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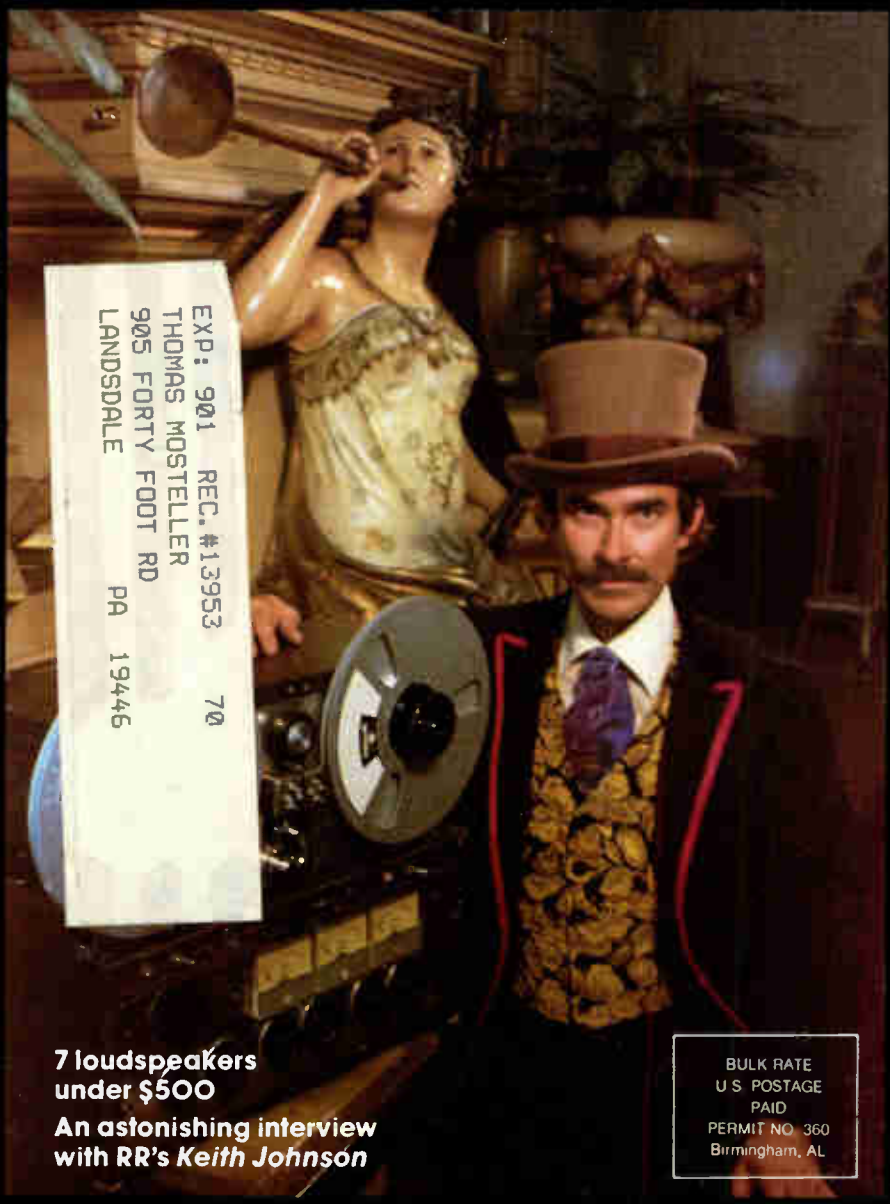

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Circulation Donna Martinez
Contributing Editors Anthony H. Cordesman, Allen Edelstein, Laurence Greenhill, Dick Olsher, Bill Sommerwerck, Stephen W. Watkinson
Business Manager Anne Peacocke
Photography Ruth Tatter
Advertising Manager East Coast N. of D.C.; West Coast; Foreign: Nelson & Associates (914-476-3157)
Remainder of U.S.: Robert O'Neill (303-321-2216)
Art Director Suzanne Vilmain
Cover Photo Reference Recordings

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PUBLISHER'S CORNER

THIS ISSUE

Although it doesn't bear the name, this issue of *Stereophile* might be titled our Almost All Small Speaker Issue. When Dick Olsher's report on Seven Budget Loudspeakers came in, I decided to round up all the small speaker reports we had on hand or in the offing (the ProAc, Fried Beta, Pyramid Met 11, and Rauna Tyr systems) and throw in a large speaker for good measure (the Magnepan MG-III). Two speaker systems that came in at the last minute (from RA Acoustics and Novak) could not be tested in time for their reports to appear in this issue; they will appear in Volume 7, Number 5.

I wish I could say we'd covered the field! Instead, I think we've managed a fairly good introduction, leaving only seven or eight times as many speakers out there still untested. At least we *have* uncovered some significantly good deals: the Rauna Tyr, the Fourier 6 (also reviewed in our last issue), the Phase Tech PC-60, and the Pyramid Met 11. All these speakers, which cost between $375 and $500, offer quite good sound, and in a price range where there wasn't much that *could* be recommended two years ago. Be sure and take into account JGH's addendum to the Seven Budget Speakers, which attempts to correlate our current findings with our discoveries in the past: the Spica TC-50, the Spectrum 208A, the Bill Reed 6-02, and the Dayton Wright LCM-1.

The Magnepan MG-IIIs have aroused a lot of critical attention both in the U.S. and abroad (*TAS*, *IAR Hotline*, and *HFNRR* have all had reports that range from approval to adulation). JGH doesn't quite line up with these other critics, though there are many wonderful qualities to the MG-IIIs, qualities that let them rival speakers costing much more. One thing is sure: the somewhat deficient, very beamy high end of older Magnepans is a thing of the past. Their new ribbon tweeter is a remarkable achievement, and rumor has it that Jim Winey is working on a full-range speaker using the same technology.

Other remarkable products reviewed in this issue are the Decca van den Hul cartridge, the Carver TX-11 tuner (*Stereophile*'s long-awaited entry into tuner reviews!), the Dennesen Phase Restoration Device for digital sources, a quite good and inexpensive tonearm from Music & Sound, and the Sony Walkman Pro.

Our feature article is an interview with Keith Johnson conducted by JGH. Though modesty might be more becoming, I have to say that JGH has done a masterful job of bringing to light Keith's insights and experience as a recordist, as an inventor, and as an investigator—in this case an investigator of his problems with digital. I found that my understanding of the magnetic recording process was substantially increased after reading the interview; I think all will find it interesting.

Just before press time we received a report from Larry Greenhill on the June CES in Chicago, which we've combined with a very abbreviated version of JGH's experiences in the Windy City. Unfortunately, we had to eliminate As We See It to get in LG's report, but we felt it was worth it in order to give you what may be the first CES coverage in print. Scheduled for Volume 7, Number 5 are a longer report from JGH, BS's normally encyclopedic writeup, and even a word or two from me.

BROKEN PROMISES AND THEN SOME

We're not all perfect, and sometimes I think the publisher of this rag might be nominated for an award in that respect. Here are the promises made last issue, broken in this one: a review of three budget preamps (under $500); AHC's review of the Fuselier 3.3 speaker; the Nakamichi DMP-100 digital adaptor; the Eminent Technology and Souther tonearms; the Acoustat Six speaker system; and AHC's "encyclopedic assessment of our six major musical sources."

As it turns out, there are reasons. The replacement preamps (from Audible Illusions and Counterpoint) didn't both make it in time for this issue, and one of them (the Counterpoint) has gone up in price and out of our self-defined (under $500) budget category. The Fuselier, Acoustat Six, and DMP-100 reviews as well as AHC's encyclopedia were sacrificed to the little speakers covered in this issue. The original sample of Souther's tonearm was found to be defective and the Eminent Technology is evolving into a somewhat easier-to-use version. Both tonearms are excellent, and the ET is a high-end bargain at $600 (though it may be $695 by the time we report on it).

What can I say ... except to make more promises. The way it looks now, *all* that was promised for this issue, and that didn't appear, will appear in the next issue. And what else, you ask? AHC and JGH voice their views on the Robertson amplifiers (the Forty-Ten and Sixty-Ten), we review two turntables at almost opposite ends of the price spectrum (the MAS and the Pink Triangle), the remarkable Signet TK10ML moving-magnet cartridge, the Stax Lambda headphones, and the Nitty Gritty 3.5 record cleaner. We might even get out reviews on the Revox and Tandberg reel-to-reel tape decks, the former by BS and the latter by JGH. On the other hand, if you really want to know what will be in the next issue, multiply by 75% and add in some unknown quantities that aren't yet on the horizon.

RECOMMENDED COMPONENTS

Volume 7, Number 5 will also see the latest Recommended Components, which will be updated to eliminate the problems and inconsistencies of the RC that appeared in Volume 7, Number 2.

To set the record straight: The as yet unreviewed Yamaha CD-X1 *is* slightly better than the reviewed-as-best-yet Magnavox FD-1000, but not so much as to justify dropping the Magnavox to Class B. The SOTA Star recommended in Class B under turntables should have been the SOTA Sapphire; the PS Audio preamp should have been the IVH not the IVK; the Acoustat TNP (which received a semi-rave review from JGH) was omitted from the recommended preamps because further listening revealed problems that have been addressed in a newer version, to which we have not listened; the Audionics CC3 amplifier, which received a favorable but not rave review, remains a good amplifier but was not thought to be competitive in terms of cost with the other amps in Class C. **LA**

LETTERS

Although we read and take note of every letter received, we cannot reply individually to letters. Reader letters of general interest are published in this department.

SWW AND THE SOTA STAR SAPPHIRE

Editor:

SWW really went overboard reviewing the SOTA Star Sapphire. He sounds like the *Absolute Sound* freaks. I can tolerate JGH-type audio madness, but not SWW, whoever he is.

Proofreader, please note on page 79 of issue Vol.7 No. 2, conductor Mata's first name is Eduardo, not Edouard.

Congratulations on your perception of CD and taking the brave stand. This, and other things, say that you stand for a *degree* of truth in your magazine. *The Absolute Sound* cares only about their power to shape others' opinions, their power to convince. They are not into reporting—they are into MAD PROSELYTISM.

Carlos E. Bauza
San Juan, PR

We all appreciate well-founded criticism and corrections of misspelled names. It's hard to respond to the criticism-by-association in the above letter, however. As much as we find to disagree with in TAS, *they definitely do some good reviewing—we even agree with them on occasion. A more specific criticism of SWW's review would give us more to work with.*

I agree that TAS *cares overly much about their "power to shape other's opinions," but it must be conceded that anyone in the reviewing business has* some *interest in shaping the opinions of others. Our mail on CD has been running about 50-50, but as we've observed in our editorial pages, each 50 is the polar opposite of the other—unless people hear in totally different ways, such a dichotomy makes you suspect each side just a bit.*

DON'T CHANGE A HAIR FOR ME

Editor:

For some reason, you seem to derive satisfaction from printing letter after letter from people demanding that you change something in *Stereophile*. May I add my voice by asking you to increase all departments without altering *anything* else. The balance is perfect, the contents are informative and, above all, the reader (perhaps not this one alone?) does not feel pushed around by your opinions. Then there is that sobering, stimulating Cheapskate column, but it is easy to understand why I like that because I am also a fellow Quadian.

For my own edification: What is SPL, which the Quads don't produce much of? And what is arcing?

Gilberto Regule
Montevideo, Uruguay

We print critical letters because we're embarrassed by the astonishingly high percentage of praiseful letters we receive, and don't want our readers to think we're running the letters column through a high-pass filter.

SPL stands for sound-pressure level, and is the measure (in decibels) of the loudness of a sound, relative to our threshold of hearing.

To check our own concept of an "arc" we looked it up and found that we had in fact misused the word. An arc is a luminous, continuous discharge of electrical energy between two conductors. So arcing is not what the Quads did when overloaded. What they did was "spark"—a spark being a single, instantaneous *luminous discharge of electricity.*

WHO IS SWW?

Editor:

This is only the second time I have written to your Publication. The first time was in the form of a manufacturer's comment; and it is from this area of appreciation that I wish to take issue with the manner in which the SOTA turntable review was presented.

I will not disagree with the substance of the review, but what I find distasteful is that upon careful examination of your masthead, I find no listing of "SWW." Nowhere in your magazine do you introduce, qualify, or quantify "SWW." It would not have been objectionable to accept a "state of the art" benediction from the likes of JGH, LA, or AHC—but who in the hell is SWW? Since I do not know this Person, I must also question the written fact that this person purchased his unit. Could there possibly be a vested interest?

If I were a competing manufacturer, such as VPI, I would certainly have to question the effect of such a review on my sales, and where I would spend my advertising dollar in the future.

Murray Zeligman
Owings Mills, MD

Mr. Zeligman should have introduced himself. He is the developer of the Z-Mod phono cartridge and of an excellent series of Dyna tube modifications, he collaborated in the design of the Berning TF-10 preamp, he has made some significant speakers, and he reportedly has a creditable tube step-up device in the works. He also functions as a telephonic gadfly for Stereophile, *frequently having been known to bend the collective ear of editor and publisher—and at some length!*

I humbly and abjectly apologize and beg forgiveness from reader and manufacturer alike both for having omitted SWW's name from the masthead and for having failed to introduce him. These mistakes were corrected in our last issue, but I fear much damage has been done—even to the point of throwing into disrepute SWW's excellent review of the SOTA Star Sapphire. To repeat:
SWW is Steven Watkinson; he works as a lawyer in Phoenix, Arizona. He is a longtime audiophile whose observations have been confirmed by both the editor and the publisher. SWW has numerous associations with manufacturers in the high-end industry, but has not reviewed products made by those manufacturers; his acquaintance with the people at SOTA (notably Rodney Herman, the designer) only developed in the process of reviewing their turntable, as is frequently the case. Although purchasing a product does incline one to liking it, SWW actually auditioned the Star Sapphire against the Sapphire and against his Linn for over a month prior to purchase—it would seem that his positive review of the 'table actually preceded his purchase. In fact, it is not uncommon for reviewers to purchase products which they feel are particularly noteworthy. **LA**

DISAPPEARING ACT

Editor:

I was amused to learn that Ambisonic sound by IMF has reached a level of technology where it can cause speakers to "literally disappear." Up until now, the

best we could hope for was virtual disappearance.

Mike Kohrman
Ft. Wayne, IN

We are sad to report that IMF itself has literally disappeared, departing as a company from the audio scene just prior to summer CES. Bill Sommerwerck will have a posthumous report on their Ambisonics system in an upcoming issue; as a system for convincing you that the music is really in the room with you it is (was) unparallelled in our experience, and we hope it will be revived. We don't know if IMF's demise is related to their somewhat overstated advertising claims, the unlistenability of certain of their speaker models, or simply bad management, but it's always disheartening to see another of the real quality names in audio go down the tubes.

PLATTER FLUTTER

Editor:

In your article "Turning the Tables at CES," (Volume 6, Number 4) you say that the massive platters on these heavyweight 'tables are designed to get rid of vibrations fed back from the platter to the pickup stylus. My own (25 years) experience in audio would lead me to believe that the advantage of these heavy platters is that they have less flutter in the higher frequencies—from 10 to 15 kHz.

I have observed that a light platter, even though the 'table's specified flutter is very low, sounds much harsher than a heavy turntable with the same flutter specs. I think this may be because turntable flutter is specified at 3 kHz rather than at high frequencies where the differences are more audible.

Thomas Becker
Waukesha, WI

A little clarification might help here. Wow is unrigorously defined as variations in speed slow enough to be counted without instruments; flutter is variations in speed too fast to count. 3 kHz is simply the tone to which we listen in order to hear flutter; the flutter is audible as a variation in the 3 kHz tone, which many tests have shown to be the frequency at which our ears are most sensitive to the phenomenon.

The harshness you have heard from light-platter 'tables is more likely due to something arising from another source, such as disc-surface shock waves set up by stylus modulations or airborne acoustic feedback, causing the platter to resonate. Moreover, any time the record moves the stylus sideways, work is done. The energy to do this work comes from the turntable platter, and involves a slight slowing down of the turntable. Since both the momentum and the kinetic energy of the platter are directly related to mass, a heavy platter will slow down less than a light platter to accomplish a given amount of work. Of course, the amount of energy supplied by the motor is eventually the same in each case, since the light platter (which slowed down more) is easier to accelerate back to the correct speed. All other things being equal, however, the speed variation should be more noticeable in the light platter.

All other things are rarely equal! A good example is the Linn, a relatively light turntable which sounds cleaner than many heavyweights and knocks the props out from under generalizations about platter weight versus sound quality. My suspicion is that you're right, however: a Linn designed with a heavy platter would sound better than the current Linn.

FOOT IN MOS

Editor:

I am sorry to have to tell you this, but MOS stands for "Metal-Oxide Semiconductor," not for what you said it did on Page 29, issue 6-5.

Donald G. Fawkes
Mason City, IA

We also are sorry you had to tell us, and gleefully stand corrected. I've decided that the best way to avoid all such mistakes is not to write anything at all. **LA**

AMPS FOR DYNAMICS

Editor:

I am a recent subscriber (3 issues to date) and find that most of your reports are geared toward what things sound like through electrostatic speakers. Are there any amplifiers you know of that will do a good job on dynamic speakers?

I have a pair of JBL L-300 speakers. What combination of amplifier and preamplifier do you recommend for use with these?

Robert Williams
Greenville, MS

Although there are more and more exceptions to the rule, it is generally true that electrostatics sound best with tubed electronics while dynamic speakers sound best with solid-state electronics. We have published many reports on both kinds of electronics in recent months, and feel that you shouldn't have too much trouble finding which ones would suit your needs. For example, the moderately-priced VSP Trans-MOS power amp was highly rated recently, as was the Amber Series 70, and the Acoustat TNT 200. For less money we've found the B&K 140 to be a remarkable performer with either dynamics or electrostatics. If you like high volume levels at low cost, the Hafler 220 can be recommended, though the high end is not as good as on the B&K. We're not familiar with your particular speakers, and again suggest that you insist on auditioning any amp in your home with your speakers. We've been astonished often enough in the past by speaker-amp incompatibilities and do not wish the experience on you after you've laid down your bucks. If your dealer doesn't approve—go elsewhere!

MATTI OTALA'S HERITAGE

Editor:

In Volume 6 No. 6, your article on the Electrocompaniet contains a small but noticeable error. Dr. Matti Otala may be mild mannered but I doubt that he is Norwegian. I believe that if you check into the matter you will find the good doctor to be Finnish. The roots of his first and last name are Finnish and not Scandinavian in origin.

The content of your publication continues to improve with each issue but I wish that you would have less in the way of articles that just ramble and don't have well defined structure. I refer to the pointless and tedious ramblings of Mike Sullivan. Bill Sommerwerck seems to suffer from the same sort of verbal diarrhea.

John L. Krause M.D.
Cherry Hill, NJ

I stand corrected with respect to Dr. Otala's nationality. Thanks for the compliments and criticisms. I also think our articles ramble a bit at times (though I wouldn't put it in such strong terms). Since I'm one of the worst offenders it would hardly do to launch into a lengthy defense in these pages. **LA**

All you need to know about Stereophile:

Frustrated by the look-alike equipment reports, J. Gordon Holt started Stereophile in 1962 to let consumers know how components actually **sound**. He's still at it, maintaining a balance between technical fundamentals and the evidence his ears provide. Stereophile is a reader-supported magazine, and we invite the queries and comments of our readers–let us know how you feel!

Stereophile is now published 8 times a year, twice each quarter. We attempt to review **all** serious audio equipment, from the budget to the ridiculously expensive.

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SUMMER CES 1984—CHICAGO

BY LAURENCE L. GREENHILL

The 1984 Consumer Electronics Show (CES) took over the city of Chicago for the early days of June. Over 90,000 registered industry personnel filed through endless exhibits, stepped over breakdancers, and lined up for cabs, to take part in the annual electronic rite of spring. Compared with last year, morale in the audio booths was up, with more smiling manufacturers and friendlier handshakes. In audio, this optimism was shown by high-end manufacturers (like Levinson, B&W, and the speaker cable manufacturers) introducing high-ticket products they would not have dared to bring into the recession-ridden market a year ago.

There were three major sites for the show. Huge McCormick Place, the size of three suburban shopping malls placed end to end, held what attendees dubbed "The Zoo"—a sprawling, cacophonous cavern of endless displays of electronic debris. The commotion and glaring light of McCormick reminded one journalist of the end of *Close Encounters of the Third Kind*. This sci-fi atmosphere was enhanced by the crazy mixture of people employed: Stepford Wives, tight-outfitted models, Indianapolis racing drivers, Leonard Nimoy boosting computer software, and Hubie the Robot meandering around among showgoers and display cases.

Video dominated the show. Color monitors of all sizes showed Olympic athletes diving, cartwheeling, lifting weights and running, while Panasonic and Hitachi hawked the latest in VHS Hi-Fi. Videodisc racing car and golf games were mobbed. Even B&W, the conservative British loudspeaker firm, featured a videotape of the helicopter attack scene from *Apocalypse Now* to show off their new TV loudspeakers.

Sony was displaying its DIN-sized car Compact Disc players. Although sales reps swore that the latest CDs could stand the automobile's harsh environment (try 120 degrees inside a glove compartment for a few hours!), a few firm raps on the top of the display's imitation dashboard caused the Sony CD player to skip badly, just like the original prototypes of their CDP-101.

This year the "adult" videotape booths, always well attended, were packed into a large yellow and white tent just behind the satellite antenna gear. Crowds surged through the tent and had their whatever autographed by the Pets or Playmates, gazed at the racks of X-rated videotapes, saw the latest in peep-show booth styles and prove once again that sex draws even better than gadgets. Protestors carrying signs that said "Porno-Pigs Ruin CES Show" paced close by.

Across town was the Conrad Hilton Hotel, unfortunately in the throes of a major remodeling. This meant there was much less space than originally anticipated for the high-end audio exhibitors who favor the quieter and more intimate setting of the hotel, and in fact a number of firms were reportedly not in attendance for lack of room. To make matters worse, the air conditioning in most of the suites was inoperative and the weather was hot and muggy. The resultant open windows allowed noise from the jackhammers working in the street to come through loud and clear—best low end at the show!

Possibly to avoid such problems, a number of manufacturers were situated uptown in Chicago's Gold Coast section.

The very elegant Raphael Hotel featured Levinson, Apogee, Madrigal (importers of Koetsu, Meridian and Accuphase). Sony also had elaborate suites at the nearby Whitehall, for displaying their new high-speed Beta videotape duplicator.

Most of the interesting audio manufacturers were at the Hilton, though a number held forth at McCormick Inn, another hotel just a block from McCormick Place. The following exhebits represented high points of the Show for me, and are in alphabetical order.

