader Service Card
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 at 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 µV 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 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. 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.
STANDING ALONE

"A rich and eloquent sound leads the listener into the world of music and now define a new high point in the replay of Compact discs."
...Keizo Yamanaka, Stereo Sound, Japan

"The richness of tone, the precise clarity, the authenticity of the stereo presentation, and so on -- in all of these areas the Wadias set the sonic standard."
...Joachim Pfeisser, HiFi Exclusiv, Germany

"Wadia has recreated the natural sound of live music, in a way that continues to elude other manufacturers of digital audio equipment."
...Yoshihiro Asanuma, Stereo Sound, Japan

"The very pinnacle of the digital component world, destined to remain there for a very long time."
...Tony De Marchi, AudioREVIEW, Italy

"Even for a hardened critic, the transparency when direct-coupled to the power amplifiers was breathtaking, instantly recognizable as a closer approach to the real thing."
...Martin Colloms, HiFi News & Record Review, England

"The quintessence of digital audio, the dream which has become reality, the absolute reference point."
...Roberto Lucchesi, AudioREVIEW, Italy
So, the 21st Century arrived a little earlier than you expected.


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 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

By the time a child is six years old, experts can tell if he's at risk to drop out of high school. They can predict who will have a hard time keeping a job. And even who is more likely to end up on welfare. Thirteen million American children live below the poverty line. And they need help before the age of six to improve their chances in life.

Early intervention programs are crucial. And they do work. Programs like Success by Six have proven that a poor child who receives help early on can hope for a much brighter future.

But these programs need help from people like you. People to answer the phone, do odd jobs, raise money or play with a child.

Whether you give an hour of your time, or a box of used toys, it can make a world of difference. Call 1-800-733-5400 to see what you can do to help in your area.

By the Academy for State and Local Government

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

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

Crowns 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, resembles 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 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).
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
"The Hafler 9300 THX has earned a Class B rating in the April 1993 issue of Stereophile's Recommended components. It is one of the least expensive components in Class B power amplifiers!"

—John Atkinson, Stereophile High End Show San Francisco, CA, March 12, 1993

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

—Sam Tollig Stereophile, May 1993 Vol. 13, No. 5

"The Hafler 9500 joins that select group of moderately priced amplifiers which make life difficult for manufacturers of higher ticket electronics."

—Thomas J. Norton Stereophile, April 1993 Vol. 16 No. 4

"THX is a registered trademark of Lucasfilm Ltd.

"The Hafler 9500 joins that select group of moderately priced amplifiers which make life difficult for manufacturers of higher ticket electronics."

—Thomas J. Norton Stereophile, April 1993 Vol. 16 No. 4

"THX is a registered trademark of Lucasfilm Ltd.
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 x 3/16 x 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 windscreen 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 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 1650 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.

The tiny electret capsules in the SASS-P have high S/N ratios for their size.

THE TINY ELECTRET CAPSULES IN THE SASS-P HAVE HIGH S/N RATIOS FOR THEIR SIZE.
As virtually every speaker manufacturer rushes to deliver "home theater" speakers to the marketplace, M&K amasses nearly twenty years of experience in the field—dating back to Hollywood screening-room installations in the 1970s.

M&K engineers have spent well over a decade studying the varied aspects of surround sound—including encoding and decoding; soundtrack recording; and the differences between reproducing sound in theaters and in homes.

M&K speakers excel in the reproduction of all source material. Accuracy, low coloration, pinpoint imaging, wide dynamic range, and deep-bass reproduction are all critical for music as well as film soundtracks. M&K Satellites and Subwoofers have been acclaimed for these attributes since the '70s.

And this is why M&K knows that any speaker that claims to be optimized for either music or film sound, one at the expense of the other, will never reproduce either one properly.

**M&K Home Theater Systems**

Conventional speakers make the music and effects on film soundtracks compressed and dull. But M&K's exciting dynamics and "quick" transients give you precise 3-D imaging and a lifelike presence.

M&K Satellites are timbre-matched, using virtually identical speaker drivers, crossovers, and frequency response, for a seamless 360° surround-sound performance. With an all-M&K home theater system, voices and effects do not change character when their sound moves from left to right or front to back in your room. Even if you are just adding an M&K subwoofer, front/center, or surround speaker to your present system, M&K's unique timbre controls allow you to "fine-tune" the sound of your new M&K speakers to achieve the closest possible timbre-match with your existing speakers—even if they are not M&Ks.