B&W Loudspeakers

The British dominated the speaker business at the Conrad Hilton with their new, highly accurate speaker designs. B&W introduced a completely new product to the press at their elegant champagne breakfast. John Bowers, head of the engineering design team, demonstrated a new monitor, the $3750-per-side B&W 808. The speaker was in the tradition of the extremely expensive self-powered monitor from KEF which was mentioned unfavorably in this magazine's writeup of last summer's CES ($27,000 for the system), and the $14,000 Wharfedale Option One which we didn't think much of at the winter CES.

The big difference with this $7500 system ($9700 in rosewood) is that it sounds very, very good. Bowers designed it in response to the popular music industry's need for a monitor to replace the B&W 801F SP, because of that system's low efficiency and inability to play at levels up to 120 db. The new 808s are large, heavily braced box speakers, having none of the robotic look of the 801s. The same drivers are used, but are charged with ferrofluid to increase the heat ratings to as high as 250° C. in the woofer voice coils! Bowers let loose with a very brief excerpt from Michael Jackson at 120 dB. I thought the entire press corps would leave the room at the very mention of the music, but the sound was listenable, clean, undistorted, and dynamic. At lower volumes, these large speakers retained the detailing, clarity, dynamics and imaging with none of the warmth-region boost heard in the earliest 801 monitors.

B&W introduced a number of far less expensive "digital-ready" speakers (this means they play loud with low power), ranging in price from $149 to $349 per side, as well as a new triangular-prism time-delay loudspeaker, the DM3000 at $895 per side. Special monitor speakers for television, with zero external magnetic fields, were introduced: the $300 per pair VM1 and $500 per pair VM2.

Carver

Bob Carver took the prize for funniest presentation. He held forth at the Holiday Inn Lakeshore at a press conference on Sunday evening.

Bob warmed the audience up with a wisecrack about the "cube amplifier," his first product after leaving Phase Linear (where he got his start). Bob called it his "out of Phase" amp, punning on the feature that one of its channels was inverted to maximize power supply efficiency.

The real point of the conference was to present a 2.5-pound, 3.7-*inch* cube, which puts out an astounding 180 W/ch in stereo. Dubbed the "Cubelet," the entire amp sat on top of an inverted water glass and was dwarfed by the speaker cables attached to it! It uses a number of new developments in Carver's "Stratified Magnetic Field" power amp design, allowing it to drive 2-ohm loads at 250 watts per channel. At the demo we heard the amp drive two very inefficient British loudspeakers at high volume levels for several minutes, after which Carver fanned the little cube with a towel and covered it with ice cubes. Not only was Carver making a sight gag over the fact that heat-dissipating metalwork isn't easily minia-

turized, but apparently the Cubelet we saw was a hastily assembled prototype whose bias had been set a bit high—hence the extra heat.

Carver released more information about the company's Digital Time Lens (DTL). Carver's work with Purdie Rogers, the late psychoacoustician, showed that the 16-bit aspect of the digital system was not the cause of the harsh sound heard from many CDs. He determined that current CD recording techniques boosted midrange frequencies (creating artificial brightness and hardness) and reduced the amount of L - R information (3-dimensional sound field information) by a power factor of 33% relative to the L + R (monaural information), thus decreasing depth of field. The DTL sits at the output of a CD player and is claimed to correct these deficiencies.

Compusonics

Easily the talk of the show, David Schwartz's DSP-1000 recorder/player uses a 5¼-inch digital floppy disk as its music storage medium. The company claimed that the device could make hour-long digital recordings with fidelity equaling that of playback-only CDs. What was all the fuss about? Simply that it would be the first digital storage medium to offer both playback and record combined with the convenience and fast access time of CDs.

Schwartz is working closely with Kodak, whose current Isomax disks can store as much as 3.3 megabytes of data per side, about 4 minutes of monophonic music using current digital format. Kodak promises better diskettes next year, with about 50 megabytes of storage. This still falls far short of the 500-650 megabytes now available on the 4¾-inch optically scanned CD, but Compusonics has apparently devised a data compression system that may "sample the digital samples." This corner-cutting is supposedly justified on the basis that much of digitally sampled music is apparently silence.

The big question, How did it sound?, was unanswerable: the durn thing doesn't work yet. Due to Compusonics' very effective public relations department, which had press releases out a month before the Show and has kept them coming since, it definitely had the most talked about non-sound at CES.

Dahlquist

The news here was the new DQ-20, an $1800 heir-apparent to the company's ten-year-old classic, the DQ-10. Jon Dahlquist is still working with the new design's vertical array (the DQ-10's drivers were arrayed horizontally). According to Dahlquist, the ear-brain system is far more tolerant of comb-filter effects presented in a horizontal plane than in a vertical plane. The four drivers in the DQ-20 were set in a strictly vertical line at this show, whereas there was some mix of horizontal and vertical at the Winter CES where, according to several reports, the sound was significantly better.

At this CES, the sound of the DQ-20 was more forward with greater emphasis on the midrange and less of the "you-are-there" sense of depth experienced with the DQ-10. The 20 is narrow and tall (somewhat like a Quad ESL-63), getting away from the short and wide shape of the DQ-10, which was itself almost a dead ringer for the original Quad. The DQ-20 definitely deserves a serious audition under reference conditions, once its design is finalized.

KEF Loudspeakers

KEF introduced a new 104.2 loudspeaker, incorporating the newest technology since their classic 105.2 system. The 104.2 is a slender, 3-foot tall box that can be screwed to the floor (an old Linn trick) for stability and better coupling.

The woofers are used in a manner that may appear similar to the Linn Isobarik, but is in fact different. The woofer system is isolated, and only the reflex port is open to the outside. Two bass drivers are used in "balanced mode," facing vertically upward and coupled together by a non-ferrous alloy bar bolted rigidly between their magnet structures. KEF claims that this quadruples the efficiency of the 104.2 as compared with the 105.2, giving the new system the ability to play at 110 dB. The sound of the units was neutral, with tight, very defined bass. In the show setting, the 104.2s did not produce the pinpoint imaging of the older 105.2s, but a more thorough evaluation should be done before any conclusions are reached.

Mark Levinson (MLAS)

Levinson's Raphael suite also had a surprise, the long-rumored 100 W/ch Class A amplifier. The ML-15, billed as a successor to the company's flagship ML-2, is the first really super-expensive product Levinson has introduced since 1980. Retail pricing will be $4500 per channel, somewhat less than the $12,600 needed up till now to get 100 watts of Levinson Class A per side (two bridged pairs of ML-2s).

The new amp features total regulation of drivers and outputs, the ML-2 metalwork, L-C (inductance-capacitance) energy storage in the power supply, and dual toroidal transformers—which must be a first for a monophonic amplifier! Like the ML-2, the amp runs very hot, and I was assured by my engineering colleagues that parts longevity would be good because of the amp's good thermal design. A 6-foot rack holding six of these amps sat between two Magnepan Tympani IVs, and the sound was excellent—as you might hope.

Mark Glazier and David Sales (of MLAS) were also pleased by sonic improvements worked into the company's least expensive preamps, the $1200 ML-12a (it now has its own high-level section and outboard power supply) and the $2780 ML-10a.[1]

Meridian

Meridian, a British electronics manufacturer, features the innovative designs of Boothroyd Stewart. A recent arrangement combines Meridian with products imported by the former D&K Imports (Koetsu cartridges, Accuphase cartridges and amplifiers), now under the name Madrigal Ltd. Sandy Berlin, Levinson's very effective business manager, helps run this new company as well.

Meridian's Raphael Hotel suite contained its line of compact electronics and self-powered loudspeakers. In addition, and big news to these ears, was a new Compact Disc player with outstanding sonics. The Magnavox/Philips FD-1000's D/A converter and audio electronics have been completely redesigned for the Meridian unit, while keeping Philips' oversampling technique and beautifully stable laser-tracking system. A standard Rickie Lee Jones CD, heard that same day on other CD players as overly bright and with unintelligible lyrics, came across as smooth and clear on the Meridian. This will be one CD player to watch. Price was not available at the time.

Monster Cable

Noel Lee had a spate of new products to introduce at this CES, which demonstrate this company's move from simply a manufacturer of speaker cables to a position of importance in the larger field of audio accessories. None of these new products are audio cables; instead Lee brought out a new cartridge, sound-absorbing panels, and quality computer-connecting cables.

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1 If this is low-priced I'll eat a $100 hill—with champagne! **LA**

The company's latest moving coil cartridge is the $650 Alpha 2, whose price and sonic performance pit it directly against the Koetsu Black. The Alpha 2 was being demonstrated at restricted auditions (which I didn't attend) but is not quite ready for release, though it may be ready by the time you read this. The 2's new feature is a synthetic sapphire cantilever and microridge configured stylus. The tip geometry is said to lower distortion appreciably and enhance trackability by a significant margin.

Monster's newest product is an expensive sound-absorbing panel called Soundex (not to be confused with Sondex, a British manufacturer of integrated amplifiers). Unlike Sonex ribbed panels, which were difficult to decorate with, Soundex consists of smooth panels of fiberglass (commonly available through acoustical supply houses) bonded to nonwarping plastic frames and cloth-covered in a variety of snappy-sounding colors: Sierra Blue, Gray Mist, Bamboo Beige, and Heather Rose. Three models are offered, from the 1-inch thick, 34- x 60-inch Soundex 1 at $160 per panel, up to the $1400 Soundex II free-standing room-divider screen system.

Monster has been eager to enter the lucrative computer hardware market, and their double-shielded Monster Computer Cables could be just the shoehorn. These cables are said to block both RF and electromagnetic induction from copiers, air conditioners, and other devices in the local environment. They utilize all-metal connectors and are very flexible. Prices range between $45 and $75, depending on length and adapters required.

Sheffield

I suppose it was just a matter of time. Sheffield released its first Compact Discs at the show, and they were very, very good! I heard a sampler from the more popular albums, including favorites from the *Track Record*, the Amanda McBroom series, and the Dave Grusin jazz album. These are copied from analog or digital tapes recorded simultaneously with the direct-to-disc mastering. Since CDs represent an exact copy of the master tapes, those tapes must be knockouts! Several industry people reported that the Sheffields are among the most listenable CDs in their collections. Doug Sax has managed to quietly drop the "fight against digital" and come out ahead.

Snell

Peter Snell's room at the Hilton featured the Type A/III loudspeaker, complete with a 12-inch woofer promised at Winter CES. The sound from these speakers, backed up by a Citation XX amp and Audio Research SP-6C preamp, was wonderfully coherent, with great dynamic range, powerful low end, excellent imaging, and wide soundfield. This version of the Type A is light-years ahead of earlier models—in fact it sounds like a different loudspeaker. The effect was even more striking since I had just been unimpressed by a listening session at the WAMM (Wilson Audio Modular Monitor) room, where the sound was hobbled by just about everything: a room with boomy, boxy acoustics, vibrating venetian blinds and glass—and far too small for Dave Wilson's product. We look forward to receiving an early sample of the A/III for review.

Speaker Cables

In previous work concerning the audibility of speaker cables, I examined a number of them costing between 90¢ and $5 per foot. Even though open testing (where participants knew the identity of the cables) revealed some differences among these wires, double-blind trials were inconclusive unless the wires were vastly different in size and electrical characteristics. Though sonic differences between high quality cables have been dif-

ficult to prove through such testing, audiophiles remain fascinated by new speaker wires. This year's CES witnessed a resurgence of very expensive, exotically designed wires.

The most prominent example is Spectral Audio Associates' MH-750 Speaker Interface Cable, known affectionately as the Music Hose. Prices start at $15.50 per foot for the ¾-inch-thick beige-jacketed wire, with a $50 mandatory charge to terminate the four ends of a stereo pair with gold spade connectors. Bruce Brisson designed the wire using computer models to yield a flat phase response over a wide bandwidth. The size of these wires is impressive; they truly look like garden hose.

Randall McCarter, formerly an instrument-panel design engineer in the aerospace industry, has been attracting a lot of attention with his company Randall Research. In addition to RR's interconnect cable, about which many good things were said at WCES, McCarter has designed an all-out multistranded speaker cable in which each strand is individually coated with Teflon. The strands are not twisted tightly like Litz wire, so capacitance is said to be low. The Randall Research cable system is dubbed the 64 TBC Cable and costs $17 per foot, with a mandatory termination charge of $60 for a stereo pair of wires. Doing some quick calculations, it would cost me between $515 and $570 to accomplish a 15-foot run from my amplifiers to my speakers.[2]

Acquaintances who have auditioned the wires in open trials say they bring sonic improvements—just how much improvement may well be the subject of a future review.

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2 Randall McCarter, when asked about review samples, was adamant in his preference for long interconnects (which ain't cheap either) and short speaker cables. **LA**

Spectral Audio

Spectral had outstanding sonics at this year's show, a tribute to the special care taken in setting up their system. A reel-to-reel 15 ips Tandberg TD-20SE playing Keith Johnson jazz choral tapes was fed into a Spectral DMC-10 preamp (Gamma version, of course). Using Bruce Brisson's Cannon-terminated, balanced line interconnects, the amplifier-speaker setup consisted of stacked pairs of Entec subwoofers and a single pair of highly modified Quad ESL-63s driven by the company's instrumentation amplifier, the DMA-100. The huge MH-750 speaker cables (Music Hose) dominated the scene visually.

Spectral's Demian Martin had redone the Quads from stem to stern, replacing all the delay line capacitors in the base with polypropylenes, replacing the louvered metal grills with a open-mesh metal grid, and redesigning the speaker's base to include an elevated stand. The result was a very open sound, imaging to beat the band, and lovely non-fatiguing music. It even (!) put to shame all the *Thriller* albums playing next door; in fact, I've found that any room with non-fatiguing music attracts my attention more than the deepest bass or the loudest sound.

Spectral introduced a $1495 preamp, the DMC-5, with many of the DMC-10's features like a high-gain phono stage that accepts moving coils without a step-up. A 200-watt version of the company's basic 100-watt amp was also shown, but was not demonstrated while we were present.

Tandberg

Tandberg joined forces with Custom Woodwork & Design (CWD) in a large, comfortable suite. CWD's cabinetry was easily the best I saw at the show for the housing of audio gear. Modular units can be stacked to contain the most elaborate system of components.

Tandberg presented a new reel-to-reel tape deck, the TC-50, which has an RS-232 serial port for programming by computer, and many of the niceties of more expensive machines, such as the Levinson/Studer ML-5. A professional series of cassette decks, the TCD-900 series, was presented. The list price of the company's outstanding TD-20SE reel-to-reel was dropped from $1560 to $1100, in response to the rapidly declining market for home reel-to-reel decks.[3]

Sitting right near the front of Tandberg's suite was a totally new 200 W/ch Class A amplifier in basic black and weighing in at 140 lbs. In my opinion, it competes directly with Levinson or Krell in metalwork, internal parts, and design. Unfortunately, this beautiful amplifier was a one-of-a-kind, handbuilt prototype that had no designation, name or plans for marketing. Joel Rosenblatt of Tandberg teased interested showgoers, refusing to play the amp or even discuss it as a product.

He did mention that it was constructed from parts used in the company's latest 3006A MOSFET 150 W/ch amplifier, using bigger power supply parts and more output devices. Although Tandberg has publicly positioned itself just below the exotic audiophile manufacturers in the marketplace, it appears they may be tempted to enter that category with such a product.

CES Design And Engineering Awards, 1984

Six judges from the audio press selected 143 of the top products at the show for design awards. At least 22 of these products, by my count, would be of interest to the serious audio hobbyist. They included the B&W 808 speakers; the little Apogees (the Scintillas); the Carver Digital Time Lens; the Counterpoint SA-4 direct coupled tube amplifier; the Dynavector DV-507 tonearm, the KEF 104.2; new Compact Disc players by Kyocera, Yamaha, Technics, and Revox; power amps by Tandberg and Robertson Audio; and the Sumiko Talisman Alchemist IIIS high-output moving coil cartridge. This recognition that audiophile products are not just "exotic" but actually have some engineering merit follows a developing trend in the press—check out AHC's column in *Audio* (June and July issues), JGH's article in *High Fidelity* (July), and Julian Hirsch's review of the Levinson ML-3 (June *Stereo Review*).

3 Watch for JGH's rave review of this product in Volume 7, Number 5—in many respects it does as well as the PCM-F1, now costs half as much, and allows for editing!

Publisher's note:
JGH dashed off some notes about the highlights of SCES as soon as he returned from Chicago, and here they are. Volume 7, Number 5 will contain his more in-depth report as well as some observations from Bill Sommerwerck and myself.

Although there were no breakthroughs in high-end audio to be found at this summer's CES, there were several things worthy of note.

SME

English tonearm manufacturer SME, reportedly bankrupt last year, is back with a new arm, and this is without a doubt the most strikingly beautiful (and promising) one from them to date. It has everything the perfectionist could ask for, including provision for varying both tangency and vertical tracking angle while playing a disc.

THE TWO Ms FROM BRITAIN

Mission and Meridian, two English firms noted for their excellent electronics, have introduced CD players consisting of Philips decks with completely redesigned electronics. Now, when is an American firm going to do this?

SONY

Sony unveiled a high-speed videocassette tape duplicator which may ultimately unseat VHS as the preferred medium for home video programming. It could allow the prices of prerecorded Beta (including Hi-Fi) to be cut substantially; the commercial advantage is that the new system cannot duplicate VHS Hi-Fi tapes.

WILSON AUDIO

JGH finally got to hear the WAMMS, which he averred to be "simply and utterly incredible." Maybe even worth the even more utterly incredible $42,000 pricetag.

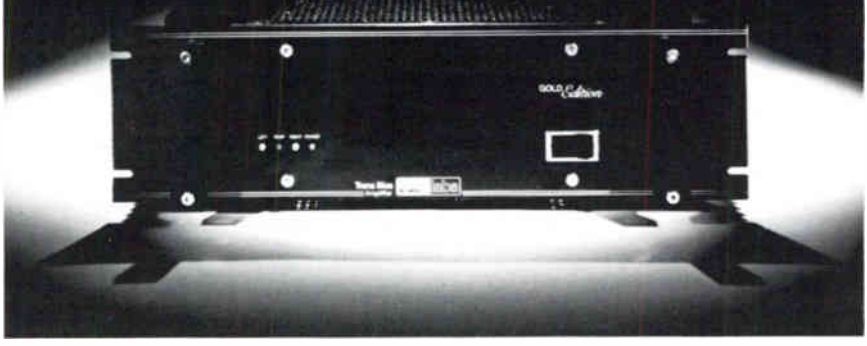
THE NEW GOLD STANDARD

When VSP Labs released our now-classic Trans Mos amplifier, it received excellent reviews from the audio experts at *Sensible Sound*, *Stereophile*, and *Stereo Review*. Now, we are pleased to introduce an enhanced performance version — the new *Gold Edition* Trans Mos. Featuring more power (200 watts/channel) and a naturally smooth musical sound, the *Gold Edition* breathes life into even the most complex program material.

For complete specifications and reviews of our Trans Mos, *Gold Edition* Trans Mos, and the Straightwire Preamplifier, plus the location of the dealer nearest you, call (313) 769-5522. Or write: VSP Labs, Dept. A6, 670 Airport Blvd., Ann Arbor, MI 48104.

VSP labs

Only the music remains.



EQUIPMENT REPORTS

B&K ST-140 Power Amplifier

Solid-state stereo power amplifier. Rated power: 70 watts/ch into 8 ohms, 20 Hz to 20 kHz. Dynamic headroom: 3.2 dB. Frequency response: ± 3 dB, 3 Hz to 70k Hz. Sensitivity: 1.1 V in for full out. Dimensions: 19" W by 15½" D by 6¼" H. Price: $395. MANUFACTURER: B&K Components, Ltd., Orchard Park, NY 14127. (716)652-7667.

I must admit that even before I connected up this amplifier I was put off by the accompanying literature. B&K makes some persuasive points about the validity (or rather the lack thereof) of some traditional amplifier tests, but the literature was so loaded with flagrant grammaticides, syntactical ineptitudes and outright errors that I could not help but wonder if the same lack of concern had gone into the product itself (e.g., the term "infrasonic" is used throughout to mean "ultrasonic"). Good copy editors aren't that hard to find;[1] B&K should have found one.

There were other off-putters. Although the unit is commendably well protected by fuses, four power-supply fuses which the instructions say may blow if the amplifier is "severely overdriven" are located inside the chassis. And the Owner's Manual (one typewritten sheet of paper) states that only "qualified personnel" should open up the unit. This is ridiculous! Although a 70-watt amplifier with a reasonable load is not likely to blow a 4-amp fuse, it is very likely to be overdriven on occasion, and if the load happens to be a nasty one, fuse popping is well within the realm of possibility. The ST-140 has speaker fuses located on the rear panel, and these (if properly chosen) should pop before any power supply fuses do. But insisting that the owner trot the amp down to his friendly repairman (who will gleefully charge him $25 to remove six screws and replace a 20¢ fuse) if a fuse *should* blow, that's a bit much. These fuses should be accessible from the rear panel, the way fuses having a similar function are on most other high-quality amplifiers. Or the user should be instructed how to change the internal ones himself.

This may seem like a trivial point, but it could cost the owner of an ST-140 some unnecessary expense and make him afraid to play his system at much above pussyfoot volume levels. I promised myself in advance that if I blew any of these fuses, I would consider myself a qualified personnel and do the damn thing myself. None ever blew, even though I often ran the amplifier to the point of overload.

The term "dynamic headroom" has been around for a while (I think the first company to use it was APT), but this is the first amplifier I've tested that specified its dynamic headroom: 3.2 dB. Apparently this refers to the amount of power that can be delivered beyond rated power for some short period of time, and is relevant to the observation that many amplifiers sound much more powerful than their rating would suggest—it used to be called "peak power output." Unfortunately, some of the relevance of this is lost by the failure to cite the length of time for which this power can be delivered. If accurate, that modest-looking 3.2 dB translates into an instantaneous peak output capability

1 *Stereophile*'s copy editor would beg to differ, and no one should know better than JGH. **WV**

of a respectable 147 watts. B&K has also invented a measurement: phase noise, the explanation of which I found deliriously incomprehensible.

The following observations about the B&K's sound are based on the performance of the second sample received. The first was about to get an exceedingly bad report because of an intolerably shrill, glassy high end. But when that sample suddenly quit on us, it raised a serious question as to whether it might have been defective all along, with the shrillness merely reflecting a circuit problem that finally caused it to fail. This was evidently the case, as the second sample sounded quite different from the first. In fact, the ST-140 turned out to be a real sleeper!

Before auditioning the ST-140, I had been using a recently upgraded (to a Series II) Threshold S/500 Stasis power amp, having just returned our Electron Kinetics Eagle 7A (my favorite solid-state amp to date) for modernization. We'll have followups on both of these in a future issue, but suffice it to say that the Threshold now leads the solid-state field, with (among other things) the smoothest, sweetest, most open high end I have yet heard from any non-tube amplifier. When I disconnected the Threshold to try out the B&K, I expected the difference to be laughable, but much to my surprise it wasn't!

Amazingly, here was a $395 dual-70-watt amplifier that could hold its own against the best I have heard! This amp is detailed, beautifully sweet and airy at the top, capable of reproducing remarkable depth and spread, and all that with a truly authoritative low end that can compete with the best. Of course, it doesn't deliver the beef that a 200-watter can. Those last vestiges of control and impact at the extreme bottom are missing, it can't make most speakers shake the walls the way a truly high-powerd amplifier can, and it tends to exacerbate acoustic feedback through the phono unit more than does a very high-powered amp when the system is played at very high levels. But if 70 watts looks puny on paper, it sure doesn't sound puny from this amplifier! That dynamic headroom factor, perhaps?

Its high end sounds more naturally balanced through good dynamic systems than through electrostatics, but it is one of the growing number of amps that are quite tolerable on either kind of system. In short, if this had cost $550 it would have gotten a very favorable review. At $395, the B&K ST-140 is *the* amplifier of choice for the perfectionist on a tightish budget. It's a veritable triumph of design, and perhaps the most cost-effective amplifier I know of. **JGH**

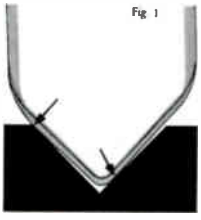
DECCA VAN DEN HUL PHONO CARTRIDGE

Tip-sensing matrixing MI cartridge. Stylus: Van den Hul type. Compliance: lateral 15 cu, vertical 7.5 cu. Output: 5 mV. Channel balance: ± 1 dB. Tip mass: less than 1 mg. Recommended load: 47k ohms. Recommended tracking force: 1.8 grams. Price: $850. IMPORTER: Audio Access, P.O. Box 385, Whitestone, NY 11357.

Longtime subscribers may recall the high esteem in which *Stereophile* used to hold some of the early Decca cartridges, from the Mark II to the Mark V. JGH used several models of the Decca as his reference cartridges for a number of years, his preference for them persisting because of their remarkable transparency, detail, and "aliveness," and in spite of their poor quality control, microphonic tendencies (tapping the body caused a pronounced ringing sound), less than sterling trackability, and sensitivity to hum. When Shure came out with their first V15,

which had almost the clarity of the Decca and none of its shortcomings, JGH (reluctantly, it seemed) switched allegiance and the Decca has since remained unmentioned in these pages.

The VdH represents an attempt to elevate the venerable Decca to state-of-the-art status. While it is identical in appearance to the Mark VI and V Decca models, it is in fact being remanufactured as a labor of love under the supervision of Andy Liu at Audio Access, and differs from previous Deccas in several important respects. Most significant, of course, is its use of the VdH stylus. The stylus shape invented by Mr. Van den Hul is the most famous of the designs intended to mimic the shape of a disc-cutting stylus, having a very long (vertically) and narrow (horizontally) footprint. The only drawback of such designs, and this applies equally to the Van den Hul, is that they demand very accurate torsional (rotational, as viewed from the front) alignment with the surface of the disc. Any error here will cause only the top or bottom of the stylus faces to contact the groove, increasing distortion and record wear as well as seriously affecting the sound.



Shows the effect of slight torsional misalignment between vdH stylus and groove wall resulting in greater wear and signal distortion than misalignment with an elliptical stylus.

Other Audio Access modifications of the Decca are aimed at improving the rigidity of the case, lowering the tendency of the body to be microphonic, and lowering the stylus assembly's resonance through mass-loading. In addition, two tiny screws have been added to secure the plastic mounting block through which one mounts the cartridge to the tonearm. Moreover, the metal part of the cartridge body is heavily gold-plated, perhaps to "mass-load" the body, but more probably to help justify the new and hefty price being asked by Audio Access.

The basic and unique design of the Decca remains. Unlike almost all other stereo cartridges, the Decca does *not* use 45°-oriented sensing coils. Instead it uses a combination of lateral and vertical sensing; matrixing[1] is used to extract the 45° outputs corresponding to the stereo groove modulations.

A single coil winds around the cantilever very near the stylus, with magnetic pole pieces straddling the cantilever just above the stylus tip. This puts the signal-sensing poles closer to the actual groove modulations than in any existing design, and minimizes the degree to which cantilever flexing affects the sound. It is literally as close to the groove modulations as one can get, and this is cited by many as the reason for the cartridge's legendary clarity and detail. The main coil senses only the lateral motions of the stylus, which represent those parts of the stereo signal that are common to both channels.

The vertical components, representing the stereo difference signals, are sensed by two magnet/coil assemblies located at the top of the cantilever. This arrangement also provides a very tight coupling to the stylus tip, because groove motions are passed along the length of the cantilever instead of at right angles to it. Thus, flexing and "fishtailing" vibrational modes in the cantilever cannot modify the motions "seen" by the sensing coils. In other words, as far as the sensing elements are

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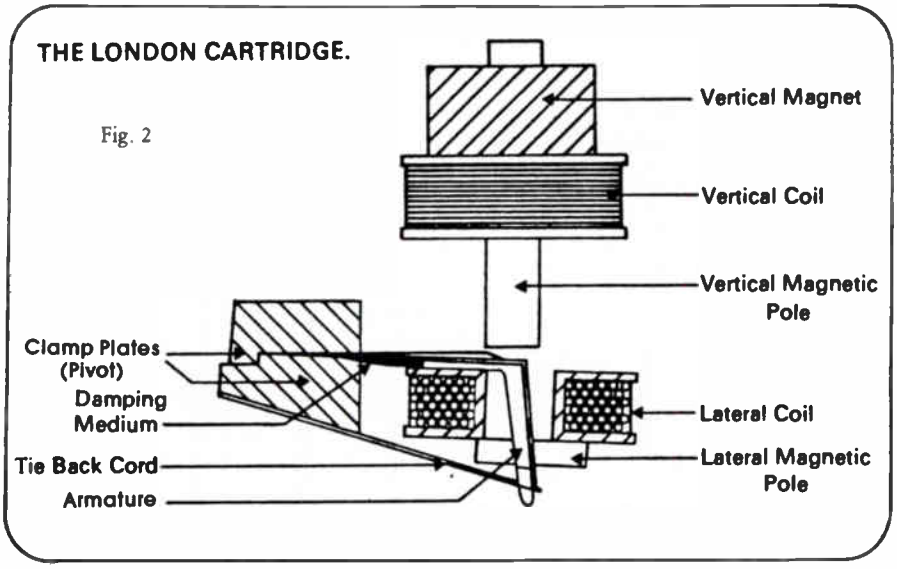
1 Matrixing is a process of mixing two signals to extract from them signals that represent their sum or difference. See box within this report.

concerned, the Decca is essentially a cartridge without a cantilever.

The armature structure of the Decca is unique too. (Figure 2) The pivot is located at the very rear of the armature, and consists of a thin piece of spring steel sandwiched between two clamping plates that provide only a very small amount of damping. A thin nylon tie-back cord attached directly above the stylus prevents it from moving forward and backward in the groove when negotiating modulations, limiting such motions to the vertical and lateral planes. Since only a small amount of rubberlike damping material remains at the stylus pivot, the cartridge's performance is largely unaffected by the stiffening with age which afflicts all highly-damped cartridges. For this reason the manufacturer is willing to guarantee consistent performance for the life of the stylus tip.



The Decca VdH was auditioned in three tonearms: the Eminent Technology air bearing arm, the Helius Aurum, and the Decca London International. Turntables used were the VPI and the Pink Triangle. The cartridge tracked best in the Decca London arm, but otherwise it sounded best in the Eminent Technology arm (review delayed but coming up in Volume 7, Number 5).

In the ET arm, I found that the cartridge tracked best at 2 grams—a bit over the recommended force of 1.8, but not so much as to cause excessive disc wear.

The Decca VdH is one of the most neutral-sounding cartridges I have heard, being neither bright nor dull. Bass is in perfect balance, without heaviness or muddiness, and the middle range is expansive and well integrated with the treble. There is none of the high-end emphasis and transient "zing" that characterizes so many moving coils, yet the Decca equals any of them in its resolution of detail in complex material. All this is achieved with a delicacy, aliveness, and transparency that I have never before heard. Instrumental timbres are fleshed out with uncanny realism, and the cartridge projects an immediacy that is difficult to forget—having experienced the Decca, one becomes intolerant of cartridges lacking that immediacy. A ca-

veat is in order here: with an overly bright system the Decca's remarkable aliveness can easily turn into hardness, so a careful audition in the context of your components is recommended.

The Decca VdH is capable of producing quite amazing dynamic contrasts, seeming to provide a wider dynamic range than other cartridges. I was continually surprised at how crescendos were effortlessly opened up, almost as though there was a super-clean volume expander in the system. Only the ET and Helius tonearms delivered this effect; the dynamic contrasts were considerably reduced with the Decca London arm, which shouldn't be a big problem since the Decca London is so hard to find.

I can find only two things about the Decca VdH to criticize. First, it still does not track extremely well: some mistracking was audible on very loud treble transients, although rarely. I personally consider this a small price to pay for otherwise superb performance, but some of you will differ. Second, the cartridge's susceptibility to induced hum still exists, and its common-ground setup will cause ground-loop hum with some preamps. With the Pink Triangle turntable, for example, hum from the motor's power-supply transformer was quite noticeable during quiet passages. There was no hum problem with the VPI 'table, and Audio Access informed me that the Thorens TD-124 and Goldmund 'tables are also satisfactory for use with the Decca.[2] With anything else, you should check for hum compatibility before investing in this rather expensive cartridge.

I do, however, strongly urge you to look into the Decca VdH. The clarity, detail, and sense of excitement it can generate make it worth an unusual amount of hassle. **DO**

How The Decca's Matrixing System Works

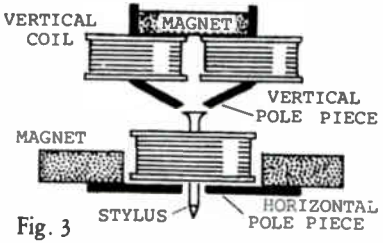


Fig. 3

Figure 3 (above) shows the configuration of the coils and pole pieces, as viewed from the front of the cartridge. Figure 4 (below) shows how the coils are interconnected, and indicates the current flow through them (arrows) when the stylus moves in a 45° direction.

Note that electron movements through the lateral and the left-hand vertical coils are in the same direction, thus producing a voltage output from the left-channel output. Electron movements through the horizontal and right-hand vertical coils are in opposite directions and thus cancel one another. No signal appears at the right-channel output.

It is also clear from Figure 4 why the common-ground configuration, which causes hum from some preamps, is unavoidable with a matrixing system.

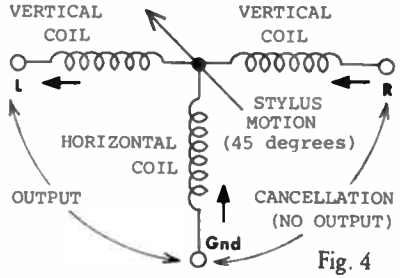


Fig. 4

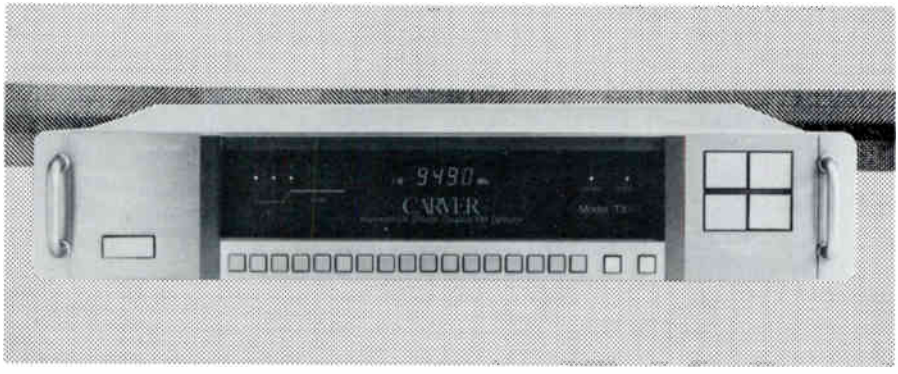
2 Actually, most recent-model 'tables should be okay, as adequate hum shielding is now taken for granted in turntable design. However, the original TD-124 *did* cause hum with the original Deccas, so the necessary shielding must have been added to later versions of that venerable 'table. **JGH**

CARVER TX-11 FM TUNER

Stereo AM-FM tuner. Tuning: crystal-controlled digitally synthesized phase-locked-loop. Inputs: 75O-ohm unbalanced; 30-ohm balanced. Adjacent channel rejection: 90 dB @ 400 Hz, narrowband; 35 dB wideband. Capture ratio: 1 dB. AM suppression: 50 dB; 65 dB with "charge-coupling delay." Image rejection: 110 dB. Audio output level (75 kHz deviation): 700 mV from 600 ohms. Power consumption: 15 W. Dimensions: 17½" W by 3½" H by 12½" D. Price: $549. MANUFACTURER: Carver Corp., 14304 NE 193rd Place, Woodinville, WA 98072. (206)775-1202.

If there is one single thing which characterizes all Carver products it is their innovative design. The company has racked up a number of firsts, including the first practical dynamic-range restorer, the first noise-reduction system that worked by analyzing the signal waveforms, the first really lightweight high-powered amplifier, and the so-called magnetic amplifier. The TX-11 tuner embodies two of Carver's most recent inventions: "charge-coupling delay" and "leading-edge detection," both functioning to reduce the adverse effects of weak signals and multipath reception on stereo FM.

There are two separate signals



Publisher's Note:
This is the first of Stereophile*'s reports on FM tuners currently available. We are also testing the McIntosh MR-78, Mac's new MR-81, the Adcom, the Tandberg, the Hafler, and others as they come in. The person carrying out the testing is Donald Scott of Middletown, Connecticut. He has an extensive background in FM broadcasting and receiving equipment, and the equipment to carry out the in-depth technical testing required with FM tuners. His location is just about ideal: Middletown picks up over 100 stations, both close at hand (duplicating big-city conditions) and from relatively far away. The reports are collaboratively written by JGH and DS.*

broadcast by an FM station: the sum signal, consisting of the Left and Right channels mixed together in-phase, and the difference signal, which is what is left after the Left and Right channels are subtracted from one another—that is, mixed together out-of-phase. The sum signal is always the quietest when received, because it constitutes about 90% of the station's total modulation. The difference signal, comprising only about 10% of the transmission, is the source of most received noise, as becomes apparent when one switches a weak signal from stereo to mono.

In conventional tuner designs, the difference signal is simply subtracted from

the sum signal[1] to yield the two stereo signals. Thus, all of the noise in the difference signal appears in the L and R stereo signals. But stereo difference signals are rarely identical in intensity for L and R information, whereas the noise content of the L-R signal *is* identical in both channels. Carver's charge-coupling delay circuit cancels these equal noise impulses, while imperfect cancellation of the unequal stereo difference signals leaves these largely untouched. Thus, the noise is gone, and only the desired difference signals remain—at least theoretically.

Carver has determined that roughly 85% of the difference signal is duplicated in the sum signal, with only 15% of the difference signal representing true stereo information. Thus, by comparing the sum and difference channels, and canceling all the redundant difference-channel information, the difference signal is stripped of all but the true intra-channel differences.

The research done by Carver leading to the development of his "sonic hologram" space manipulator revealed that only about one-third of the total intra-channel stereo difference signal is actually involved in our spatial discrimination. By stripping the unnecessary two-thirds from FM's difference signal (in the "leading edge detector"), the TX-11 ends up with only 5% of the transmitted difference signal being used to matrix out the L and R stereo channels, and the result is a net gain of around 20 dB of S/N ratio over conventional stereo FM receivers.

The TX-11 is an attractive and rugged-looking device. Tuning frequency is displayed on an LED readout, and two push-buttons allow the user to increment from station to station in either direction across the FM band. This manual mode is easy to use once you develop the right touch. There are presets for up to 16 stations, which is a welcome asset because the TX-11 pulls in a lot of stations in urban locations. The tuner remembers the last station selected when the unit was turned off, and automatically goes to that station when turned on. All in all, the TX-11 is a pleasure to use.

Carver claims a usable mono sensitivity of 2 μV across 300 ohms. Actual measured values over most of the FM band ranged from 1.6 μV to the specified 2 μV. Only above 106.9 MHz did it fall a hair shy of spec, down to 2.2 μV. In short, this would be an ideal tuner for distant-station reception even without Carver's noise-reduction circuitry. With a good antenna, the TX-11 will bring in practically any station which *can* be received. The specified 39 μV for 50 dB of quieting was precisely met by my sample TX-11 except at the extreme upper end of the dial, around 107 MHz. But this isn't a very good figure—or at least, would not be if it were not for the TX-11's noise-reduction feature. With that switched on, quieting improved to a remarkable 6.2 μV for 50 dB S/N! This is one of the best such figures available from any popular tuner.

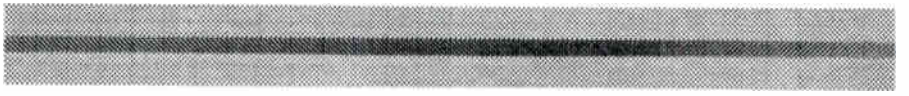
Obviously, Carver's quieting circuits work superbly. There was in fact never a time when I preferred to listen to the tuner without the quieting switched on, and this was particularly true of signal sources carrying other programs (SCAs) on them. These piggybacked signals, used for such things as in-store background music (e.g., Muzak), data transmissions, or pager/beepers, are normally not heard without the addition of a special decoder, but their effects are often heard as distortion in the main stereo signal. SCA rejection is the measure of a tuner's ability to suppress this interference, and the Carver proved outstandingly good in this respect, measuring 70 dB of rejection.

If bandwidth is specified as 90 dB

1 Actually they are added, but since the difference signal consists of negative values, the arithmetic sum is a subtraction.

(isolation) between alternate channels, and measured from 88 to 100 dB. Interestingly, it was found that the Narrow IF bandwidth switch setting produced cleaner sound than the wideband setting on *all* transmissions. This indicates that the narrow position gets rid of a lot of unwanted sideband crud, and also suggests that the bandpass characteristic of the IF system is close to ideal, having a narrow, flat-topped response. Most of the wanted signal gets through but not the interference. The Carver outperformed my two reference tuners, a Sansui TU-9900 and a modified Kenwood KT-8300, in the reception of a particularly difficult station at 94.9 MHz, receiving it cleanly and totally rejecting a 50-kW station at 94.7 MHz. The reference tuners were unable to do this. one-way power devices called isolators which are designed to eliminate both problems, but not all stations use them. With these instances of multipath the problem is in the transmissions themselves, and no amount of antenna orienting or corrective circuitry in the tuner will ameliorate the resulting signal distortion. Carver's tuner didn't seem to help two stations in the Hartford area which seem to be pre-multipathed, but I doubt that any tuner could.

Generally, the TX-11 did a superb job of receiving cleanly the vast majority of stations within reach. Noise and distortion were remarkably low with the noise reduction activated; because the NR acts without attenuating high frequencies, the sound was otherwise uncompromised.



Pushing the multipath-reduction button seemed to have little effect on reception, perhaps because multipath is not a problem in my receiving area, or perhaps because local stations are producing their own multipath condition, which *can* happen. Some stations inadvertently broadcast a signal that is pre-multipathed to begin with. For example, a less than perfect match between a broadcaster's antenna and its transmission line can do this. Some energy reflects back down the line and up to the antenna again, to be radiated a split-second after the main signal.

So-called "antenna farms," where there are several FM stations broadcasting from the same geographic location, can cause pre-multipathing too, as the signals transmitted from one antenna are picked up by an adjacent one, fed down its transmission line and back again, and reradiated from that antenna. There are

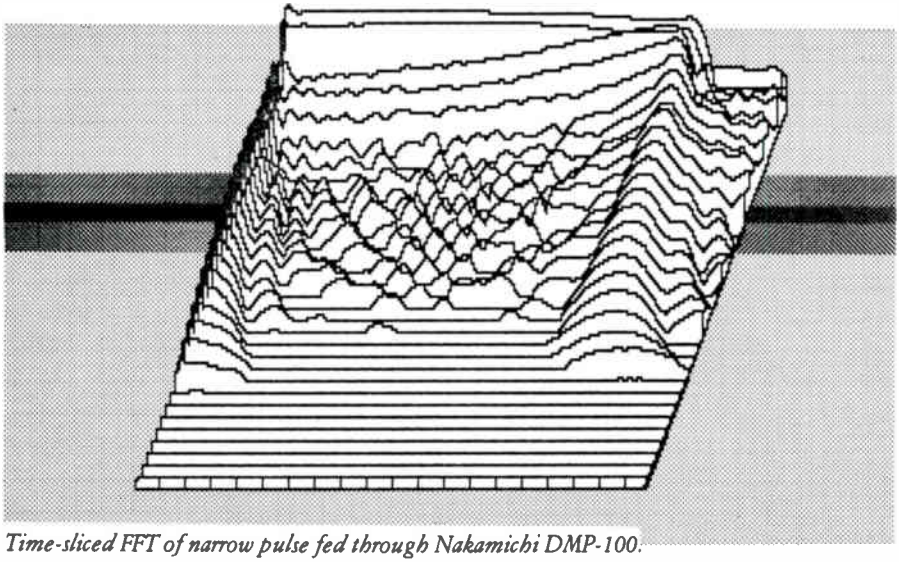
Only on the strongest, cleanest transmissions was the TX-11 outperformed by other tuners. On such transmissions, there was a loss of separation in delicate program details, but the loss was so slight that it was evident only on direct comparison with tuners utilizing the entire difference signal, and those tuners were substantially noisier and dirtier-sounding on less perfectly received stations. In other words, the TX-11 does exactly what it was designed to do: reduce noise and distortion on most stations. About 40 of the 100+ stations I receive came in much more cleanly on the Carver than my other tuners.

This, then, is an ideal tuner for any FM listener who doesn't have clear, strong access to the stations of his choice. It's not the least expensive tuner you can buy, but the quality of reception makes it look like a bargain. A winner!

DS & JGH

DENNESEN PRD PHASE RESTORATION DEVICE

Signal-processing device for correction of phase shift introduced by anti-aliasing filters used in the digital recording process. Switches for inverting polarity of signal and bypassing phase correction. Input impedance: 15k ohms; output impedance: 100 ohms. Dimensions: 1¾" by 9½" by 7¾". Weight: 1 lb. Price: $300. Source: manufacturer's loan. MANUFACTURER: Dennesen Electrostatic, 715 Hale Street, Beverly, MA 01915.



Time-sliced FFT of narrow pulse fed through Nakamichi DMP-100.

During digital recording, any signal components greater than half the sampling frequency are sampled at too low a rate to be correctly recorded. Instead they appear as "alias" signals, as far below a frequency that is half the sampling rate as they actually are above that frequency. For example, if we were sampling at 50 kHz, a 30 kHz signal at the input would appear as a 20 kHz signal in the output (half the sampling rate—25 kHz—less the 5 kHz difference between 25 kHz and 30 kHz). It is as if the out-of-band signal appeared as a mirror image on the other side of half the sampling frequency. In playback, the reconstructed signal contains powerful ultrasonic components from the abrupt transitions that occur between samples. It is therefore necessary to filter during recording to prevent aliasing, and during playback to eliminate those ultrasonic components.