**M&K Center Channel Speakers**

Beware of inexpensive "center channel" speakers. In Pro-Logic, the center channel speaker is driven the hardest, and often reproduces as much sound as the left and right speakers combined.

Each one of M&K's six individually-available Satellites has exceptional dynamic range and high output to meet and exceed the tremendous demands of the center channel.

**M&K Powered Subwoofers**

Legendary for their massive output, exceptional detail, and articulation, M&K's thirteen internally-powered Subwoofers set the industry's standards for high-performance deep bass.

M&K's innovative Push-Pull Dual Driver subwoofers deliver a major improvement by virtually eliminating even-order harmonic distortion, and doubling efficiency (same as doubling amplifier power) with four times the output of single driver subwoofers.

Whether you choose our state-of-the-art Home THX® Audio speaker system, an add-on set of surround speakers, or anything in between, no other speakers will give you the exciting performance, sound quality, flexibility and compatibility of M&K's home theater component speakers.

---

Enter No. 19 on Reader Service Card
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 response 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 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
You can spend more, but you can't make a smarter buy.

Both domestic and international markets rank McCormack electronics as blue chip investments in recognition of their high musicality yield. You receive superior sonic returns because our products are designed by ear and built by hand. Others aren't. You can hear the difference.

Contact us for the name of your local dealer and a copy of our latest review.

McCORMACK AUDIO CORPORATION
542 North Highway 101 • Leucadia, CA 92024 • (619) 436-7666
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 was reproduced by the Crown mikes was surprisingly similar to that from the AKG, and not so reverberant as you might expect at such a great distance. The rear chorus was employed on two pieces by 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
If you’re looking for excellent audio imaging, wider high-frequency dispersion, extended lower frequencies and more power-handling ability, you’re ready for the Next Level in ALLISON home theater loudspeakers.

The NL SERIES by ALLISON ACOUSTICS

Sounds Like Life.
Blackwood:
Symphonies No. 1 and No. 5
Chicago Symphony Orchestra,
James DePriest (No. 5);
Boston Symphony Orchestra,
Charles Munch (No. 1)
CEDILLE CDR 90000 016
CD; 57:46

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 early 1920s—screechingly 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 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.

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 Tatinall Canby
Illustration: Jack Simmerling

AUDIO/APRIL 1994 74
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: its 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 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 the audio side. The finest, sharpest, clearest trumpet sound I have ever heard on records. An absolutely stunning job, with a perfect ambience, 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

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 warhorses 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 Cuban-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 Tarrega," 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 Toscanini. 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

Need a second opinion?

CS5
"...an extraordinary achievement in speaker-making."
—Larry Archibald, Stereophile, Vol. 13, No. 6, June '90

"A completely flawless design."
—Naoshima, Stereo Sound, Japan, No. 705, Winter '93

CS2 2
"...it is musically one of the most satisfying loudspeakers we've heard...Highly recommended."
—John Atkinson, Stereophile, Vol. 16, No. 1, January '93

"...I think they are one of the best, if not the best, performers I have come across."
—Andy Berlant, Hi-Fi Choice, U.K., Winter '93

"...you will not find another speaker that plays your favorite records so wonderfully or realistically..."
—STEREO, Germany, August '92

SCS
"...I can’t think of a better sounding model in such a small enclosure."
—Doug Messenger, Hi-Fi Choice, U.K., January '93

From left to right (suggested retail per pair): SC5-$1,090; CS2 2-$1,750; CS5-$1,300; CS3 6-$1,900; CS1 2-$1,250

THIEL
High performance Coherent Source Loudspeakers

Call or write for literature, review reprints, and the name of your nearest THIEL dealer.
THIEL • 1026 Nandino Boulevard, Lexington, Kentucky, 40511 • Telephone: 606-254-947

Ciurlionis: In the Forest; The Sea
Lithuanian State Symphony Orchestra, Gintaras Rinkevicius
SEVEN SEAS/KING RECORDS
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

76
Making Good Stereo Sound Better
AudioControl is the world's leading manufacturer of high quality equalizers & analyzers

We are the best because we specialize in forming a perfect match between stereo components and listening rooms.

We are the best because of our pro sound heritage, passion for musical pleasure, quest for the highest possible quality, and adherence to our principles for the last 16 years. Built in the USA. Five year warranty.

Shown is the NEW C-101 Series III, a precision octave equalizer with a built in real time spectrum analyzer and laboratory quality microphone and digital pink noise generator.

Shown the finest products ever from AudioControl - the C-131 one-third octave, constant Q precision equalizer and companion R-130 one-third octave real time spectrum analyzer.
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 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 latest, 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 concrete manipulations of Pierre Henry and Pierre Schaeffer in the 1940s. Sections of Aphex Twin’s Selected Ambient 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.
Mobile Fidelity Sound Lab is dedicated to making music sound its absolute best. Our proprietary mastering techniques advance one step further with the cutting-edge technology of the GAIN System™. We work from original master tapes—with strict attention to detail—because we love the music as much as you do. Hear the difference with Ultradisc II™. The original limited edition, 24-karat gold audiophile CD.

For a free color catalog, call 800-423-5759
e-mail: mofi@mofi.com

Enter No. 23 on Reader Service Card
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 weird-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 was called New Age. More than most ambient artists, William Orbit embraces melody and dynamics. 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."

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

The irony of this music is that it slips right out of what was called New Age.
The most musically refined loudspeaker systems in the world.

ACCEPTING SPEAKER TRADE-INS ON MAJOR BRANDS

distributed by Reel to Real Designs, 3821 Sangamon Ave., Springfield, IL 62702
Dealer and export inquiries invited • Fax: 1-217-744-7269

Call 1-800-283-4644 for a free color brochure today

Enter No. 34 on Reader Service Card
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.

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

**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.

M.B.
Imagine inviting a few of your friends over to hear a live Carnegie Hall concert in your living room.

If you love music ... and great music performances ... then you're ready to upgrade to high-end audio.

Manufacturers of high-end components take great pride in being able to faithfully re-create the thoroughly enjoyable live experience of music.

The difference is in the details. The result is music so accurate, so true to the original live performance, you won't believe it's a recording.

And upgrading to high-end doesn't necessarily mean higher cost. There are many high-quality, hand-crafted, American-made components that are easily affordable. They're on display at your nearest high-end audio specialty shop, where you'll find knowledgeable people who are eager to share their expertise in this exciting, emotional experience in sound.

Consider the amazing accuracy of high-end audio and start planning for your first "live" concert at home.
JAZZ-BLUES RECORDINGS

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 let 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
CD STORAGE+

Sorice Systems — Setting the Standards in Audio/Video Storage Systems

- Store 300 CD's in this Premium Solid Hardwood Cabinet.
- Impeccably crafted in your choice of Solid Oak, Walnut, Teak or Cherry.
- Fully adjustable Shelves store any combination of CD's, Videos and Cassettes — all in ONE cabinet.
- No-Slot design maximizes storage space, simplifies organizing & re-arranging your collection, accommodates single & multiple CD sets, allows for possible changes in the size of CD packaging.
- Adjustable Solid Brass Bookends keep Discs & Tapes upright and in place.
- Cabinets can be stacked, wall mounted or left free standing.
- Optional Clear or Smoked Glass Doors are available.
- Completely enclosed back provides dust protection.
- Compact size: 39½"H x 23½"W x 7½"D
- Shipped to you fully assembled.

For Prices and Free Full Color Literature on our Complete Line of Audio/Video Storage Systems: Call Toll Free 1-800-432-8005 or FAX your name and address to 1-201-748-2592

Sorice
Sorice Systems
P.O. Box 747 - A Nutley, NJ 07110
We accept Visa, MasterCard, American Express, Checks and Money Orders. All Models come with a 30 Day Money Back Guarantee and a Full One Year Warranty.
MOVING? Please give us 8 weeks advance notice. Attach label with your old address, and write in new address below.

RENEWING? Check box below and attach label with corrections marked, if any.

SUBSCRIBING? Check box and fill in coupon. For gift subscriptions attach a separate sheet.

Send Audio for 1 year at $24.00
☐ New subscription  ☐ Renewal  ☐ Payment enclosed  ☐ Bill me

Canadian orders add $8 per year. Foreign orders add $8 per year.