If we sampled at, say, 100 kHz, then the lowest frequency which could audibly alias would be 80 kHz, and we would only need to remove stray RF during recording. On playback, the ultrasonic trash would be so far above the audible range that almost no filtering would be needed. Unfortunately, the sampling rate for consumer equipment is 44.056 kHz, and not even professional machines sample at above 50 kHz. Given this limitation, digital recorders must use filters that are nearly flat to a bit past 20 kHz that then abruptly nose-dive to kill anything outside the (supposed) range of hearing.

It is an unalterable law of nature that such a sharp drop in response brings with it large amounts of phase shift in the audible band. The phase shift itself isn't audible; the ear cannot extract phase

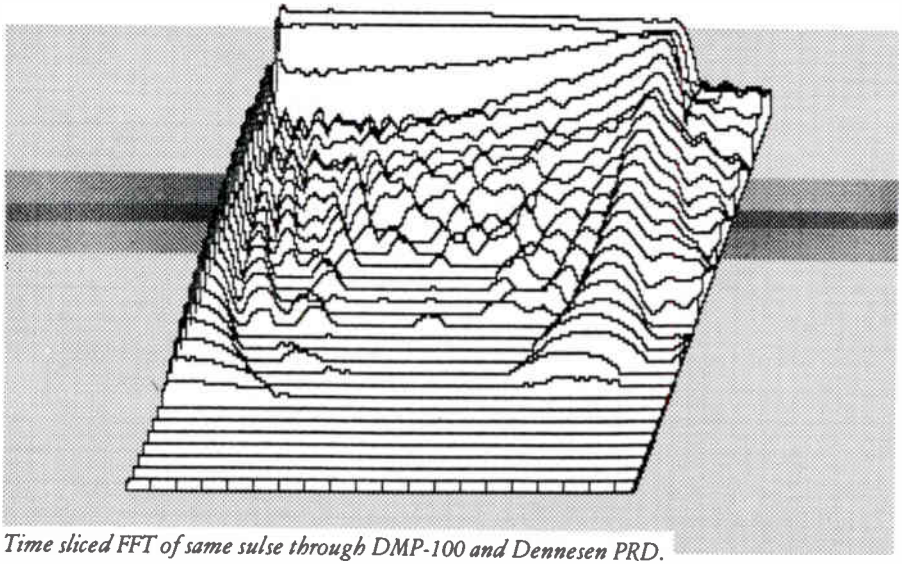
information above about 1 kHz. This is picking nits, however, with the radical phase shifts caused by these "stone-wall" filters: even though the phase shift itself is inaudible, the effects of the phase shift may well be audible. Since the phase shift is not a linear function of frequency, the components making up musical sounds receive differing amounts of time shift. This causes the "envelope" of the waveform (that is, the final shape it has as a result of summing all its components) to be distorted. In electrical engineering jargon, the system does not have "constant group delay." It is not known if this effect is audible, since it is not clear whether the ear responds to the waveform's shape.

This sharp cut-off also causes the filter to store energy and release it at some frequency near the filter's cut-off, a phenomenon known as "ringing." This ringing appears as sustained oscillations on signal transients. It is probably audible (directly or indirectly), though its effects have not been quantified.

The Dennesen PRD (Phase Restoration Device) attempts to minimize these problems by introducing *additional* phase shift, so that the total group delay is as nearly constant as possible across the audible band. (See graph.) And guess what? The PRD does improve the sound. The effects are subtle, but audible.

Specifically, the midrange and treble become less dark-sounding, gaining in clarity and detail. Transients seem slightly less rounded-off. In complex passages, the sound becomes noticeably less confused and more open; it's easier to follow individual voices. And a particular coloration, which makes woodwinds sound slightly distant and honky, disappears!

For once it's possible to show a measurement that correlates with the apparent sound differences. This display is called a "time-sliced FFT" (Fast Fourier Transform). It is also known as a "waterfall" display, or "cumulative decay spectrum." Basically, it allows one to see how the frequency response of a system varies with time.



Time sliced FFT of same sulse through DMP-100 and Dennesen PRD.

In these displays frequency is plotted geometrically rather than logarithmically (as is normally done on frequency response curves). As on standard graphs, 0 Hz is to the left, 30 kHz to the right; each short vertical line at the bottom of the graph represents an interval of 1.5 kHz.

The first display is the Nakamichi DMP-100 by itself, while the second is the DMP-100 and the PRD together. A very narrow pulse was fed to the DMP-100, and the output was sampled at 60 kHz. Each curve in the display was produced by processing 256 samples with the usual Cooley-Tukey FFT algorithm.

The curve farthest away from the viewer is the first curve; it was created from samples 1 through 256. I found that spacing the curves at increments of 3 samples produced the clearest display, so the second curve is from samples 4 through 259. And so on.

Note that although the curves are spaced at 1/20,000-second intervals, each curve represents the system response over about 4.2 milliseconds (256 ÷ 60,000). This makes interpretation of the curves less than obvious, because they represent the system response for a time interval that is longer than the spacing *between* the curves. Nonetheless, quite a bit can be gleaned from the curves. The most obvious feature is the large lump at the right side. This is the ringing of the anti-aliasing filters; it occurs at about 22.5 kHz.

More interesting is the behavior throughout the audible range. Compare the first five curves of each set. The first three are virtually identical. Ah, but the fourth and fifth! With the PRD inserted, there is a much more rapid decay of signal energy across most of the audio band. In other words, the pulse has been reproduced with less smearing and a quicker decay. There is also less low-level trash, and that which *is* present decays more quickly. This measured result seems to correlate with the improved clarity and detail heard with the PRD.

By the way, this is a real first. I know of no other publication, including the Journal of the AES, that has ever published time-sliced FFTs of electronic (as opposed to electromechanical) equipment.

At $300, the PRD is not cheap. It is currently hand-assembled; produced in quantity, it would undoubtedly cost less. One might even argue that there is no excuse for Sony's not including it in the line output section of their PCM-F1, nor for Nakamichi not including it in their DMP-100! The PRD was designed to correct those particular machines, and I obviously have no hesitation in recommending it to recordists who own them. Since other digital processors have similar but not identical filtering, the effect of using the PRD with them should likewise be similar but not identical.

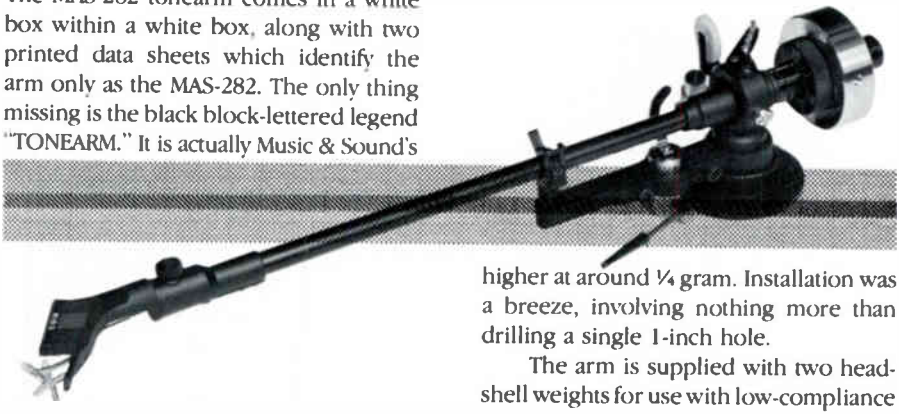
The other obvious use of the PRD is in playing back digitally-mastered analog discs and CDs, but there are few of the former which warrant a $300 investment! I checked the PRD with several Sony-mastered recordings from Sonic Arts, and could hear no difference at all. Apparently there is sufficient additional phase shift and time smear on analog discs to mask any improvement.

As for CDs, I don't have a player for comparisons. But the potential buyer should note that Philips/Magnavox players use constant-group-delay digital filtering *before* D/A conversion, so that a much less complex analog filter is required. Such units may actually sound worse with the PRD. Likewise, CDs mastered from analog sources may have enough time smear to mask the benefits of the PRD. So if your main interest in the PRD is to correct the output of a CD player, I recommend listening to it for a considerable period of time on a familiar system to see if the investment is justified. For the amateur (or professional) digital recordist, the PRD is "icing on the cake," and is well worth the money in my opinion—I bought the review sample for my own work. **BS**

MUSIC & SOUND MAS-282 TONEARM

Pivoted arm with plug-in headshell. Cueing level, bias compensation. Bearings: gimbal and sleeve. Pivot-to-stylus distance: 8¾" adjustable ± ⅛". Cartridge weight range: 3 to 10 grams. Cable capacitance: 100 pF. Mounting hole: 1" diameter. Price: $169. MANUFACTURER: Music and Sound Imports, 30 Snowflake Rd., Huntingdon Valley, PA 19006.

I never thought I'd see the day when high-end audio components went generic, but this looks like the start of it. The MAS-282 tonearm comes in a white box within a white box, along with two printed data sheets which identify the arm only as the MAS-282. The only thing missing is the black block-lettered legend "TONEARM." It is actually Music & Sound's "House Brand" arm, but when M&S's Mel Schilling learned how much it would cost to imprint a small quantity of boxes, a measure of anonymity started to look more attractive.



On first inspection, this looks very much like what the Infinity Black Widow might have looked like if allowed to evolve through a few more model changes. I would not have been a bit surprised to see it identified as a BW-III. There are, however, some differences. The Black Widow used knife-edge bearings in the vertical plane; the MAS-282 uses gimbal bearings. Otherwise, the only differences seem to be cosmetic. So if you were itching to buy a Black Widow but didn't do it before Infinity dropped the item from its line, here's your second chance. And you'll save $50 by having waited; the Infinity Black Widow used to sell for around $245.

There is nothing all that unusual about the MAS-282. It is a simple, straightforward design utilizing a straight arm that looks (and sounds) like carbon fiber, a plug-in plastic headshell, and snug (no rattles) vertical and lateral bearings.

Vertical friction was so low I was unable to measure it (well below 1/10 gram) but lateral friction was a little higher at around ¼ gram. Installation was a breeze, involving nothing more than drilling a single 1-inch hole.

The arm is supplied with two headshell weights for use with low-compliance cartridges, but this is only a halfway solution to the problem of low compliance. Additional headshell weight keeps the stylus/arm resonance suitably low, but it doesn't prevent the cartridge from vibrating the hell out of the arm, relative to the turntable surface. Low-compliance cartridges work best with very strong, rigid tonearms (and preferably with heavyweight turntable structures too). The MAS-282 is simply better suited for use with moderate- to high-compliance cartridges.

The arm handles superbly and performs very well, although some moderate (longitudinal?) resonances in the arm tube impart a slightly bright quality to the sound. My strongest reservation about the 282 has less to do with its actual

performance than with the formidable competition it gets from a $145 arm which in fact sounds rather better than the MAS: the Mayware Formula Four. The Formula Four's viscous damping provides tighter, better-defined low end, and the arm itself imparts somewhat less coloration to the sound. Its main disadvantages are that it is a little bugger to set up properly, and that it must be ordered from the manufacturer in England. Either consideration could swing the pendulum back in favor of the MAS.

Despite my cavils, a very nice to-nearm at an attractive price. **JGH**

ProAc Tablette Loudspeaker System

Two-way design with ¾" Scanspeak ferrofluid-cooled dome tweeter and 4" woofer in resistively loaded ported cabinet. Frequency reponse: ± 3 dB, 70 Hz to 20 kHz. Sensitivity: 84 dB. Nominal impedance: 8 ohms. Power capacity: 80 watts. Dimensions: 10½" H by 6" W by 9" D. Weight: 10 lbs each. Price: $550/pair. IMPORTER: Modern Audio Consultants, 2888 Bluff St., Suite 210, Boulder, CO 80301.

Small enough to fit in a shoebox, these little darlings from England almost manage to redefine the state of the art in *very* compact monitor design.[1] Here's a speaker that isn't as neutral as the BBC-spec LS-3/5a compact monitor, but that does manage to equal or exceed that venerable design in most respects.

To cover the entire audio spectrum with only two drivers is a hard task, and most two-way systems end up with a crossover frequency around 2000 Hz—right in the middle of the critical mid-range octaves. The Tablette, on the other hand, manages to reproduce almost the entire middle range from one driver, with the crossover at 5 kHz.

To ease the demands on woofer cone excursion at system resonance, designer Stewart Tyler has devised a clever rear-facing port that is resistively damped via a bundle of paper straws, which butt against the back of the woofer cabinet. In other words, the back wave from the woofer leaves the cabinet (just as in a standard bass reflex design), but the air has to fight its way through the paper straws, thus accomplishing the damping action.

All listening tests were done with the ProAcs affixed atop their "Super Stands" ($110/pair). Also, as per the importer's instructions, all the screws on the front baffle were tightened—and a good thing, too. Apparently the cabinet "settles" a little after assembly, and the subsequent tightening is needed to avoid any spurious rattles and buzzes. Nevertheless, a sine-wave frequency sweep elicited a persistent buzz from both speakers at around their resonant frequency. Oddly, this was never audible from program material.

Optimum placement was found to be at least 3 feet from any reflecting surface, and slightly toed in toward the listening position.

The Tablettes' strongest point is their middle-range performance. In fact, a more lucid, cohesive and focused midrange is hard to find anywhere. There are no boxy colorations, simply a clear, spacious soundstage. Vocals are reproduced with uncanny realism and resolution, sound sources are well focused in space, and imaging specificity is excellent, both in depth and in lateral positioning. The vertical image isn't quite as good, sounding slightly squashed.

1 See also the report on budget loudspeakers in this issue, and the recommendations therein. Of the seven in that report, however, only the Spendor LS-3/5a is close to being as small as the Tablette.

This is not to say the speaker is perfect—far from it, in fact. One basic problem is with tonal balance. Not only do the Tablettes have no deep bass, but their entire frequency response sounds slightly tilted upward toward the high end. The sound is a bit forward, bright, and thin, tending to emphasize sibilants and other high frequency transients. Associated components that tend toward a bit of brightness become unbearable on the Tablettes; if anything, a somewhat rolled off amplifier or cartridge would be in order, with perhaps a bit of lower midrange warmth thrown in.

Another problem area is the reproduction of musical timbres from instruments whose lower range extends below 100 Hz, where the Tablette's low end droops. The resonance of piano bass is noticeably diminished and cellos sound emasculated, possessing less body and heft than the live instrument. This should be read as an indictment not of the Tablettes alone but of the entire breed of mini-monitors. Like most subcompacts, these cry out for a good woofer to flesh out the bottom octaves. Finding one that blends with them may be a problem. The only one I could find that worked was a homemade pair of subwoofers using 8-inch drivers in an "Isobarik" configuration. While not providing the ultimate in low-frequency extension, the 8-inch drivers are quick enough to blend well with the Tablettes.

At the high end, while the Scanspeak dome tweeter sounds civilized enough, it falls far short of the best high frequency drivers in clarity and quickness of response. The treble range on the Tablettes is good but not great.

Although power-handling ability was remarkably good for speakers of this size, they nevertheless started to show signs of distress at listening levels above about 95 dBA (at 1 meter)—this in spite of maximum allowable power peaks of 150 watts (according to the manufacturer), which does seem to be stretching things a bit. I cannot recommend them for use in large listening rooms.

As readers of my reports may have noticed, I am a fanatic about midrange clarity and imaging. These happen to be the two characteristics in which the Tablettes outperform not only their direct competition, but many more expensive speakers as well. These speakers *do* serve the music more often than not, but they possess such an unusual tonal balance that I cannot recommend them on their own—not, that is, without a woofer. Readers who primarily value a direct midrange and superb imaging, as I do, will really like these speakers. Of one thing I'm certain: the Tablettes must be auditioned prior to purchase. It won't take an extended listening session for you to decide whether the tonal balance problems outweigh the crystal-clear midrange. **DO**

MAGNEPAN MG-III SPEAKER SYSTEM

Magnetic planar loudspeaker system with ribbon tweeter. Nominal impedance: 4 ohms. Efficiency: 84 dB. Recommended minimum amplifier power: 75 watts. Dimensions: 22" W by 71" H by 2" D, not including panel. Price: $2000. MANUFACTURER: Magnepan, 1645 Ninth Street, White Bear Lake, MN 55110.

Ever since high-fidelity sound reproduction began to look possible, loudspeaker designers have been wrestling with the irreconcilable demands of good treble and good bass reproduction. Treble requires that a loudspeaker diaphragm be extremely light, to be able to change direction rapidly; bass requires that the

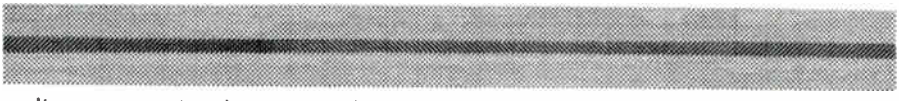
diaphragm be able to move a lot of air, which calls for a large and generally heavy radiating surface.

The earliest solution to the dilemma was separate, optimized drivers—the woofer/tweeter approach first used in cinema sound systems. In these, bass extension was achieved by horn-loading a woofer of moderate size, but when high fidelity started moving into homes in the late 1940s, consumers demanded smaller speaker systems. Since a small horn is worse than no horn at all for LF reproduction, speaker designers started working within the limitations of direct-radiating cone woofers.

They soon encountered a stone wall that has still not been breached. In order to reproduce deep bass, a cone must be large in surface area. But in order to cover a reasonable part of the upper audio spectrum (so the tweeter doesn't have to be excessively large to reach down to the woofer's upper range), the woofer cone must be light in weight. And there is the problem. To achieve lightness, the cone material must be thin and made of a lightweight material, and its affixed voice coil must also be as light as possible. But lightness requires that a voice coil be small, which means it must drive the cone from a small circle near its apex. Lightness in the cone almost always involves sacrificing rigidity.

Thus we end up with a relatively flexible cone of large size, in which accuracy of bass reproduction depends on the whole surface area of the cone moving in unison like a piston, in response to motions applied at its apex. The fact that this is too much to ask has not however discouraged designers from continuing to try. But even today the only way to get deep, low-distortion bass from a direct-radiating cone driver is to opt for a heavy cone with a large, heavy voice coil, limiting its upper-range span to between 60 and 100 Hz—the typical subwoofer.

There *was* an alternate approach—one that some designers had been toying with ever since the early '40s. Called an electrostatic speaker, it applies the driving force uniformly over the entire area of a large, usually flat diaphragm. (The force used is not electromagnetic, as in a cone speaker, but is the electrostatic—the same force that causes the "static cling" which TV commercials warn us about.) Because the electrostatic's diaphragm does not have to convey actuations from its apex to its entire surface area, it does not require stiffness. Thus, its diaphragm can be extremely light in weight (for low mass) and can be limp rather than stiff (for freedom from resonances).



But technology wasn't ready for electrostatics in the '40s. Electrostatics require high voltages, both for the signal and for the polarizing DC charge they need for reasonable efficiency, and the quality of neither the insulating materials nor the signal transformer core materials was adequate back then. It wasn't until the late '50s that full-range electrostatics were good enough and (almost) reliable enough for commercial production. Two such designs were released: by Quad in England and Janszen (later KLH) in the U.S. These earned considerable critical acclaim for their sound but not for their reliability. Neither could produce high sound levels, and attempts to make them do so resulted in breakdowns which were all the more treacherous because, unlike cone speakers, electrostatics give no warning before blowing out.

A young man named Jim Winey wondered if there wasn't a way of duplicating the drive-force uniformity of an electro-

static via the much more reliable electromagnetic principle. At the time, there was a French design attempting this called the GeGo, which used heavy strip magnets spanning widely-spaced strips of ribbon attached to ribs on a flat, rigid panel. Winey's design was similar but used a light, flexible diaphragm and many lightweight wires instead of a few ribbons. It was the first "Magneplanar" speaker.

Along with their very high reliability, which had immediate appeal to people who liked electrostatics but feared breakdowns, the early Magneplanars had extraordinarily clean and respectably deep bass (depending on how many panels were used), plus remarkable purity of midrange performance. But they tended to image poorly because of the multiple panels, and they sounded conspicuously sluggish, as though the diaphragms were taking their own good time starting and stopping. Some audiophiles observed that the sound never seemed able to "break loose from the speakers," and owners kept turning up the volume in an effort to overcome this. It wasn't easy to get high volume out of them, as the Magneplanars were (and still are) inefficient and very current-hungry. Few power amps could cope.

Later Magneplanar models had less of the original slowness but added something new and less pleasant: a very bright, almost hard quality in the middle highs. I developed a distinct distaste for this coloration, and Magnepan got tired of my trashing their speakers in this magazine and didn't bother to send me any more for review . . .

Until now. The MG-III is a 3-way system using Magnepan's proprietary midrange and low-end drivers combined with an incredible-looking ribbon tweeter. It's a single ribbon, almost 5 feet long, and on first inspection it appears to be fastened only at its ends. A closer look reveals that it has tiny stabilizers at 1½-inch intervals along its length, staggered left and right (a left-hand one is always about ½ inch below a right-hand one). This staggering of the ribbon segments minimizes the tendency for standing waves to develop along the length of the ribbon.

The MG-III has an internal crossover network between midrange and bass, but is supplied with either an external high-frequency crossover for use with one amplifier, or a passive electronic crossover (Model X0-1) for biamping. As Magnepan points out, the XO-1 differs from other electronic crossovers: it provides no low-pass filtering for the midrange/woofer. It has level controls for the woofers but feeds a full-range signal to the woofer crossover, whose inductors provide the same rolloff to the panels as when monoamping.

Biamplification normally has two advantages over monoamping. It keeps low frequencies out of the treble amplifier, eliminating a major source of intermodulation distortion and reducing the power requirements of the treble amplifier; and it eliminates the series resistance that is introduced into the woofer circuit by a speaker crossover's in-series low-pass inductor. Normally, woofer-circuit resistance reduces the amplifier's ability to control the speaker's resonances, the most severe of which occur at the low end.