NAME ____________________________
ADDRESS ____________________________
CITY ____________________________ STATE ____________________________ ZIP __________

1(303) 447-9330 AUDIO
P.O. Box 52548
BOULDER, CO 80322
Audio consultants with over 25 years of audio experience can save you time, consumption, and hundreds or thousands of dollars. For only $49, we offer unlimited, objective expert advice on all audio equipment. Before you buy anything, call AUDIO AMERICA (Virginia) at 1-703-475-2223 today!

ANNOUNCEMENTS

LOW PRICES! SAVES$$$!! NA-KOMACHI, POLK, PARADIGM, DENON, NAD, B&K, KEF, PARASOUND, M&K, ONKYO, PS AUDIO, VELODYNE. SNELL plus more! Call us! SHOOT SOUND 206-692-8201.

AUDIO/VIDEO-THX!!! M&K, SNELL, CARVER, POLK, ONKYO, NAKAMICHI, DENON, B&K, NAD, PARADIGM, KEF, plus more! Call us for all of your DOXY PROLOGIC/THX HOME THEATER needs! Shop Sound 206-692-8201.


ANNOUNCEMENTS

ANNOUNCEMENTS

AUDIOPHILE & SCHOLAR

UNIVERSITY AUDIO SHOP, MADISON, WI


AUDIO UNLIMITED

From Colorado we offer novice and serious audiophiles an alternative to mass market high end products. We represent only musical products that offer the highest performance to dollar value. We specialize in audio components and accessories. We offer a wide selection of new and pre-owned audio components. Please call or fax (718) 423-0400 for more information.

ANNOUNCEMENTS

SALE


SAVE 40% ON HIGH-END home speakers, subwoofers, amplifiers. FREE CAT- ALOG, 3021 Sangamon Avenue, Springfield, IL 62702-1-800-283-4644.


Hi FLEX EXCHANGE. Large selection of quality USED components at huge discounts. Buy, sell, trade. Call for inventory list. (718) 423-0400 or visit our showrooms at 251-11 Northern Blvd, Little Neck, NY 11363.

SAVE 40% ON HIGH-END home speakers, subwoofers, amplifiers. FREE CAT-ALOG, 3021 Sangamon Avenue, Springfield, IL 62702-1-800-283-4644.


SAVE 40% ON HIGH-END home speakers, subwoofers, amplifiers. FREE CAT-ALOG, 3021 Sangamon Avenue, Springfield, IL 62702-1-800-283-4644.

TIPS FOR MAIL ORDER PURCHASERS

It is impossible for us to verify all of the claims of advertisers, including product availability and existence of warranties. Therefore, the following information is provided for your protection.

1. Confirm price and merchandise information with the seller, including brand, model, color or finish, accessories and rebates included in the price.

2. Understand the seller’s return and refund-policy, including the allowable return period, who pays the postage for returned merchandise, and whether there is any “restocking” charge.

3. Understand the product’s warranty. Is there a manufacturer’s warranty, and if so, is it from a U.S. or foreign manufacturer? Note that many manufacturers assert that, even if the product comes with a U.S. manufacturers warranty card, if you purchase from an unauthorized dealer, you are not covered by the manufacturer’s warranty. If in doubt, contact the manufacturer directly. In addition to, or instead of, the manufacturer’s warranty, the seller may offer its own warranty. In either case, what is covered by warranty, how long is the warranty period, what will the product be serviced, what do you have to do, and will the product be repaired or replaced? You may want to receive a copy of the written warranty before placing your order.

4. Keep a copy of all transactions, including cancelled checks, receipts and correspondence. For phone orders, make a note of the order including merchandise ordered, price, order date, expected delivery date and salesperson’s name.

5. If the merchandise is not shipped within the promised time or if no time was promised, 30 days of receipt of the order, you generally have the right to cancel the order and get a refund.

6. Merchandise substitution without your express prior consent is not allowed.

7. If you have a problem with your order or the merchandise, write a letter to the seller with all the pertinent information and keep a copy.

8. If you are unable to obtain satisfaction from the seller, contact the consumer protection agency in your state or your local Post Office.