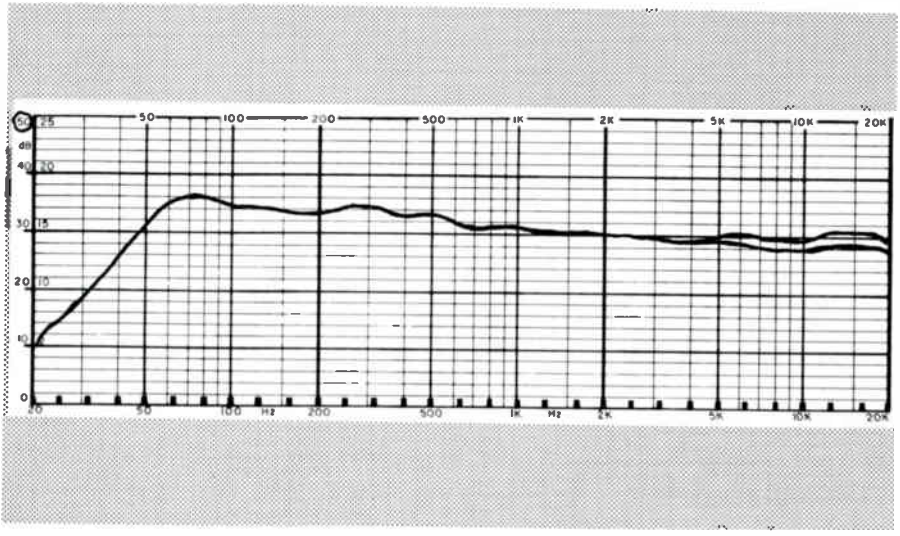
Magnepan doesn't have to worry too much about control of speaker resonance since the panels have relatively little mass and therefore little potential for energy storage. All cone-type woofer systems have a pronounced low-end resonance because of the compliance of their suspension and the mass of their moving system. While this resonance can be mod-

erately damped through the use of resistive ports and absorptive cabinet stuffing, the most potent and readily-available source of damping is the power amplifier, whose low-impedance output acts to short-circuit any electrical signals coming back to it from the speakers.

One barrier that keeps an amplifier from exerting maximum control on a woofer is the "choke" (coil) used in the crossover to roll off the upper frequencies fed to the woofer. Removing the woofer choke, as when biamping, allows the amplifier to exert as much woofer control as it can, and so improves both the bass detail and extension.

the main advantage of biamping lies in getting the bass out of the treble amplifier, which is what Magnepan's unusual electronic crossover accomplishes.

Like most dipole (front-and-rear-radiating) speakers, the MG-IIIs are a little tricky to place properly in the room. With strong reflections from the rear wall competing with the speakers' frontal output, the normal speaker problems of selective cancellation and reinforcement at particular frequencies are exacerbated. Acoustical treatment to deaden the part of the room behind the speakers is the best approach, but that can't help the low-end problems. And even with room treatment,



But a planar speaker is another game altogether. Because its diaphragm does not have to move nearly as far as a woofer cone, it does not need a highly flexible (compliant) suspension. And its diaphragm can have very low mass and high internal damping, both of which add up to virtual freedom from low-end resonance. A planar system requires little if any external damping, and much of what it needs is provided by the air load against its large-surface diaphragm. Thus, in terms of low-end performance, planar systems benefit little from biamping. For them, protracted experimentation is necessary to get the best performance from any dipole.

With the MG-IIIs as they were supplied from the factory, I was unable to get the sound right. It was lucid and detailed, but the overall balance was on the lean side. And there was an even less attractive quality: at any listening level above moderate, the high end took on an unpleasant, sizzling edginess.

I wrote a scathing report and was prepared to cast them into outer darkness and forget about them forever, when I

got a call from Magnepan suggesting that I try a small modification. The mod consisted of a 1.5-ohm resistor assembly which could simply be installed in place of the existing tweeter fuse. The result was little short of miraculous: The sizzle was gone, the speakers were suddenly full and superbly balanced, and I felt moved to continue experimenting with room placement.

I finally ended up with the Maggies dividing the room into thirds—that is, a third of the room length away from the rear wall and a third of the width away from the side walls. Then I worked to improve the imaging through adjustment of speaker angle. Because the low-, mid-, and high-frequency drivers are placed side by side rather than in a vertical line, cancellations at the crossover points are inevitable—imaging is degraded at the outset. The result is a rather fine, multiple vertical-venetian-blind effect. On pink noise (hiss equalized for equal energy through each octave), moving slightly to either side from the center of the listening area caused the image to ping-pong from side to side, not simply in apparent location but in frequency balance: as I moved my head to the side, the sound would first take on a lower midrange coloration, then a treble coloration.

Very careful placement, with the speakers toed in slightly and much attention paid to symmetry, resulted in truly excellent imaging and depth from the central sweet spot, but imaging at any location off center was variable. Merely satisfactory imaging was obtained from an unusually wide listening area, with full retention of channel balance and centering of center information, but imaging specificity from off-center was only fair, and there were slight but perceptible tonality changes which varied according to one's off-center location. For audiophile-quality tonal balance and imaging, this proved to be definitely a one-listener speaker.

It must be emphasized that the speaker positions and orientations that I ended up with were appropriate to my listening room, and will probably not be optimal for other rooms. With virtually any speaker, and especially with dipoles, experimentation is the only way to get the best sound. Symmetry is nearly always necessary. That is, the speakers should be exactly the same distance from the preferred listening seat and should be toed in towards the listener at the same angle. An inch or a degree or two of disparity can impair imaging, or throw the channel balance off by several dB.

For my tests I used the Threshold S500/II Stasis power amplifier, the c-j PV-5, and a variety of signal sources: PCM digital and 15-ips analog tape, Compact Disc, and analog disc.

In conspicuous contrast to earlier Maggies I had heard, the MG-III sounds *fast*. Delicate details are superbly reproduced, and the speaker's high end has almost (but not quite) the kind of airiness I associate with the best electrostatics. Depth and perspectives are very well rendered, imaging (from the listening sweet spot) is stable and specific, and the overall sound is effortlessly clean and lucid.

Massed violins have none of their usual steeliness, sounding pretty much like the real thing. All instrumental timbres, in fact, are very well rendered, except for one thing which I'll mention later. Indeed, except for the effects of lateral position, the MG-III has no distinguishing colorations. Tonally, it is almost perfectly neutral. In terms of balance, the MG-III in my listening room is a little on the cool,

lean side. Although its low-end range sounds flat to around 50 Hz (with usable output to a little above 40), and actually measures somewhat tipped-up towards the bottom, it gives an impression of having a response that is very gradually sloped upwards towards the high end. Thus, recordings that have sounded full and rich, or even bass-heavy, on most other speakers (some Telarcs, for instance) sound fairly neutral on the MG-III, while recordings with a more neutral low-end balance on other speakers sound decidedly shallow on the MG-III. But again I must emphasize that this was in my listening room with the best speaker placement I could achieve. Dipoles are so unpredictable in performance that there is every chance that these could sound neutral or even bottom-heavy in some other rooms. (Acoustat 2+2s are also a hair lean in my room, but not as much so as the Maggies.)

Additional listening turned up little to add to the foregoing. During that period, though, I obtained the Telarc CD *Star Tracks* (music from recent fantasy and sci-fi films), which probably has the widest dynamic range of any symphonic recording that has ever been commercially released. The awesome finales on some of those excerpts were the only signals I could feed the MG-IIIs that caused the woofers to actually bottom out—and at listening levels that were musically appropriate!

The Magneplanar MG-III does so many things so very well that I have had to ask myself why I am not completely bowled over by them. I cannot readily answer that question, except to say that the speakers do not pass my hackle test. At no time did the sound cause one of those involuntary attacks of goosebumps that indicate a speaker has gotten to me on a level below the conscious—the "gut" level. There is a lot I like about the MG-IIIs, but music reproduced through them has never moved me as much as through the Acoustat 2+2s, the Watkins WE-1s, and the Quad ESL-63s—which admittedly cost more than the MG IIIs. In the $2000 price range there are few speakers that I *do* find ultimately convincing (though to my taste the Thiel CS3s do better than the Maggies).

Obviously, this is a matter of taste. The MG-IIIs have received rave reviews from Peter Moncrieff in *IAR* and Martin Colloms in *HFNRR*—two critics for whose judgment I have high regard—as well as a number of other sources. I can only conclude by saying that I hear what they like about the speaker, but it doesn't quite convince me. My reaction may be the result of my listening room, but I'm inclined to doubt it. **JGH**

Author's addendum:
Just before this went to press I tried the MG-IIIs with the conrad-johnson Premier One amplifier, which I had already tried—but before the 1.5 ohm tweeter resistors had been supplied. In that earlier configuration the Premier One had merely exacerbated the speaker's hardness, although certain other aspects of performance were improved (imaging, spaciousness). With the hardness gone, the Premier One was an excellent match in the midrange and high end: the speaker attained a greater degree of liveliness, and the imaging was notably better. The low end of the Premier One, however, does not help out the MG-IIIs; the Maggies are already shy on bass impact and the Premier One emphasizes this tendency. Soon I will try biamping, so I can have $7400 worth of amplifiers hooked up to this $2000 speaker, and will report in a future issue. **JGH**

FRIED BETA SPEAKER SYSTEM

Two-way mini-monitor with 6½" woofer and 2" cone tweeter. Crossover: 1.5 kHz. Nominal impedance: 8 ohms. Frequency response: ±3 dB, 60 Hz to 18kHz. Dimensions: 13½" H by 8" W by 8" D. Price: $250/pair. MANUFACTURER: Fried Products Co., 7616 City Line Ave., Philadelphia, PA 19151.

These are the least expensive loudspeakers I have tested in the 21 years this magazine has been in existence. I did not expect much; after all, what can you buy with $250 minus markup? They are certainly unprepossessing in appearance: simple boxes with two ordinary-looking drivers in each, the only unique feature being Bud Fried's signature plaque behind the black grille where it will remain unseen with the system clothed (grille cloth in place). According to the accompanying literature, though, the Betas embody some of the latest audiophile-level design innovations.

My first impression of these speakers was that they had a very clear, pristine quality. Their high end is soft but very smooth, middles are subtly brash at times but very detailed, with superb imaging and unusually good reproduction of details within complex program material. The low end, as claimed in Fried's literature, was "clear and crisp, [with] dynamic attack and decay." There was no overhang, no mud, no one-note coloration.

Unfortunately, there was also virtually no bass. This is not so much a matter of limited low-end range as a problem with overall system balance. Using the most neutral program material I could throw at the Betas, the persistent impression was of glitter and shimmer overpowering all else. The richness and power of a full symphony orchestra was totally absent. This became a source of some perplexity when I looked at the frequency-response curves I ran on the Betas, because in terms of spectral distribution (upper range versus lower) there was virtually none of the upward-skewing that I associate with the sound I was hearing. I can only guess that harmonic distortion was responsible for the discrepancy, although the system's sound had none of the other earmarks of excessive harmonic distortion: shrillness, irritation, and listening fatigue. The question remains unresolved, as much as I would like to be able to say to Bud, "Fix this and it will sound dandy!"

The Betas proved to be one of the few dynamic systems I've encountered

that do better with most good tubed power amps than with solid-state ones. The warmth of tubes does wonders for the Beta's overall balance, but tubed amplifiers are hellishly expensive and I doubt many folks will be pairing a $2000+ amplifier with a $250 pair of loudspeakers. We've found that the maximum effective amplifier/speaker cost ratio seems to be around 2:1. The Betas would, however, probably be one of the best matches around for the $299 Creek CAS-4040 reviewed here in issue Volume 6, Number 1, although I cannot verify that since the Creek was returned to the manufacturer some time ago.

There is no question in my mind that the Betas provide very good sound for the money—sound that, at this price, might well be unequalled in some respects. On the other hand, it has been my long-standing conviction that there is a price below which it's impossible to even have pretensions to high fidelity, and I think the Betas may be below that price level. **JGH**

PYRAMID METRONOME 11 LOUDSPEAKER

3-way electrodynamic loudspeaker; 8" woofer, 5" midrange, two 2" cone tweeters. Impedance: 4 ohms. Efficiency: 89 dB. Minimum recommended power: 40 W/ch; maximum recommended power 400 W/ch. Frequency response: 38 Hz to 22 kHz ±3 dB. Dimensions: 19" H by 11½" W by 12½" D. Weight: 35 lbs. Price: $500/pair;[2] S-11 stands, $75/pair. MANUFACTURER: Pyramid Loudspeaker Corporation, 131-15 Fowler Avenue, Flushing, NY 11344, (212) 762-1300.

The Met 11 is a modestly priced 3-way system that incorporates some of the design principles I discussed in an earlier review of the Fried Q/2 (Volume 6, Number 4). The most important principle is that the woofer is simply a larger version of the midrange driver. The cone material, shape, treatment, and surround are identical. This suggests that both drivers would have similar "flavors" of coloration, and indeed this proved to be the case: there was no audible discontinuity between them.

Both crossovers on the Met 11 are 1st-order (6 dB/octave) which, if properly executed, produce flat frequency response and no phase shift. The tradeoff is that the slow rolloff requires drivers with wide bandwidth and good power handling. This partly explains the use of two tweeters in this product. The tweeters are not mounted vertically as one would expect, but horizontally, which has three additional benefits.

First, the tweeters have about the same effective width as the midrange. Therefore, their collective dispersion will be about the same as that of the midrange driver in the crossover region; this maintains a smoother response for off-axis listeners and reduces any subjective disparity between the midrange and tweeter. Second, since more of the drivers' energy is directed to the front than to the sides, there is less diffraction from the front panel and grille. Third, this reduced dispersion produces a boost in on-axis treble output that can be used to overcome the losses of the grille cloth.

The grille is in some ways the most interesting part of the speaker! The drivers are mounted in the usual stepped-back pattern for time alignment. The grille follows the step, a feature that not only

2 Just prior to press time we learned from Pyramid that the price for the Metronome 11 is taking a sizable jump to $650. We will follow up this report with an evaluation of the speaker at its new price level.

is attractive but also keeps the grille cloth from reflecting sound directly back toward the drivers, since it's not parallel to them.

Whoever wrote the literature must be congratulated for breaking tradition in *not* describing the grille cloth as "acoustically transparent." There's no such thing! Even the loosely woven double-knit synthetic fabric used on the Met 11 alters the sound, but the Met 11 is the first speaker I've heard that doesn't sound significantly more open with its grille removed. In fact, the opposite is true. With the grille removed, the upper midrange becomes too bright, the bass disappears, all sorts of colorations and oddities of polar pattern appear, and the ideal listening position shifts.

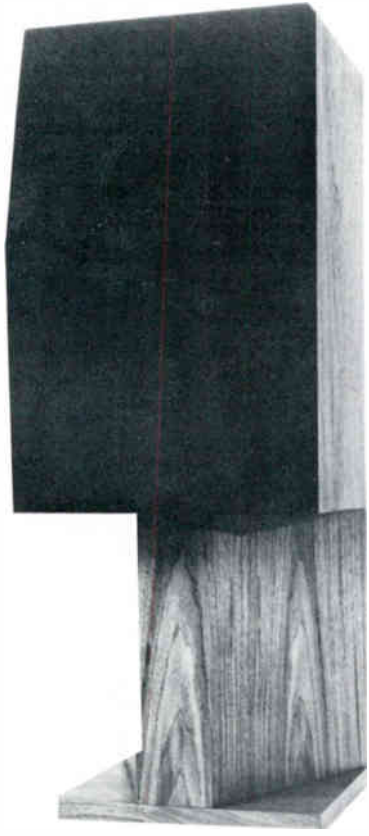
Far from being a flaw, I see this as a mark of design excellence. The grille's

behavior has been so carefully factored into the overall design that it is an integral part of the speaker's operation. The grille is also needed for other than acoustic reasons. The pole piece of the bass and midrange drivers' magnets, and their voice coils, extend forward rather than backward (this is part of something called a "coaxial sheer radiator" that is supposed to extend driver bandwidth), and the grille is necessary to protect these parts. The entry of dirt or magnetic particles into the voice-coil gap could be disastrous. Keep the grille in place!

One other design feature of the Met 11 deserves mention. The usual method for time-aligning drivers is to build a stepped front panel. The complexity and cost of such an approach are obvious. Pyramid simply uses chunks of thick cardboard tubing to position the drivers forward-to-back! This allows the cabinet to be a bit smaller, since the rear of the driver no longer hogs cabinet volume.

There would be no point to this long exposition on the Met 11's design if it wasn't a good speaker—but it is. I feel it's a serious contender in the under-$1000 sweepstakes; that it costs less than $600/pair gives it a real edge, especially for audiophiles who are just starting out.

The overall sound of the Met 11 is on the lean, crisp side. By "crisp," I don't mean simply that the speaker emphasizes the upper midrange (although it does do that a bit). Rather, the sound is free of the euphonic sweetness and richness that mar the sound of other speakers. The



bite of woodwinds and brass and the dryness of strings are fairly well preserved. The sound is very much like that from polypropylene drivers, yet the 11's drivers are made of treated paper!

This absence of euphonic slurring combines with a slightly bright upper midrange to produce a very live-sounding speaker; there is nothing vapid or "pretty" about it. The penalty is that the 11 emphasizes disc surface noise, of both the steady-state and transient kinds. Any distortion from the recording or pickup is likewise exaggerated. As with the Fried Q/2, I did not measure any frequency response rise in the brightness region. The overall response was fairly smooth, with the usual slight peaks and dips characteristic of all but the best speakers. The top extended to 15 kHz, after which it rolled off smoothly at 12 dB/octave. It was down about 6 dB at 20 kHz.

At the other end of the spectrum, the speaker at first appeared to have little midbass, and almost no low bass. Further listening showed that these regions were present, but depressed. (The effect is of a response shelf rather than a rolloff.) The bass that *is* reproduced has great detail and openness, free of boom, muddiness, or hangover.

Imaging is another strong point of the Met 11. Instrumental positions are sharply defined, with no tendency to wander. However, moving away from center produced a loss of sharpness, along with some very slight "vertical venetian blind" effects. The listening window is wide enough, though, to accomodate two or three listeners comfortably. The system is free from the effect called "speaker detent" in which sounds originating near one speaker seem to come directly from it. Although this effect is partly due to the nature of stereo recording, it can also be caused by diffraction and panel reflections in the speaker, both of which are kept low in the Met 11.

Low diffraction and panel reflections also contribute to open, spacious sound. The reverberant energy relates well to the direct sound, particularly with simply miked, carefully engineered recordings, and contributes to a realistic reproduction of ambience. Each instrument is sharply positioned but still has an apparent width; it doesn't collapse to a featureless point of sound.[1] This contributes to the sense of realism with better recordings. The 11 also creates a good illusion of depth, and this, combined with the excellent ambience, produces realistic stage effects on better recordings.

Dynamic range and power-handling capability were both outstanding. The speakers took in stride everything I threw at them, including dbx-encoded discs and digital master tapes. The volume could be turned up to really exciting levels with only slight compression or "gagging." (The 11 has a 6-ampere fuse. At a nominal 4-ohm impedance, this translates into an average power of 144 watts before the fuse pops!) At higher levels there was some added hardness or brightness, as the harmonic distortion of the midrange and tweeters increased. Dynamic contrasts were good, too. Sudden orchestral outbursts were handled with aplomb.

The 11 has no perceptible vowel colorations. A slightly hooded quality to the midrange was heard occasionally, but this seemed to be caused by the mixture of slight colorations in the speaker with colorations from a particular recording. Applause was uncolored, but voices had

1 The widening heard on the Met 11s is not a smearing of the image, but rather a normal and proper effect. Even if the direct sound arriving at the microphones (or your ears) is virtually identical left and right, the reverberant indirect sound will not be. In fact, studies have shown that listeners prefer halls with ambience that creates large inter-aural differences. These differences in ambience cause the image to broaden slightly, a very agreeable effect.

a slight chestiness or boxiness, probably a side effect of the cardboard spacing tube described above. The lean midbass, combined with the alive upper midrange, were judged to nicely complement early stereo recordings (of the late '50s and early '60s), which tend toward an overly warm sound that can also be a bit lacking in transient snap. The 11 made them sound more alive without removing too much of their luscious richness.

Current versions of the Met 11 have a tweeter level control. It gives a shelved response above 7.5 kHz of about ±3 dB. No recommendation was given for a normal setting; the flattest subjective response was at about 9:00 o'clock. Obviously, the setting is going to depend on your room acoustics, associated equipment, and personal taste.

The 11s were supplied with the Metronome S-11 stands, which did, indeed, position the speakers for best tonal balance and imaging. In the right position my ear canal was exactly 40 inches above the floor. Since the S-11 stand is not adjustable, be sure before buying it that it delivers the best sound when you are sitting the way you like to sit. If not, you should get an adjustable stand (such as the Levitation, described in Volume 6, Number 4), or design something to taste.

The Met 11 does have some problems. Although there are no vowel colorations, the speakers nonetheless sound colored. Compared to something as smooth as an Acoustat, they seem lumpy. Compared to the best (which for me is the Acoustat 6), the sound is a bit mechanical and artifical, as if I'd been taken several steps further away from live sound. The result is that it takes a few minutes of listening to adjust to the 11, and apparent sonic differences among re-recordings sound quite good, while mediocre records sound worse than they should.

The other problem is that the 11, like most speakers, tends to lose the character of instrumental sounds. For example, I recently recorded a fine performance of "The Swan of Tuonela"; the conductor's sister played the English horn solo superbly. With the Acoustat 6s, the reproduction was almost perfect; the horn sounded like that particular instrument played in that hall. With the 11, much of the distinctive character was lost; it could have been almost any English horn in any hall. It did, however, sound like an English horn, which is more than you can say for many $500 speakers!

I do not raise these points to denigrate Pyramid; after all, one does not expect perfection from speakers that cost $250 apiece. Rather, I want the reader to better understand the differences between "good" inexpensive speakers and "good" expensive speakers. Nor do I think it fair to praise what is right about a speaker and then ignore its defects, even though they may be common for speakers in that price range.

I hope the designer of the Met 11, Richard Sequerra, will try his hand at a somewhat more expensive speaker design (say, $800/pair) that attempts to solve the most significant colorations remaining in the 11. Such a product could be stiff competition for virtually any other dynamic speaker. In the meantime, the Met 11s are not only very good, but also very good value for the money. They are worth a careful listen. **BS**

THE RAUNA TYR LOUDSPEAKER

Two-way bookshelf speaker system in concrete enclosure. 6″ woofer, 1″ dome tweeter. Frequency range: 40 Hz to 20 kHz. Power capacity: 60 W. Sensitivity: 90 dB. Impedance: 8 ohms. Dimensions: 13¾″ H by 11″ W by 10½″ D. Weight: 30 lbs each. Price: $395/pair. IMPORTER: Scandinavian Sounds, P.O. Box 3656, San Clemente, CA 92672. (714)498-0709.

Loudspeaker designers have been fighting the good fight against panel flap ever since they started putting cones in boxes.

The first choice has always been wood, simply because it is readily available in sheets and is easily cut to size. But wood, like every easily cut paneling material, is flexible and fairly resonant, and responds to changes in internal cabinet pressure by flexing and resonating. Because the sides of a cabinet have substantial area (always larger than that of the drivers themselves), these disturbances are efficiently radiated into the listening area, causing colorations and smearing of detail. Bracing and damping both help, but neither can completely eliminate the problem.

For many years, concrete has been seen as the ideal cabinet material in terms of its acoustical properties. Its disadvantages are also obvious: it must be molded into its final shape (rather than conveniently cut with a saw), and is absurdly heavy relative to the system's size.