If, after following the above guidelines, you experience a problem with a mail order advertiser that you are unable to resolve, please let us know. Write to the Associate Publisher, AUDIO Magazine, Tony Catalano. Be sure to include copies of all correspondence.

FREE SHIPPING! PLUS! EXPERIENCED, FRIENDLY ADVICE! MIRAGE, PS, CWD, CELESTION, DEFINITIVE TECHNOLOGY, KEF, PHILIPS, AUDIOQUEST, FRIED, MONSTER, KIMBER KABLE, SPICA, STRAIGHT-WIRE, QUAD, MORE! READ BROTHERS, 593 KING CHARLESTON, SC 29401, (803) 723-7276.


BIG, BIG DISCOUNTS! SAVE UP TO 70% OFF LIST ON VCR’S, TVs, STEREOS, VIDEO DISC PLAYERS, COMPUTERS, GAMES, GIFTS, SOFTWARE, SECURITY, OFFICE & AUTO. CALL FOR FREE CATALOG: 1-800-752-3526.
**LOUDSPEAKERS**

**CUSTOM ACTIVE ELECTRONIC CROSSOVERS,** 6 to 36 dB/Oct. Also Scell, Magnepan versions. DB SYSTEMS, POB 460, RINGDE, NH 03461. (603) 899-5121.

**BEST SELECTION & GUARANTEE**, 50 SPEAKER/ KITS for HOME, SURROUND SOUND, IN-WALL, CAR, PRO, SUB- & CROSSOVERS & CROSSOVERS. JBL, DYNAVO, POLY- DAX, MOREL, SEAS, VIFA & APOGEE, CARVER, C.J. LUX, NAD, THORENS & MORE: 64p CATALOG; $2; GOLD SOUND, 4285 S., BROADWAY, ENGLEWOOD, CO 80110.


**ROTTEN FOAM EDGES?**

**SIMPLY SPEAKERS** uses professional foam replacements for any size/brand. 7 Year Warranty. We sell DIY Foam Surround Kits for less! Speaker recollection. MC/VISA/DISCOVER: 1-800-625-6551.

**WATERPROOF SPEAKERS.** The industry's finest sounding waterproof speakers bring true high fidelity sound to your outdoor patio, pool, or spa. Call now for your FREE color brochure. BOYNE AUDIO, INC. 1-800-625-6551.

**SPEAKER CATALOG**

Parts Express is a full-line distributor of electronic parts and accessories, geared toward the consumer electronics industry, and the technical hobbyist. Stacking an extensive line of speaker drivers and accessories for home and car. Call for your free 172 page catalog today.

Parts Express 1-800-338-0531

**STATE OF THE ART CROSSOVER NETWORKS.** UPGRADE ANY SPEAKER SYSTEM. FREE DESIGN GUIDE.

**ALLPASS TECHNOLOGIES, INC., P.O. BOX 453, AMITYVILLE, NY 11701. (516) 598-1320.**

**LOUDSPEAKER SALE!** Acoustat 3300: $1200; B&W 640: $1200; Canton Karal 920: $600; Carver Amazings: $1600; Celestion 100s: $650; DCM Time Windows: $705; Energy Ret. Con. 22s: $800; Infinity Ref. 6: $550; Infinity Kappa 7.1: $1000; JBL LXS5: $600; Kab 1032: $450; KIngeretics Sub: $200; Kirkasater 260: $1300; Linn Isobaric System: $2000; McIntosh XR-16: $1000; Magnepan MGIIIA: $900; Martin Logan CLS: $1400; Meriton Dig. III: $1400; Mirage M3: $1500; M&K MKX9 sub: $850; Polk Monitor 10: $500; Polk SDA 2.3: $1300; Polk SRS 3.1: $750; Polk L66: $725; Proac Studio Towers: $1200; Quabit 595MCX $1500; Theil CS3.5: $1400; JEFI (217) 544-5252.

**McIntosh**

**MCINTOSH MC2000 $4150, MC880 $1250, MC75 $900, C24 $250, C25 $300, MC2002 $475, 4100 $750, 1900 $350, 7150 $1450; MELOS 333 $2150; MARANTZ 8B $1250; AUDION 300B $3150. (713) 728-4343. MAURY CORB.**

**NOHMA**

**Factory Direct Service on OHM brand speakers over 20 years old with many upgrades available. Ohm Acoustics Corp., 241 Taaffe Place, Brooklyn, N.Y. 11205 (718) 783-1111.**

**Madisound Speaker Components (8608 University Green)**

**P.O. Box 44283 Madison, WI 53711 U.S.A.**

Tel: 608-631-3433 Fax: 608-951-3771
We set out to build the best minimonitor and to offer it at an affordable price.

**True Subwoofer**

With phenomenal true deep bass extending below 20Hz with low distortion at a very affordable price.

The HRSW10s will extend the bass of your stereo or video system for that "air shaking all around you" effect.

Here's what the experts are saying:

"Once you have heard what they can add to your system, you won't want to get them. Easiest room sweeper I have heard." 

— Gerald F. Burt, Sound & Vision, Issue No. 43, Fall 1992

"If you have a listening room with problems, getting healthier sound is possible. Install your speaker system as dramatically as $750 as the HRSW100s." 

— Peter J. Azcune, The Audio Critic, Issue No. 19, Spring 1993

"I guarantee you this much; once you hear good, clean bass, you won't want to part with them. Ecstatically recommended," 

— Don Keele, Audio Review, Vol. 11/92

"The HRSW10s... deliver clean low bass at high levels... work lust splendidly." 


We at VMPS are committed to producing state of the art speaker systems at a fraction the cost of other name brands.

Our newest model maintains this 17 year tradition. The VMPS Dipole Surround ($299ea kit, $399ea assem) is designed for side channel operation in high quality home theater installations. Features include front-and-rear firing 61/4" butyl surround polycone woofers (with phase plugs) and 10" soft-dome tweeters in a sealed enclosure only 16 x 10 x 9". Bass response is flat to 48Hz (~3Hz), imaging spectacular and front-to-back depth amazing for such a small speaker. Audiofiles fond of their expensive imported minimonitors should discover the Dipole Surround, one of the wold's best-sounding compact fullrange speakers regardless of price.

Hear VMPS at the dealers listed below, or write for literature and test reports on all 15 models including our four Subwoofers ($299-$549ea), the "Best Buy" Tower II and Tower II Special Edition ($495-$939ea), the top of the line FF-1 Focused Field Array ($6800pr), and the GSO Series of Audio/Visual and bookshelf speaker systems. Kits are supplied with fully assembled cabinets and prices include free shipping in 48 states.

**VMPS Audio Products**

1423 Morningside Dr. El Sobrante, CA 94803
(510) 222-4276
Fax: (510) 232-9837

*Hear VMPS at The Listening Studio, Reston Sounds incredible, Brookfield CT Dynamic Sound, Washington DC, Hill Farm, Roanoke VA, American Audio, Greenville SC, Chattiansoga Valley Audio, Rossville GA, Tech Electronics, Gainesville FL, Arthur Morgan, Lake Mary FL, DNA Audio, Orlando FL; Sounds Delux, New Haven CT; Audio Exchange, Mishawaka IN; Audio Connection, Terre Haute IN; Rich industries, St. Louis MO; Shadow Creek Ltd, Minneapolis MN; Audio by Gil Morrison, Denver CO; Loudout Electronics, Longview WA; Affordable Audio, Fresno, CA; Exclusively Entertainment, Goanside, CA, Hal Bros, Escondido CA; Christopher Hansen Ltd., Beverly Hills CA; Audio Haven. Brea CA; Sounds Unique, San Jose CA; Private Line Home Entertainment, Stockton CA; Golden Ear; Chico CA; Icobe Audio, El Sobrante CA; James Romeyn, Patalumne CA; The Sound Room, Vancouver BC Canada*
STORADISC **— See why CD Review picked our Library Series as their "top choice". Fine-furniture quality in a variety of finishes and sizes. Call or write DAVIDSON-WHITEHALL, 555 Whitehall Street, Atlanta, GA 30303. 1-800-948-9811.

NEUTRON COMPONENTS—preamps (from $595), monoamps(from $399), FREE CATALOG. Factory-direct savings to 40% on world-class designs by Harry Klaus-former Dyna/Hitachi Project Engineer, USA made. SATISFACTION GUARANTEED. Sound Val- ues, Dept. AM01, 185 N. Yale Ave., Colum- bium, OH 43222-1146. (614)279-2383, 10-4, Eastern.