High-end audio tends to view as secondary such practicalities as the ease of moving something around, yet few firms have produced concrete speaker enclosures; but the Swedish Rauna company joins the relatively new American firm of Essence in producing the only ones currently available. Rauna offers three models: the Leira and the Njord, which somewhat resemble ventilator pipes on ocean liners, and the more conventional looking Tyr.

Unlike most mini-monitors, which are usually designed for free-standing operation, the Tyr is optimized for placement against the rear wall or on a wall-mounted shelf, preferably a couple of feet above the floor.

Many years ago, I got into the habit of spot-assessing the rigidity of speaker enclosures by rapping the sides and top with my knuckles. With the Tyrs, this elicited a surprise. Since all vertical faces of the speaker are covered with a kind of foam plastic, knuckle raps elicited no sound whatsoever from those surfaces. The top, however, produced a markedly resonant, very UN-concretelike *tock* sound. The top panel, it would seem, is a thin layer of some plastic material, with a hollow area beneath it. Presumably there is concrete under this, so the resonant flexibility of the top panel will not be

excited by internal cabinet pressures, but the very presence of such a marked surface resonance on a speaker whose major asset is supposed to be enclosure deadness took me a little aback.

One of the Tyrs I received had a dab of orange paint on one input connection to identify the Hot side, the other speaker did not. I suggest making the connections to the speakers with both turned upside down and facing the same direction. Hot should go to the same-side terminal on each speaker.

And before I get into a discussion of the Tyr's sound, I have another gripe. The speaker wire connectors are unlike anything I have encountered before, and I would not be unhappy if I never encounter them again. The terminals are located in a large ½-inch-deep recess in the bottom of the enclosure, which is fine. But the connectors are two protruding tabs through which screws run *horizontally* (parallel to the bottom of the speaker). That's right; the tabs are vertical to the bottom of the cabinet, which means that you cannot attach any loudspeaker cable that has spade lugs, unless you can bend the lugs at a 90° angle. I suggest that either you or the manufacturer simply bend the terminals sideways so that they are horizontal and the screws are vertical.[1]

Then there's the channel through which the speaker cables emerge from under the Tyr. This is too narrow to accommodate most of the high-quality speaker cables audiophiles are using these days. I had to prop the Tyrs up on a few paperbound books to get them to stand upright, which looked like hell! I am amazed that neither the manufacturer nor the importer saw fit to correct these minor but very irksome hitches before marketing the speakers.

Okay, then, how do the Tyrs sound? They sound almost astonishingly good. Not surprisingly, they image very well, although not quite as dramatically well as some speakers I've heard lately (the ITC1s, the M&K Satellites, the Spicas, and the Thiel CS3s). Images are stable and properly placed across the stereo "stage," but are not as unambiguous and tangible as I have heard them from those other speakers. On a good recording, no sound sources appear to coming directly from one or the other speaker, but from somewhere between them, which is as it should be.[2] Switching to mono, however, reveals a slight lack of imaging specificity, which shows up as a broadening of the center image.

Apart from that, the most immediately striking thing about the Tyrs is their musicality—and I don't mean that in what has unfortunately become its pejorative sense, of "euphonic coloration." The speakers are superbly balanced (when properly placed in the room), they reproduce *all* instrumental timbres with startling accuracy, and they give an uncommonly convincing illusion of listening to live music. They have that rare and precious combination of sweetness and spiky edginess that characterizes live-instrument sound, and are almost perfectly neutral in terms of perspective,

1 The importer informs us that, partially due to our criticism, the input connectors for the Tyrs have been changed to "banana jacks," which will accept banana plugs but not the other cable terminations which work with 5-way binding posts. With the banana jacks as implemented on the Tyrs (that is, with little recess) it is necessary to use individual banana plugs which hook on to your speaker wire by way of spade lugs, rather than speaker wires with built-in banana plugs or dual banana plugs.

2 In my experience, speakers that image truly well locate a considerable number of sound sources to the rear and beyond the outside edge of each speaker, just as if the speaker "disappeared" and the room boundaries were the only limit to location of sound sources. Sometimes this means room boundaries even larger than the listening room, depending on the recording. **LA**

sounding neither overly close nor distant. Yet their reproduction of depth and front-to-back perspectives are as good as from any system I have heard. The Tyrs do not have the typical (of hi-fi) hot high end, and sound almost as open and extended at the top with good tubed amplifiers as with solid-state amps. Tubes merely add a slight, attractive bloom to the low end, and give the high end somewhat greater delicacy. This is one of the few speakers I've heard that works well with both tubes and solid-state.

The rated 40-Hz lower limit sounds like a realistic specification. The Tyrs have real impact at the bottom, and can produce a satisfying amount of pressure from bass drum and string basses. Only the musical foundation, which produces the pressure wave from bass drum and the feeling of size in a large hall, is missing. Like the original Quads, the bottom deficiency of the Tyrs seems to be largely offset by the *quality*—the tightness and detail—of the low end.

Detail through the rest of the range is very good but not superb—not equal, for instance, to that from the Spica TC-50s (reviewed here by Tony Cordesman in Volume 7, Number 2). I find the lower treble from the Tyrs more agreeable and natural than the slight steeliness of the Spicas—a difference that shows up most readily when both are reproducing massed violins played with great vigah.

The Tyrs are not entirely without coloration. There is a very subtle snarly quality to the sound, which adds a touch of drama to brasses and piano strings but also gives a hint of leanness to the sound of voices and massed violas. I emphasize that this is not a pronounced aberration—it merely imparts a slight flavor to the sound that I personally did not find unattractive.

I have a feeling that the Tyr's 60-watt maximum-power rating is overly conservative. I listened to some very high-powered material (Sheffield's *Drum Record* and RR's *Symphonie Fantastique* and *Dafos*), at rather high levels approaching 100 dB on peaks (from a 200-watt/channel Premier 1), and never once heard signs of strain from the speakers. No woofer-bottoming snaps, no mud, no shrill edge. Just hair-raisingly clean, powerful sound. This is quite amazing performance from a pair of 6-inch woofers!

All in all, these are most remarkable little speakers which, uncommonly, will appeal to audiophile and music-lover alike. They can be enjoyed for their musicality at moderate listening levels or for their ability to give you goosebumps at higher levels with bombastic showoff fare. Despite their few shortcomings, these are most highly recommended. **JGH**

7 BUDGET LOUDSPEAKERS

The speakers in this survey range in price from $300 to $500 per pair which makes them less than extremely budget (e.g., the Boston Acoustics A40 at $150/pr.). It *has* been my experience that $400 or thereabouts is about the least one can pay for a pair of speakers with the expectation of audiophile-calibre sound.

Design constraints are quite serious in this price range. Cabinet size must be

kept modest so that lumber and finishing costs are kept to a minimum. Driver quality and crossover complexity must be juggled so that no one design parameter is favored over the others. All of the speakers reviewed here use two drivers because two good drivers are better and usually cheaper than three mediocre ones—not to mention the simpler crossover required.

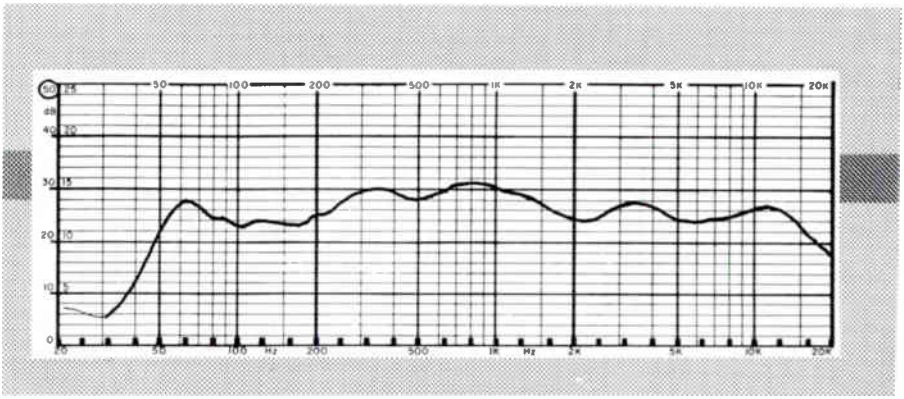
Unsurprisingly, none of the contestants in this sonic sweepstakes comes close to state-of-the-art. To begin with, it is a given that no small speaker will produce deep bass. No one has yet found a way of circumventing that law of physics that says "To move lots of air, one needs a large radiating surface or extremely large cone excursions." Neither has anyone found a way of getting no-holds-barred sound from high-cost-barred drivers. "Budget" always involves significant compromise, beyond the compromises imposed by the laws of physics.

These cautions notwithstanding, several of these systems represent unusually well-advised sets of performance tradeoffs which add up to uncommonly good performance for the price; I can recommend my two top choices without hesitation to audiophiles on a tight budget.

Listening tests were carried out in my 14′ by 20′ living room. The sound source was primarily analog records played on my Pink Triangle turntable, and the cartridge was a Sao Win strain-gauge model fed directly to the power amplifers. I have found this cartridge to be tonally neutral—in fact, one of the most neutral I've heard—as well as very fast, but lacking the somewhat "zingy" top end of many moving coils. I used a variety of power amps to audition the speakers, all of them likely candidates (from a cost standpoint) to be used with $300-500 speakers: the PS Audio 2C-Plus, the VSP Labs 150, a Futterman OTL, and the B&K ST-140. The speakers tested are reviewed below in alphabetical order.

THE AUDIO CONCEPTS JC-CM COMPACT MONITOR

Two-way closed box with pressure release vents. Drivers: 6½″ Peerless polypropylene woofer, 1″ Dynaudio dome tweeter with ferrofluid cooling. Impedance: 8 ohms. Response: ±3 dB, 55 Hz to 20 kHz. Dimensions: 16″ H by 16″ W by 8″ D. Weight: 18 lbs. Price: $389/pair. MANUFACTURER: Audio Concepts, 1631 Caledonia St., La Crosse, WI 54601



It is readily apparent that an honest effort was made here to provide good value for the money: very decent drivers, nicely finished cabinets, and premium-grade parts for the first-order (6 dB/octave) crossover. In all fairness, the JC-CM has to be considered a decent speaker for the price, and in general does not irritate. Unfortunately, its sound is far from neutral. Woody, hollow colorations dominate in the lower midrange, the midbass lacks definition, middle-range transparency is only average, and clarity is below average, getting worse as the speakers are driven harder. The treble is lively, slightly grainy, and tends to hardness.

Perhaps a few years ago this speaker from Audio Concepts could have been recommended in the sub-$400 price range, but I feel that currently it does not justify a recommendation. The Bill Reed 6-02s (reviewed in Volume 5, Number 3) cost less and to my ear sound better.[1] The pair of JC-CMs reviewed here is the third version to arrive in Santa Fe; LA, who auditioned the previous two pairs, reports that the current version is definitely the best. Audio Concepts should keep trying.

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1 Or you might look at the Spectrum 208As for $295 (reviewed in Volume 6, Number 9). They're still being made and according to our memory (they weren't on hand for direct comparison) would fare very well in the under-$400 part of this survey. **LA**

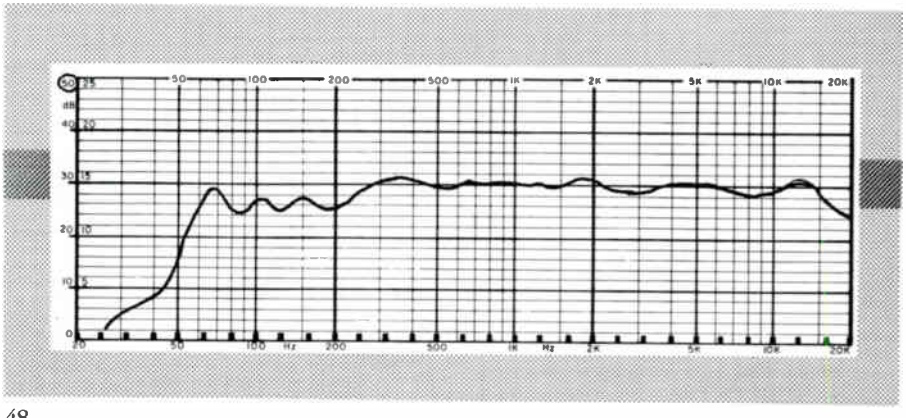
CASTLE ACOUSTICS "CLYDE"

Two-way bass reflex. Drivers: 5½" paper cone woofer and 1½" plastic cone tweeter. Impedance: 8 ohms. Dimensions: 15" H by 8½" W by 8" D. Weight: 8.5 lbs each. Price: $295. IMPORTER: May Audio, 646 Blvd. Guimond, Longueiul, Quebec, Canada, J4G 1P8.

The Clyde is the cheapest, cutest, and lightest-weight of all the speakers in this survey. It is beautifully finished in wood veneer, and on all surfaces!

So far so good, you say, but how do they fare sonically? Only fairly well. Generally, their sound is light and a bit thin, with a depressed midbass region. The midrange is pretty clean with decent resolution and transparency, while vocals are reproduced quite well and with good focus.

At moderately high listening levels (loud enough to discourage quiet conversation) a brittle distortion creeps in around 5 to 8 kHz, and treble sizzle becomes increasingly evident. Despite my good first impression of the Clydes, I



subsequently found them fatiguing to listen to for long periods.

Since these *are* substantially cheaper than any of the other systems tested for this report, it isn't surprising that the Clydes come out less well than speakers where the designers had more resources at their disposal. Nevertheless, I find it difficult to recommend them. Perhaps if their problems weren't in the range which tends to fatigue the listener I could be more positive. In this price range I found the Bill Reed 6-02s to be really quite a decent speaker, if not the equal of the best speakers in this survey. LA and JGH report that the Spectrum 208A is also substantially better than the Clyde, at approximately the same price.

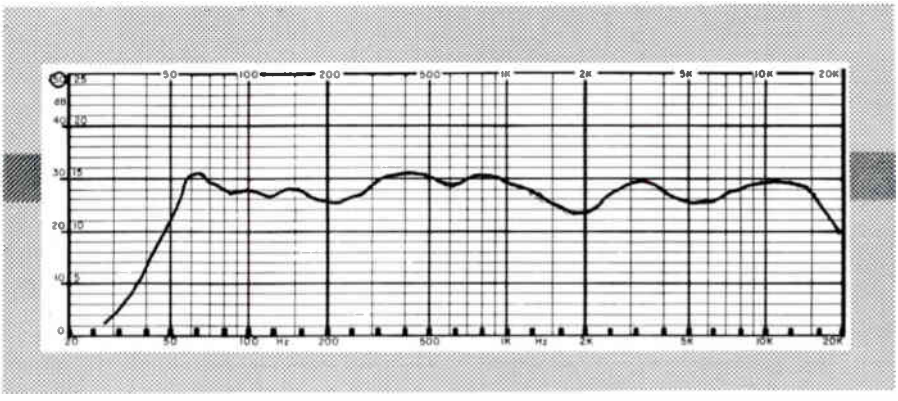
FANFARE ACOUSTICS TEMPO

Two-way time-aligned bass reflex. Impedance: 8 ohms. Claimed response: ±3 dB, 45 Hz to 21 kHz. Dimensions: 25½" H by 12" W by 11" D. Weight: 31 lbs each. Price: $498/pair. MANUFACTURER: Fanfare Acoustics, 4550 Arrow Highway, Unit 4H, Montclair, CA 91763.

The instructions enclosed with the Fanfare Tempo confidently assure the purchaser that "you have purchased what we believe to be the finest dynamic loudspeaker available in the world today." Although the Fanfare has some things going for it, I can safely say that the Fanfare Owner's Manual is not accurate in its assessment of the "finest dynamic loudspeaker."

It is, however, a decent loudspeaker. The Tempos have a spacious and well-integrated sound that I find very appealing, and its long-term listenability is not unduly diminished by a slight roughness and brightness in the mid-treble region. There are enough problems in the critical midrange, though, to preclude a strong recommendation. The midrange is slightly withdrawn and distant, not quite "on" with regard to accuracy of musical timbres, and somewhat opaque. Additionally, there is a slight boominess and blurring of transients through the midbass, perhaps because of the bass-reflex design.

The Fanfares, it should be pointed out, are not exactly the bookshelf speaker that typifies this group: they are a good 2 feet high and weigh a hefty 31 lbs each. That, plus their near-$500 price tag, led us to expect performance near the top of this group, which they unfortunately don't provide. The Tempos are, however, a decent and promising first product from Fanfare which only narrowly misses the mark.



FOURIER MODEL 6

Two-way bass reflex. Drivers: 6½" polypropylene woofer, 1" soft-dome tweeter. Impedance: 8 ohms. Dimensions: 17¾" H by 9½" W by 10⅜" D. Weight: 21½ lbs each. Price: $499/pair. MANUFACTURER: Fourier Systems, Inc., 540 Nepperhan Ave., Yonkers, NY 10701.

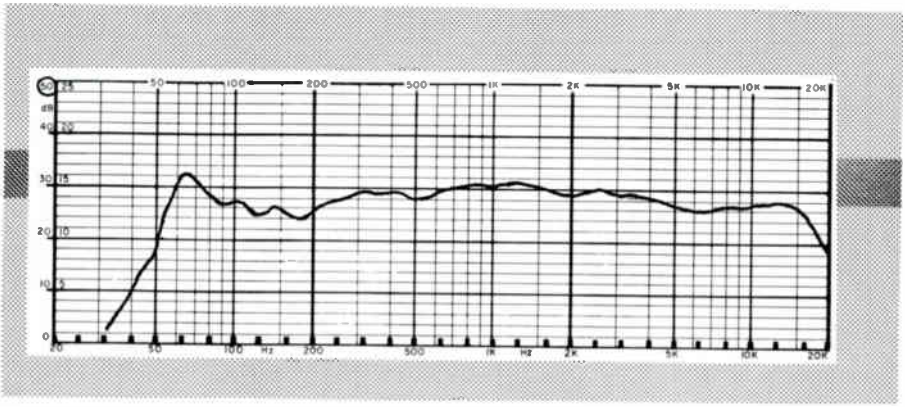
While he was editing and publishing *The Audio Critic*, Peter Aczel became so disenchanted with the available audiophile loudspeakers that he decided to show the industry how to produce a moderately sized and priced system. The result was the Fourier 1, which aroused extensive critical discussion as to both its sonic merits and the ethics of promoting one's own speaker in one's own magazine (Aczel favorably reviewed the Fourier 1 in one of the final issues of *Audio Critic* before revealing that he was in fact one of the owners of Fourier). Since then there have been several more Fourier models, of which the 6 is the smallest—and perhaps the best.

Peter obviously did his homework on this one; the Fourier 6 is without a doubt one of the best in this group of speakers, while at the same time it's the most expensive. In my opinion, it redefines in some respects the standards by which all speakers in this price range must be judged.

Middle-range clarity, freedom from distortion and colorations, and resolution of detail are all excellent. Tonal balance is realistic despite the absence of any deep bass. The soundstage is open, dynamic and transparent, with imaging that is precise and quite stable.

This is not to say the 6s are perfect. Some ringing is detectable on transients, and the treble, although fairly extended and open, sounds slightly grainy. There are some mild, "boxy" lower midrange colorations, and—most seriously—midbass definition suffers from rather noticeable "overhang." Overhang occurs because the low frequency driver doesn't stop moving as soon as the input signal would have it stop, and is characteristic of bass-reflex systems—though in most such systems it shows up more seriously as "one-note bass" and frequently disqualifies them completely as high fidelity reproducers.

Overall, though, the Fourier 6 is a fine performer, comparing favorably in some respects with speakers costing as much as $1000 a pair. On stands, and placed away from reflecting room surfaces, the 6s offer, to my mind, a level of performance not previously available from any speaker system of this price. In Volume 7, Number 3 LG went into a comparison of the Fourier and the Spica TC-



50, another much talked about speaker costing only $420. Since the Spica has already been discussed twice in these pages (see also Volume 7, Number 2), I didn't include it in this survey. I have listened to the TC-50, however, and would have to come down more heavily in favor of the Fourier 6 than did LG. To my ears the Spica, although it does image very well, lacks significant impact at the low end and clarity in the midrange. This lack of clarity in the midrange I find too off-putting; I prefer the errors made by the Fourier 6 in portions of the frequency range that I think are less significant. The Fourier 6 is highly recommended.

HEYBROOK HB1

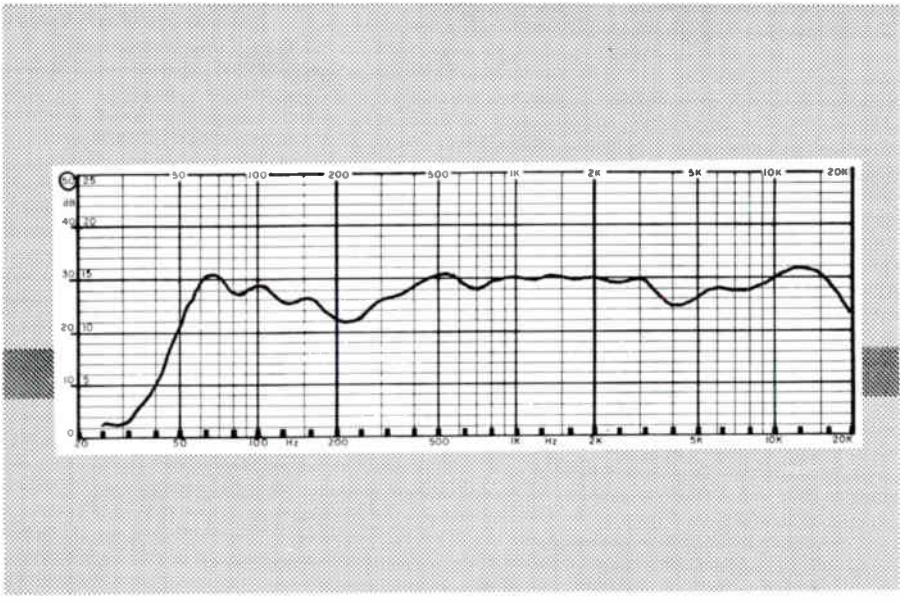
Two-way, sealed enclosure. Impedance: 8 ohms. Dimensions: 18½" H by 11½" W by 9" D. Weight: 20 lbs each. Price: $339/pair. IMPORTER: D'Ascanio Audio, 11450 Overseas Highway, Marathon, FL 33050

These little speakers are nicely finished and attractively priced, but their sound is just not for me, thank you very much.

The HB1s are colorful-sounding speakers with a hi-fi-ishness that is sure to impress a first-time listener. There's enough punch and forwardness to please any JBL fan.

The midrange is quite listenable with good transparency and resolution but only average focus. The midbass is prominent and muddy. From 5 kHz on up, the response is razor sharp, suitable only for those of you out there who really enjoy a close shave. The treble is etched and aggressive in character.