DEALER SHOWCASE

WEST VIRGINIA

Hi-Fi Farm

The Best in Home Grown Audio

FEATURING:
Quad, Alon, OCM, Magnum, Snell, Woodside, Roksan, Spendor, B&K, Kimber, VMPS, Cardas, Harmon Video, Creek, Epos, Micro-Mega, Fosgate, and many more. Also featuring high end used equipment, fully guaranteed! 735 S. Kanawha, Beckley, WV 25801

VA Location:
2039 Electric Rd., Roanoke, VA 24011

Call for Information
1-304-253-5450
Nationwide Toll Free: 1-800-752-4018

All major credit cards accepted

FOR SALE

STEVE'S AUDIO ADVICE 10 Years of Excellence in High End Audio. Call for the very best pricing on Alon, B&K, Quad, OCM, Magnum, Snell, Woodside, Roksan, Spendor, Kimber, VMPS, Cardas, Harmon Video, and many more. Now offering multiple showrooms on the East Coast! Call 1-800-752-4018.

Help wanted

EASY WORK! EXCELLENT PAY! ASSEMBLE PRODUCTS AT HOME. CALL TOLL FREE. 1-800-467-5566.

Blank tapes

TAPE WORLD 1-800-245-6000. Only 4.95 Shipping! We beat any price on blank tapes. FREE CATALOG. Sony MAXXELL TDK FUJII DAT-120 7.49 XI-90 1.89 125HS 1.89

Laser video

NEW & USED LASER DISCS—10% TO 70% OFF LARGE SELECTION. LIST-SEND $2.00: LASER ENTERTAIN- MENT CENTER, 40-44 GRAND AVE., ENGLEWOOD, NJ 07631. (201) 894-0075; FAX (201) 894-5263. WE ALSO BUY USED DISCS.

Audio video storage

THE BEST DISC, TAPE & COMPONENT STORAGE SYSTEM IN AMERICA. Stackable, portable oak units hold all recording formats & Audio/video components. FREE Mail order Brochure (please mention Audio). Per Madsen Design: (415) 928-4509. P.O. Box 330101, San Francisco, CA 94133.

Custom design

AUDIO POWER AMPLIFIERS. 100-500 W RMS/CH. Completely assembled and tested from only $108.00 to $223.00 each. Satisfaction Guaranteed. Call Electronics Hospital (407)952-3838.

New products


Millions of your prime prospects can be found in the industry leading titles of Hachette Filipacchi Magazines, Inc.

To place a classified ad, simply call Toll-Free and reserve your space today!

1-800-445-6066
(9am - 5pm EST)
In Canada: 1-212-767-5750

Audio/April 1994 96
THE WAY THESE GUYS ARE TALKING, MAYBE WE SHOULD RAISE THE PRICE.

"For the first time in 20 years, an affordable product that sounds like music."
Larry Schnelle
AP.5 owner
Manchester, MO

"The best I've heard under $6000."
Mark Shale
AP-2 owner
Richmond, KY

"Blown away by them..."
Speight Bird, Jr.
AP-2 owner
Athens, TN

"Greatest product since stereo was invented."
Mark Fitzsimmons
AP-2 owner
Richmond, TX

"Awesome! Flawless! Real!"
Eric Keller
AP-4 owner
Wheeling, WV

There was a time when Digital Phase systems were available only through the most exclusive audio salons. Today, the same systems are offered factory-direct, and at the greatly reduced prices that implies.

But the way these guys are talking, maybe we should raise the prices and go back to the old way of doing things.

Well, we don't because there's nothing old about Digital Phase.

There's the new and patented Acousta-Reed technology for bass depth and definition at a level never before realized. There's the new one-piece dome tweeter of spun titanium for unparalleled sweetness in the highest of frequencies. And then there's the new way of doing business: factory-direct.

Yet with all that's new, we have an old-fashioned promise, one better than at most places you shop. If you don't like what you hear, return it in 30 days for your money back.

So call us today while the sound is great and the price even greater on the all new Digital Phase.

For factory-direct pricing, call 1-800-554-7325

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 22815, Chattanooga TN 37422

Enter No. 13 on Reader Service Card
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.