Apparently the HB1s have received a lot of good press in the U.K., which frankly leaves me baffled. While they would certainly stand out of a crowd in a typical showroom situation (which is maybe the whole idea of their design), the sound of violins is steely and hard and Amanda McBroom's voice, for instance, sounds harsh and shattery. Definitely not my cup of tea.



PHASE TECH PC-60

Two-way system in sealed enclosure. Drivers: 6" flat solid piston woofer, 1" soft-dome tweeter. Impedance: 4 ohms. Dimensions: 13¼" H by 8" W by 8" D. Weight: 12½ lbs. Price: $400/pair. MANUFACTURER: Phase Technology Corp., 6400 Youngerman Circle, Jacksonville, FL 32244. (800) 874-7076.

Judging by the excellence of the finish on our review samples (I love the light oak veneer), this would not appear to be the product of a novice company. And indeed, Phase Technology has been in business for almost 30 years, most of this time under the name of United Speaker Systems. Why then aren't these names familiar to you? Well, because for all those years the company has been designing and fabricating speakers for other manufacturers, starting in 1959 with Fisher Radio, and since then for MacIntosh, Yamaha, Pioneer, Electro-Voice, Dynaco and others—brand names well known to all of us. Designer Bill Hecht, who by the way holds the US patent on the very popular soft-dome tweeter, must be one of the least well known "grand old men" of audio.

The PC in the model designation stands for phase-coherent, and the accompanying literature makes a great deal out of the system's phase linearity. I am not convinced of this. It is true that the woofer's flat front face is in the same plane as the soft-dome tweeter, but this in itself does not guarantee a time-aligned design. In fact, it is usually a guarantee that the drivers are not time-aligned. Driver inertia and crossover phase shift must also be taken into account, and the correct driver placement is rarely that which puts them in the same plane. On the other hand, I've found that phase coherency goes hand in hand with the ability to reproduce soundstage depth, and the PC-60s are excellent in that respect.

The novel woofer cone used here is a single, solid piece of expanded polystyrene—a material which combines great rigidity with a high degree of internal damping. The result is a "cone" which behaves much like an ideal piston radiator, with significantly reduced possibility of flexing and breakup.[2]

We tested two versions of the PC-60. The second version came about partly because of criticisms we made of the first version. No surprise: we liked the second version better. In the earlier speaker (serial numbers 3801 and below) the range covered by the unusual woofer was excellent, but above 2 kHz there was a broad suckout extending from 2 to 10 kHz. This had a drastic effect on tonal balance, making the sound distant, lifeless, and fairly Blah. Brasses lacked the requisite bite, and violins were so silky-sweet they sounded like violas. The timbres of all instruments were affected: the sound was dark and closed-in.

Fortunately the second and current version of the PC-60 incorporates a revised crossover network which greatly improves matters in the range above 2 kHz. The portion of the frequency range handled by the woofer is still a delight. Midbass is quick, detailed, and remarkably clean, with no trace of boom or overhang. Lower-midrange resolution, transparency, and focus are very good. This is perhaps one reason why the PC60 does a better job of reproducing hall acoustics than any of the other small

2 "Breakup" is the term used to describe the tendency for a speaker diaphragm to vibrate in sections rather than as a whole. In breakup mode, adjacent areas of the cone vibrate in opposition to one another, with some segments moving outwards when others move inwards and vice versa. This causes severe selective phase-interference cancellation at certain frequencies, raising merry Ned with the speaker's response linearity and radiation uniformity, and destroying its ability to image accurately.

speakers I know of. The soundstage is wide with good height and excellent depth.

The broad suckout of the first version is gone but there are still some minor flaws above 2 kHz, the most serious of which is a wiry quality noticeable on string overtones. There is also a slight brittleness to the sound which extends through the presence region (5-8 kHz). The upper treble lacks delicacy and is slightly closed-in and dark in nature, but these problems are not so great as to preclude a recommendation.

Phase Tech offers a separate subwoofer with a built-in crossover, for a modest $250. Since the lower octaves of the PC-60 are already so good, the subwoofer does not make a night-and-day difference; it does extend the speaker's performance to a subjective 40 Hz, which significantly augments the system's reproduction of orchestra. This same statement could be made with respect to using a subwoofer with the other speakers reviewed here, though getting a good match is always difficult. The only problem caused by the Phase Tech subwoofer is an occasional instance of image wander.

Overall I find the PC-60s to be nicely balanced and eminently listenable. The lower range just beats the pants off the present competition. Enough said—this speaker also is highly recommended.

SPENDOR LS3/5A

Two-way system in sealed box. Impedance: 8 to 15 ohms. Dimensions: 12" H by 7½" W by 6¾" D. Weight: 10½ lbs each. Price: $450. IMPORTER: RCS Audio International, 1055 Thomas Jefferson St. NW, Washington, DC 20007

The now-classic BBC-licensed LS3/5a has been produced by more different manufacturers through the past 10 years than any other system in the history of audio. It is now being made under license by Spendor, Rogers and Goodmans, all English firms. To my knowledge, only the Rogers and Spendor versions are being imported into the US.

Although the generic LS3/5a has been reviewed many times in many places, I included it in this report to ascertain how, 10 years after its introduction, it stacked up with current designs. It stacks up quite well.

The imaging is still exceptional, with excellent focus across a wide soundstage. Midrange transparency and clarity are still very good by today's standards, and the speaker really excels on vocals. The KEF T27 tweeter does show its age, being somewhat rough and harsh above 5 kHz. And the speaker's midbass is still messy—tubby and underdamped. Power handling is very limited; material with heavy bass content cannot be reproduced at above moderate level without bottoming-out the woofers. Many solid-state amps, I have noticed, have a tough time driving these speakers, presumably because of the difficult impedance presented by the complex crossover. Tubes are usually the better choice. My feeling is that the LS3/5as still badly need a woofer, and are best used as satellites in a biamped system. The problem is that the exaggerated mid and upper bass of the design makes it almost impossible to mate with a subwoofer, unless it were one specifically designed for this speaker.

Used within the limitations noted above, though, these can still be recommended for their middle-range neutrality, clarity and imaging—but they no longer have the field to themselves.

SUMMARY

None of the speakers costing less than $400 (the Audio Concepts, the "Clyde," and the Heybrook) did all that well in our listening tests. There is no doubt that

it's difficult to design a good speaker in that price range, and that those manufacturers have carved out for themselves a difficult task. There *are* a few good speakers in that price range, however, and we will have to continue to recommend them, in favor of any of these three, until we hear better.

The Fanfare "Tempo" did better than the under-$400 speakers, but its price puts it directly in competition with the Fourier 6, the Spica TC-50, the Dayton-Wright LCM-I (reviewed in Volume 7, Number 2), the Met 11, and the Phase Tech PC-60. In that group the Tempo did not stand out, though the speaker is promising enough that some evolution in design might make it a significant contender.

Of the speakers tested, the Fourier 6 and Phase Tech PC-60 emerge as clear-cut winners, with the Spendor LS3/5a running a not-too-close third. The PC-60 excels in the bottom octaves, while the Fourier 6 does better through the top range. At $400/pair, however, the PC-60s qualify as the best buy amongst this group of speakers. **DO**

Editor's Note:

Although it is obviously a difficult task to design a satisfactory speaker system to sell for $500 a pair or less, most of the speakers in this survey gave a suprisingly good accounting of themselves. Practically all of them are superior to the majority of systems selling for under $500 a pair, while a couple—the Fourier 6 and the new version of the Phase Tech offer stiff competition for products from better known perfectionist manufacturers.

Both the Spica TC-50 and the Dayton Wright LCM-1, priced at $420 and $499 respectively, were reviewed in Volume 7, Number 2. They are quite different in sound, and offer performance in certain respects not available from any of the six speakers covered in DO's 7-speaker report. The Dayton Wright, for example, has by far the best low end of any of these systems, ranging from an honest 55 Hz in some rooms to a usable (though weak) 40 Hz in others. The Spica is better in detail, imaging, and depth presentation than any of the others, but has a somewhat lean sound overall, reflecting a gradual but broad low-end taper, in contrast to the fuller midbass but more sharply falling low bass of the other systems.

I was particularly impressed with the midrange accuracy of the Fourier 6. More forward than any of the other highly rated units, the 6s reproduce voices and individual instruments with an almost-palpable you-are-there quality that bordered on the spooky. Highs and extreme highs were a trifle hot on CD sources but almost perfect on tape and analog disc.

Of all the speakers in this price range that we have tested, the real sleeper may well be the $395 Rauna Tyr from Sweden, a unique concrete-enclosure design which combines an almost perfect set of design tradeoffs to produce a superbly balanced and neutral sound. We regret being unable to compare the Met 11 reviewed by Bill Sommerweck to these speakers.

Finally, we should call your attention to the fact that there are a few—very few, in fact—loudspeakers costing under $350 which are comparable in most respects to the ones recommended here. One is the Spectrum Acoustics 208A, another the Bill Reed 6-02. One of the rewarding aspects of reviewing high-end components is to see real choices in a price realm where we couldn't recommend anything 3 years ago. Granted, all of these designs involve necessarily drastic compromises in some areas of performance, making the choice between them heavily dependent on personal taste. Thus our recomendations here are, more than usual, subject to the caveat that auditioning prior to purchase, in your own home if possible, is necessary for long-term listening satisfaction. **JGH**

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AN INTERVIEW WITH KEITH O. JOHNSON

by J. Gordon Holt

Keith Johnson is the man responsible for the records issued by Reference Recordings, from Professor Johnson's Astounding Sound Show *through* Tafelmusik—*not to mention upcoming releases of* Your Friendly Neighborhood Big Band *and Respighi's* Church Windows. *As is frequently the case, Johnson's astounding recordings result from his intimate (molecular level) knowledge of the process with which he deals and his ingenious adaptations to squeeze the most out of available (and not so available) technology. He is also one of the few critics of digital recording who has actually used a digital recorder, who has run tests to specifically identify digital's problems, and who would welcome a digital format that works as perfectly as the claims would have us believe the current system works.* **LA**

Note from JGH:

After a couple of scheduling foul-ups, I managed to corner Reference Recordings' Keith O. Johnson at WCES (Las Vegas, 1984) for an interview. Trying to find a location in the Riviera Hotel that was quiet enough for a tape-recorded interview proved to be a problem until Keith suggested a vacant automobile parked next to the Acoustic Research room. (That's right: Both the room and the car were in a vast hall.) The car was part of AR's exhibit (it contained an AR auto-sound system) so we got permission from one of AR's people to use it for the interview.

Three-quarters of the way through the interview, a group of men approached the car and peered rudely in through the window. JGH irritably explained that an interview was under way and instructed them to get lost, at which they all backed off, looking perplexed. Then it dawned on us: It was their car. We graciously vacated so they could lock it up for the night.

The opinions expressed here are those of the interviewee, and do not necessarily reflect those of Stereophile.

JGH: How did you get started in recording?

KOJ: I guess it was back in the early '50s when I started messing with a couple of Pentron recorders. That was about the time 3-M came out with their first red-oxide recording tape.

JGH: What sort of stuff did you tape back then?

KOJ: Whatever was available. Mostly school things. You know, rallies, the school band, that kind of thing.

JGH: How long did you record just for the fun of it?

KOJ: Oh, for many years. I liked to make my own tapes because I could get much

better sound than anything I could get from records. And I found early on that I could get even better sound from my own recordings by modifying the equipment or rebuilding it. But I didn't think of issuing any of my recordings until just a few years ago. And it wasn't really my idea even then. Some people who heard my tapes urged me to have pressings made of some of them.

JGH: What kind of music do you most enjoy recording?

KOJ: Any kind that has an exciting sound. And you can find that kind of sound from almost any kind of music. It doesn't have to be loud and have impact to be exciting, although that seems to be the kind of recording that sells best.

JGH: That's always been the case. One of the things that has always distinguished a good system from a mediocre one is its ability to reproduce high-powered program material. And some of your recordings have been as bombastic as any ever made, although certainly more natural than most.

The only reason I can see for doing that [multimiking] is to compensate for the lack of detail in a poor playback system. I don't make recordings to be played on poor systems.

But I'm told that you aren't averse to multimiking, which is something audio purists hold in ultimate scorn. Is that true?

KOJ: Yes. But I don't do it the way the major record companies do, nor for the same reasons.

The smoothest, widest-range microphones are omnidirectional ones, and to get proper stereo separation they have to be placed some distance apart. When they are far enough apart for proper stereo separation, you find that the right and left instruments sound clustered around the loudspeakers, while instruments in the middle sound farther away, so I put a third microphone between them to even out the stage presentation.

JGH: That's the same technique Telarc uses, and that certainly isn't what audiophiles think of as multimiking. I'm talking about separate microphones covering separate groups of instruments. Do you ever do that?

KOJ: Not really. The only reason I can see for doing that is to compensate for the lack of detail in a poor playback system. I don't make recordings to be played on poor systems.

JGH: Then you never use more than three microphones?

KOJ: I use as many as I need to get the sound I want. I sometimes use other microphones spaced different distances from the source to produce multiple delays in the sound, to heighten the illusion of depth.

JGH: Doesn't this cause smearing due to multiple arrival times?

KOJ: Not if it's done properly.

JGH: If you're using more than two mikes, then you have to be using a mixer, and that's another no-no among audiophiles. What kind do you use, to get that clean a sound?

KOJ: It's one I built myself.

JGH: Does it have tube electronics?

KOJ: Oh no, it has no active circuitry at all. It's a passive device. All it has are pots and resistors.

JGH: You mix at microphone level? How come you don't run into hiss problems?

KOJ: The microphones have much higher output than the usual condensers. Since I'm only making them for my own use, they don't—

JGH: Now wait a minute. You built your own microphones? From scratch?

KOJ: Well, not from scratch. I used Schoeps and other capsules. I put lighter diaphragms in, and changed the interfacing circuitry. And because my own mikes don't have to conform to any industry standard for output, I made that as high as was practical without having to worry about standard line levels, phantom power requirements, and other standardized microphone parameters.

JGH: You mean they're about halfway between a typical mike and a typical line source?

KOJ: They're about ¼ volt out on the average, and up to 30 volts when things are really loud.

JGH: Then they must be FM-type microphones, like the old Stevens condenser mikes from the '50s.

KOJ: They are in many ways very similar.

JGH: Ah, so with that much signal output, you don't need preamp stages, and you're able to use passive mixing without running into noise problems.

KOJ: Exactly. And that gets rid of two sources of distortion in most mixers: the microphone preamplifers and the overall mixer electronics.

JGH: A lot of serious tape recordists will be eager to learn something about the ways in which you modified your famous tape recorder. How much can you tell us about this?

KOJ: Unfortunately, not too much. Except that my recorder isn't a modified machine. It was built from the ground up, including the heads and the transport.

JGH: Can you tell us what you've done to get such a high level of performance from it?

Analog tape has a lot of things the matter with it. Time smearing, for one, takes the edges off transients and gives the tape a soft, subdued high end.

KOJ: There isn't much I can say about that because most of it is proprietary. But it is well known that analog tape has a lot of things the matter with it. Time smearing, for one, takes the edges off transients and gives the tape a soft, subdued high end.

JGH: You mean the smearing due to the frequency-dependent length of the magnetic gap?[1]

KOJ: Fortunately, that behavior is fixed in time and can be electronically compensated. More serious, though, is "presence-edge smear," which is literally a particle-to-particle creeping or print-through of steep-transient information. Another problem is the way a playback head distorts a steep wavefront by anticipating its arrival at the gap.

JGH: Would you explain that?

KOJ: Well, suppose you record a steep

---

1 JGH gives a good explanation of some of the problems with analog tape in Volume 6, Number 1.

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wavefront on the tape and then play it back. Because the head's pole faces are extremely long in comparison with the gap width, that steep wavefront will start inducing magnetism into the head a fraction of a second before the wavefront actually passes across the gap. A complex phase shift occurs because the short and long wavelengths are reproduced at slightly different times.

JGH: That would only affect high-frequency transients though, wouldn't it?

KOJ: Mainly, yes.

JGH: Doesn't increasing tape speed improve matters?

KOJ: Not really, because the lower the frequency, the longer the recorded wavelength on the tape. And as you increase the tape speed, the low-frequency wavelengths get even longer, and the problem with low frequencies gets worse and worse.

JGH: Have you found a way of getting around this?

KOJ: Yes. As I said, I can't discuss details. But that problem can be addressed. Electronic and mechanical time-phase correction can make the low-frequency characteristics very, very good indeed.

That problem is a result of our industry standards and practices, which require that we make tapes on today's machines which conform to playback standards established thirty years ago.

The second problem, which contributes even more to analog tape's soft, washed-out sound, is the presence-edge smear I mentioned a while back. That problem is a result of our industry standards and practices, which require that we make tapes on today's machines which conform to playback standards established thirty years ago. The early Ampexes, for instance, were workhorses. There are still thousands of them in radio stations and recording studios. Back in the '50s, Ampex was the leading tape-recorder manufacturer, and they established the standards for tape recording and playback equalization. Other tape recorder manufacturers had to conform to those standards in order to break into the market. Professional equipment stays around a lot longer than audiophile stuff, and a lot of that professional equipment, which is still in use, is geared to the early tapes that had low bias-current requirements. So recording tapes are still being made to be compatible with recorder designs from the '50s.

It's possible to make magnetic coatings that have greatly different characteristics—superior characteristics in many ways. But these tapes wouldn't be usable on most machines. Yet recorders *can* be built which could take advantage of the superior properties of those tapes.

JGH: Is anyone making these supertapes?

KOJ: That is starting to happen in Europe. They're making some of what they call high-MOL tapes, which—

JGH: MOL standing for maximum-output-level.

KOJ: Right. They're very high-energy tapes.

See, we fell into a trap here in the States, of thinking that the best way to reduce tape noise was to make the oxide particles finer. Each oxide particle holds a certain amount of energy, even when there is no recorded signal. This magnetism is random in distribution, and for the lowest noise, the randomness should always be canceling out to zero. But the fewer particles you have passing the head at any instant, the less averaging of this randomness takes place and the more tape hiss you get.

So the first thing you think of is, let's

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grind the particles up more and make them smaller, and we'll have less noise. And with more particles in a given space, we'll get more signal output because there is more total potential magnetic energy. But the problem with this is that, when you scrunch all these things closer to each other, their opposing magnetic fields are so close together they tend to erase each other. So to get around that problem you do other things, like doping the oxide with cobalt for instance.

JGH: What does the doping actually do?

KOJ: I'm not sure what it does on a chemical basis. What it does to the magnetic properties is tend to square off the hysteresis loop[2] or retentivity characteristic of the tape, so the magnetism recorded on the tape more closely tracks the audio signal fed to the record head.

Because of hysteresis you have to use more than a 50-percent magnetic-field change to change the tape's magnetism by 50 percent. When you plot the relationship between the strength of the applied field and the actual magnetic state of the iron oxide particles, you don't get a neat, straight line. You get sort of a loop. It's sometimes called a box-shaped curve.

JGH: And cobalt doping reduces this disparity?

KOJ: It makes the tape's magnetic properties more energetic and the hysteresis loop more rectangular, more linear. But unfortunately, some of those magnetic domains are not terrifically stable. In time, or as a result of elevated room temperatures, you have something that might be called longitudinal print-through.

If we take the same pulse we were talking about earlier—

JGH: The steep wavefront.

KOJ: Yes. If you start with that, and then bend the tape around a sharp curve or expose it to high temperature, or otherwise shake up the molecules of the coating, and then play back the pulse, you'll find it's wider.

Now try the same thing with a high-

frequency tone on the tape and you'll find there's been very little change. The tone is hardly affected, yet the pulse is. That's because the tone is symmetrical. The magnetic forces that tend to change adjacent domains are tending to cancel

---

2 "Hysteresis loop distortion" refers to the lag between a changing magnetizing force and the magnetic state of the ferrous material to be magnetized. If hysteresis did not exist, a graph of this relationship would be a straight diagonal line, indicating that magnetization changes in exact correspondence with the applied magnetic field. Because of hysteresis the graph appears as two S-shaped curves whose coordinates describe a rectangular box. **JGH**

each other out, and what tries to migrate in one direction gets pushed in the other direction. So everything stays pretty much as it was, but only with tones—not steep-wavefront transients.

JGH: I thought tape smearing occurred because the magnetic field around the record head's pole pieces has a different length at different frequencies.

KOJ: Yes, that it does. But this one's really insidious because it gets worse with time. That initial pulse could have been so narrow that you would have hardly heard it, because all the spectral sidebands would be those of high frequencies and would be spread out. But once the base-line of that pulse becomes wider, then those sidebands start moving closer together and become more audible. So what happens is, you make a recording in which sideband distortions are inaudible, and then in time they do become audible. Magnetic tape's reputation for stability of the recorded signal isn't entirely justified.

That is the predominant reason why analog recordings will tend to sound soft and washed out, particularly so with time.

Keith Johnson, Mickey Hart and other musicians on DAFOS listening to a play back during a recording session.

And it's a virtual crime as far as I'm concerned, because people will spend tremendous amounts of money and time making a superb tape, and then two years

later much of its original aliveness may be gone. In some cases the deterioration is so bad that when you go back and play the record that was mastered from it, the record will have more life to it than the master tape.

Again, there's a simple solution to this: Use a tape that requires large amounts of magnetism to change its magnetic state. Then the adjacent particles won't be able to demagnetize each other so easily. But then that tape won't be usable on most machines; the record head's pole-piece tips would saturate from bias and record-amplifier current before they could pass enough current to change the tape's magnetic state.

The Japanese are far more responsive and interested in pursuing research along these lines.

JGH: You said that some high-performance tapes are available in Europe. Are any such made in the US?

KOJ: Not to my knowledge. A lot of nudging from Doug Sax, myself, and others has started at least one domestic tape manufacturer investigating the problem. But most of them are aware of the problem and won't do anything about it, while the others deny that there's anything wrong with what they're producing now. I've mentioned the same thing to the Japanese and they're far more responsive and interested in pursuing research along these lines. But the Europeans, in making low-speed reel-to-reel machines, are already doing something about it, and I find it just makes the most sense to get my tapes there. Some of those tapes have very fine signal-to-noise ratios too.

JGH: Are those special tapes readily available in Europe? They're brand names, that people can walk into a store and buy? Or are they more or less experimental tapes available only to industry insiders?

KOJ: Oh, they're brand names. People can buy them, and they'll actually work quite well on many machines. But it does take a special machine to get the best out of them. When you get rid of head saturation, for example, some of these tapes are absolutely superlative. We get very little smearing problem, the recordings are highly articulated, and they seem to stay that way.

JGH: Obviously, one of the attributes of your own recorder is that its record head will take a lot of current through it.

KOJ: That's one thing, yes.

Another problem that analog has is the usual hiss. That's where the beamed-radio-frequency bias technique comes in. A lot of hiss can be eliminated by cleaning up the bias signal.

JGH: Getting rid of distortion products which introduce asymmetry to the bias?

KOJ: Yes. When the bias is clean and the electronics are quiet, most of the hiss you hear in a good system is the noise of the tape itself. The magnetic states are randomly oriented, and noise increases slightly when gap biasing reduces some of that randomness. When you have bias, the bias itself tries to erase the recording. If you can make the bias field a very narrow beam, and then make the bias collapse in the presence of a signal field, then some of the losses due to the bias are eliminated, and the high-frequency capability of the system becomes much greater.

JGH: You mean you're actually cutting off the recording bias in the presence of the signal?

KOJ: Yes—well, not really cutting it off. The narrow bias beam at the head gap is what does it.

In a conventional head, tape passing

over the gap "sees" essentially the same length of magnetic field for the bias signal and for high frequencies. As long as the magnetic field is strong enough to record the high frequencies, any more magnetic field at the higher bias frequency is going to erase some of those highs as they leave the field. With focus gap head design, the biasing field is narrower than the signal field, so the last thing the moving tape "sees" when it leaves the gap is the signal field alone. By then, the bias field has become too weak to erase the signal.

JGH: Is the focus gap head unique to your tape recorder?

The music I like a great deal is by some of the French impressionists: Debussy, Ravel, Fauré.

KOJ: Oh no, it's nothing new. The first implementations of the technique were done in the late '60s for cassette duplication. Its virtue, for duplicators, is not so much that it makes a better recording, but that you don't have to adjust the bias appreciably when you change from one tape coating to another. You see, what makes bias current so very critical at low tape speeds is its tendency to erase highs. Reducing that tendency allows you to bias for lower overall distortion without losing highs. And it makes the recording system much less susceptible to the effect of small differences from one batch of coating material to another.

JGH: Changing the subject: Something I've been curious about is, Do you ever listen to music just for the enjoyment of it?

KOJ: Oh yes, quite a bit.

JGH: How many hours a week do you spend just listening to music?

KOJ: It's variable. Like right now I've been working very hard and haven't had much chance to listen for enjoyment. Otherwise, though, I'd say close to 8 or 10 hours a week, maybe more.

JGH: That's more than a lot of audiophiles!

KOJ: That's one of my things. I play keyboard instruments, so that becomes part of the experience too.

JGH: What kind of music do you usually choose to listen to?

KOJ: Actually, the music I like a great deal is by some of the French impressionists: Debussy, Ravel, Fauré.

JGH: Are you able to enjoy listening to less-than-excellent recordings, or does bad sound make it impossible for you to enjoy the music?

KOJ: I kind of block that out. I enjoy music a lot, so I just hear the music and if the recording isn't very good I just don't pay any attention to the sound. I've built a number of devices that can expand the spatial image on these recordings, but it involves some tradeoffs. The fullness and sense of a real performance improves but everything else comes out slightly damaged.

JGH: Aside from your own recordings, which brands do you tend to single out for listening? Say you were going out to buy a recording of *La Mer* and didn't know anything about the specific recordings of it in the store, which brand of record would you gravitate towards?

KOJ: I don't really know. But that's a terribly, terribly frustrating experience. Somebody will mention to me a performance that's very good, of a piece of music I like very much, but when I find the record and look at the label I say, Omigosh, I know how they've done it, and I'm back to the same frustration of occasionally finding a very good performance that is dreadfully recorded. Or else it's the other way around: a questionable performance with absolutely wonderful sound that really does work within the limits of what the producer had to work

with. I really hate to mention any labels, but there are some that are just multi-miked mediocrity if there ever was.

Once you're dealing with a really good analog recording system like what we have, and use good microphones and the bare minimum of electronic processing, then the shortcomings of the Sony system become very apparent.

JGH: You've just cited Holt's First Rule of Recording: "The better the recording, the worse the performance, and vice versa."

KOJ: What's so frustrating to me is that most of my favorite recordings are older ones, and the newer ones are becoming increasingly harsh and grainy and unlistenable.

JGH: You must feel that way, and even more so, about Compact Discs, which are by and large awful.

KOJ: That's again a frustrating one. We use the Sony system at Reference Recordings for backup in our sessions, and it's a remarkably good piece of equipment considering all the things that are against it. But once you're dealing with a really good analog recording system like what we have, and use good microphones and the bare minimum of electronic processing, then the shortcomings of the Sony system become very apparent. At least from the standpoint of very serious recording.

If I were an audiophile or someone buying a system, and had a choice between a reel-to-reel machine and the Sony PCM—and I'm talking about the reel-to-reel machines generally available to serious hobbyists—and I was going to use it for recording from records, the decision would be in favor of the digital. But once you start dealing with a real microphone feed, and the microphone setup is working right for you, and you have a live group in a very good hall, at that point it's a different ball game. Then there are things that are wrong with the digital. And the problems that I've encountered are very similar to what other people have heard and described. I've looked into the causes of these distortions and in most cases they're things that are readily measurable and are something you can put your hands on. It's not mythology.

JGH: But then why would they show up only when you feed them from microphones? How can the PCM make such almost-perfect copies of analog tapes?

KOJ: Actually it doesn't. Most analog tapes brought to me for mastering are second- or third-generation copies, made on good but not great equipment; a cassette machine will make almost perfect copies of these. But there are a lot of things I can hear the matter with PCM copies of my own tapes.

JGH: But your tapes are hardly typical of other master tapes.

KOJ: No, they aren't, but we're trying to make a product for release, not just something to listen to for our own enjoyment. And one of the biggest frustrations is, here we have master tape that has been recorded to the highest standards we can achieve, and then we go to the phonograph records with all the ticks and pops and the mechanical sounds of the record cutter and the playback system arm resonances, not to mention the wear that occurs later on—all of which degrades the signal so much that we sometimes wonder if it's worth all the effort.

JGH: So virtually no consumers are hearing anything like the sound of your master tapes.

KOJ: Oh no, they aren't. This is a major problem with all record reproduction.
JGH: In that respect, then, digital can do a better job, as a conveyance between the master tape and the average consumer.
KOJ: Not necessarily. Maybe average consumers, but not on a good audiophile system.
JGH: You mean on a helluva good audiophile system.
KOJ: A *very* good one. What we lose in the digital copy is very interesting. The inner detail is gone, and when things get complex, like in the *Symphonie Fantastique*, even though the string section is subdued and distant, in the master you can pick out a number of the individual violins that are playing in there. It is not a "massed string sound" like you hear in commercial recordings. But once you've gone through the digital process you start losing the discrete-instrument sense, particularly in complex sustained-sound programs. Tightly mixed studio recordings of popular music more easily survive digital. One can achieve heightened imaging by contrasting tiny pinpoint-type sounds with diffuse random-phase information. The contrast between the two (analog and digital) increases the sense of both space and articulation, even though the recording has less of each. If either the inner detail is lost because of complex nonharmonic distortions, or space is lost from running out of digital bits at low levels, the overall contrast diminishes.

The other thing that is very perplexing and bothersome with the digital is that it draws attention to the loudspeakers. The *Symphonie Fantastique*[3] and the latest recordings that we're working on have been recorded in Medina Temple, which has a wonderful sense of acoustical space. I work very hard to put the instruments in that acoustical space in the recordings, and to make the playback loudspeakers seem to disappear. Digital recording destroys this.

Digital has certain distortions which are not related either harmonically or by phase to the input signal, so the distortion products appearing in each channel are entirely different. Together they produce no virtual stereo image at all, so there is no spread or apparent depth to their sound. They appear right at each speaker, and the speakers can no longer seem to disappear. The whole sense of that lovely acoustic space just collapses. Not only that, but this distortion—as subtle as it may be—acts as a diffusing filter over the sound, like a veil that obscures much of its detail. Hence, we degrade the space/articulation contrast, and a dull spacelessness occurs.

The whole sense of that lovely acoustic space just collapses.

JGH: Do you feel, then, that these problems are inherent in Sony's PCM system rather than related to the quality of, say, the analog circuitry in the PCM-F1?
KOJ: I don't think the analog circuitry is where most of the problem lies. One of the tests I did on the digital system, just to see what was going on here, used what I called a tone cluster. The signal source consisted of many different frequencies, which is what you find in music.

In this case, just to be as nasty as possible about it, I chose the cluster frequencies to be harmonically related to the digital bit flow and sampling rate. Then in playback I notched out the original frequencies, and what was left was something you wouldn't want to hear—some particularly nasty-sounding stuff. In terms of measurements it is a very small percentage of the original signals, but it is a terrible-sounding distortion and it is *not* masked by the signal because much of it is so far removed from the frequen-

3 Reviewed in Volume 7, Number 2.

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cies of the original signal—even though it might be 30 or 40 dB below the signal.

JGH: Well what does it sound like? Is it a sort of shattery quality or what?

KOJ: It sounds like a swarm of nasty little buzzes and harmonics and grating sounds. It's a very ugly sound.

JGH: You feel, then, that the problem is with the digital system itself.

KOJ: Absolutely. With these particular system standards and design ground rules that the industry has adopted.

JGH: Well, back to analog. If you were to record the *Fantastique* over again, what would you do differently?

KOJ: I'd move the outside mike pair a little closer together to put the center-stage instruments closer to the listener, and I'd get the left mike a little closer in to the first violins.

JGH: Why not just bring up the level of the center mike?

KOJ: Because phase interference calling attention to the center mikes would reduce the sense of depth.

I place the microphones for the kind of sound I am trying to get, and if they don't end up being symmetrical it doesn't matter. The sound of the recording is more important than any theoretical considerations that make the recording less good.

JGH: But don't you just use a symmetrical placement of your left and right mikes?

KOJ: Not necessarily. As I told you earlier, I place the microphones for the kind of sound I am trying to get, and if they don't end up being symmetrical it doesn't matter. The sound of the recording is more important than any theoretical considerations that, to my mind, make the recording less good.

JGH: On your recording of Dafos, what kind of instrument produced those awesome bass thuds?

KOJ: Well, it isn't entirely one instrument, but a big, circular grouping of percussion instruments that was used for Grateful Dead concerts. They call it "The Beast." A lot of drums are hung from a big circular pipe, and Mickey Hart stands inside the circle to play them. But a bass drum wasn't really what was making those bass thuds. A lot of that bass was from reverberation in the hall. Then during the setup of the The Beast, Mickey Hart lifted the entire structure and let it drop to the stage, which made a terrible noise. He was fooling around, really, but when we heard the result on the tape we decided it *had* to go onto the record. This particular passage caused great grief to Doug Sax (who mastered *Dafos*), forcing him to dig into his bag of tricks to keep the cutting stylus on the lacquer.

JGH: What are your plans for Reference Recordings?

KOJ: That's some question! We have a lot of plans for the future.

JGH: Well, what about for the immediate future?

KOJ: I suppose the biggest change is that we will be recording a lot more large performing groups.

JGH: Like symphony orchestras?

KOJ: Yes. Did you hear our new Respighi *Church Windows*?

JGH: I heard part of your two-track tape. It was incredible! That was done with the Pacific Symphony, wasn't it?

KOJ. Yes. They're very good. You know, we did that in the Santa Ana High School auditorium.

JGH: You're kidding! It sounds like Boston Symphony Hall. You didn't use artificial reverb on that, did you?

KOJ. No. Remember, I mentioned using extra microphones to extend the apparent acoustical space? That's how I made that auditorium sound like a big hall, by locating several delay microphones to build on the delays between the wave fronts reaching those microphones. The placements set up delay-phase interference from ear to ear to simulate rear-hall sound.

JGH: I still don't really understand that, but let it pass. One final question, though. Where do you think the audio field is going right now?

KOJ: You mean forward or backward?

JGH: No. Where do you think it's headed? Do you think, for example, that we'll all be listening to Compact Discs in five years?

KOJ: I think we'll all be listening to a digital source of some kind but I am not sure it will be the Compact Disc. And I hope it won't. The CD seems to have even more wrong with it than the Sony PCM-F1 system, and I am not convinced it is the fault of the software, as a lot of people are claiming. But I don't think we have heard yet how good the CD medium can be, either. The latest discs coming out aren't as bad as the first ones, and some people are taking another look at what could be causing audible problems in the CD circuitry, at both ends of the chain. I think the industry will spend several years trying to improve CD before we realize that it does have real limitations and start thinking in terms of a better system. And during that time there will be a lot more recordings that take advantage of CD's strong points and try to gloss over its weaknesses.

I think we'll all be listening to a digital source of some kind but I am not sure it will be the Compact Disc. And I hope it won't.

That's happened before. First we had Edison and the military bands that played for each cylinder, then we had Caruso and the horn, then we had the big bands and the open-backed bass-booming radio, then rock-'n-roll and the transistor, and now it's the bass drum and the digits. In other words, each time there's a technological breakthrough, you find program material that really works for it. Once the novelty wears off and we try to use that medium to do everything—that's when we come up against its inherent weaknesses and start looking to other technological breakthroughs and improvements. That's where I feel digital is right now. Various problems are surfacing, and I don't think some of them can ever be solved given the limitations of the CD industry standards.

If we were working with something like the laser videodisc, with its 4 trillion bits of available storage, we wouldn't be so information-cramped. There wouldn't be so much pressure on sampling rates and filter designs. Remember, it wasn't economy that dictated the 44-kHz sampling rate as much as the storage limit. CD's promoters insisted that the disc be small enough to fit into a standard car-radio cutout, and the CD already carries as much data as we know how to get onto a disc that size. But it's barely enough.

JGH: You feel, then, that a digital-disc format resembling the 12-inch laserdisc could provide satisfactory performance?

KOJ: That medium could overcome the disadvantages of both analog tape and today's digital. There we're talking about sound reproduction that would be quite revolutionary, and we could really start all over again—perhaps with something that really *is* close to being perfect, as today's digital is claimed to be.

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MANUFACTURERS' COMMENTS

SOTA

Editor:

Congratulations to Steve Watkinson—whose excellent review of the SOTA Star Sapphire marks his auspicious entry to audio journalism. We at SOTA have been blessed in this regard and we appreciate our good fortune. Congratulations to Larry Archibald and *Stereophile*—whose recent editions provide informative, good-natured, and balanced writing. Your recent coverage of the most advanced analog components is music to our ears; and to others, apparently, too.

True to our reputation, we have a few comments. We agree with Mr. Watkinson that the STAR vacuum system is not intended to neutralize "badly warped records." Our aim is to eliminate the effects of warp wow on all records (to increase clarity and to relieve amplifier strain). Excessively warped records will be more playable on our turntable, but the Star is indeed "at its best with good records." Vinyl resonance is an equal enemy and our system settles both problems more effectively than any other we have heard.

Our only difficulty in this review involves the discussion of "dynamic range." We have never found the Star to be less dynamic than the Sapphire. The only sonic anomaly attributable to vacuum is the slight hardening that occurs when there is excessive pressure for that record. Perhaps there was a misunderstanding about the word "compression" in our conversations. We referred to what happens to the *mat* under pressure (resulting in overcoupling of the record). Mr. Watkinson took this to mean that we agreed that the *sound* was compressed under high vacuum. This is not our position. The Star is more dynamic than the standard Sapphire, though the degree of difference *perceived* depends on the system.

As Mr. Watkinson explains, since the vacuum does diminish distortion—and distortion may, indeed, imply a sense of dynamics—then vacuum at first might *seem* less dynamic because it is more accurate. "False" dynamics is his term and we are inclined to see his quandary as psycho-acoustic. Since the Star offers greater "purity," increased "clarity" and "definition," so it stands to reason that true "dynamics" should certainly follow suit.

All in all, we appreciate the thoroughness of the review, the favorable position of our turntables (Class A and Class B) as recommended components, and the important clarification about when and if vacuum pressure may damage records surfaces. Let us reassure your readers that we find no danger from vacuum as long as the pressure never exceeds 7″ mercury. Our normal playing range stays between 1-3″ mercury. After all, we think correct vacuum hold-down to be one of the ultimate refinements in disc reproduction. It is everyone's good fortune that low-level, continuous vacuum is both harmless and sonically superior.

Robert S. Becker
SOTA Industries.

PINK TRIANGLE

Editor:

We appreciate the current rating that *Stereophile* gave the Pink Triangle turntable in the "Recommended Compo-

nents." There are several points we wish to clarify for your benefit and that of your readers.

Rather than considering the Pink Triangle suspension as being "extremely soft," it is rather infinitely (and externally) adjustable to handle any tonearm regardless of weight. In the U.K., Europe, the rest of the world, and the United States, the Pink is being used successfully with tonearms such as Syrinx PU-3, Helius "Orion," "The Arm," the EPA 100 and 500 from Technics, the Souther, and others. We don't know of any popular tonearm available for which the suspension cannot be adjusted. Of the tonearms on your own recommended list, only the Goldmund T-3 and T-3b are unsuitable for the Pink and that is because of mounting difficulties.

The Pink Triangle has been produced in the U.K. since 1979, and imported to the United States by International Audio Imports for the last two years, with high reliability and good dealer and customer relationships. The current retail price is $895.00.

Sherry Thomas
IAI
Berkshire, England

THE PAOLI S.O.B.[1] AMPLIFIER

Editor:

Thank you for JGH's typically thorough review of the S.O.B. power amplifier.

Some of his criticisms are well taken. I must admit that when we field-tested the SOB, none of the users had Monster (speaker) Cables in their systems, so no problems were encountered with the size of the output barrier terminal strip. The terminal used is a professional 20-amp strip, which causes no problems with cable lugs of normal size. We will, however, do some further investigation into this. As for the audio cables, if any user has a problem in this area, we will make them a set of audio cables to fit.[2]

I am, however, a little concerned with your comments regarding our "quality of parts" and our construction techniques. It seems to me that JGH missed our whole point there. In the audio industry there are two basic types of equipment: consumer and professional. We chose to manufacture the S.O.B. for the professional user, for whom long-term reliability is at least as important as performance when new. The S.O.B. is designed to operate 16 hours or more per day, 7 days a week. And while it is true that most professional audio equipment lasts longer and is more trouble-free than consumer equipment, it is our contention that it also performs better.

I can assure you and your readers that we have selected our component parts and construction techniques, not merely because they cost more, but because they are necessary to achieve longevity and reliability as well as superior sonic performance. Because the amplifier's excellence, which JGH acknowledged in his report, is largely a result of its straightforward, uncluttered design, free from the complications of stabilization and correction circuits, we cannot afford to have *any* component shift in value with age. The proof of this approach

1 The initials S.O.B. stand for "Son of Behemoth"; the current Paoli mono amplifiers replace an earlier stereo version ("Behemoth"), whose weight was felt to be simply unmanageable. This Manufacturer's Comment was supposed to have appeared in Volume 7, Number 2, but was mislaid amongst our towering stacks of mail. Apologies to all concerned for the delay.

2 The report had noted that many paired cables could not be separated enough to allow plugging into both of the mono amplifiers.

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is ultimately in the listening. You compared the SOB with another amplifier of the same power rating and one of twice the power rating. And within the operating range of the SOB, which sounded better?

In addition, I think you may have misunderstood us regarding the use of the SOB with dynamic speakers. As the amplifier was designed using a dynamic system as a reference, it certainly should perform well with some dynamics as well as with electrostatics. Of course, there are dynamics out there that it will not mesh particularly well with the amp, and it would appear that you tried it on some of those. Using a greater variety would have demonstrated our point here. But the unpredictability of loudspeaker/amplifier interactions is one reason why we offer the amplifier on a money-back trial basis.

By the way, JGH forgot to mention that the SOB amplifiers loaned to him belonged to a customer, and that they had been in use for 6 months with their original tubes and without any adjustments whatsoever when he auditioned it.

Eugene L. Coggins, President
Paoli High Fidelity Consultants

JGH Responds:
I think Paoli's "further investigation" into the speaker-cable terminal situation will reveal that there are more of those "oversized" spade lugs out there than they suspect. I loudly applaud Paoli's use of a barrier strip for output connections, but it strikes me that this should be large enough to accommodate all, not merely most, of the connectors provided on today's premium cables.

The audio interconnect cable "problem," on the other hand, appears to be less significant than I had thought. Few high-quality interconnects available today are fastened together; most are sold as matched but separate pairs.

I must take issue with Mr. Coggins' contention that "most" professional audio equipment sounds better than consumer equipment. It is not because of their lower reliability that consumer components are in such widespread use by recording studios which aim for the best possible sound. The mediocre sound from most of today's recordings—Compact Discs in particular—is audible proof of the kind of sonic quality which most "professionals" have found to be adequate for their purposes. An amplifier combining the S.O.B.'s sonic quality with a pro's level of reliability is a rare animal indeed.

Most consumers, however, do not need the kind of reliability demanded by a professional user. For them, a power amplifier breakdown is an inconvenience, not a disaster. They are likely to see the additional cost of professional reliability as an unwelcome premium to be paid for an unnecessary attribute. The S.O.B. is the best-sounding tubed amplifier, and one of the best-sounding of any kind of amplifier, that I know of, but that may not be enough to overcome the audiophile's reluctance to spend so much ($4000) for 100 watts of stereo power. This is a cost-no-object product, and probably worth every penny for what it is, but few audiophiles are into cost-no-object anythings.

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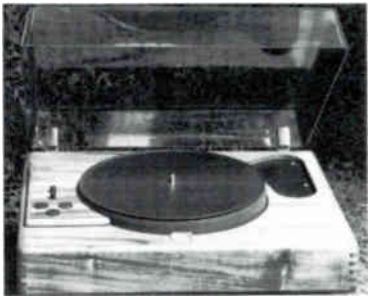

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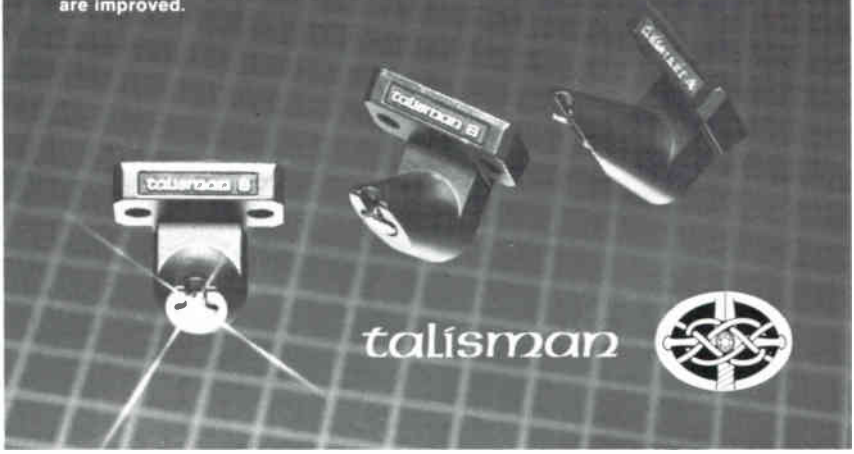


by SUMIKO, Inc., P.O. Box 5046, Berkeley CA 94705

EARL WILD, PIANO

Franck: Prelude, Corale & Fugue
Faure: Barcarolle No. 3 in G flat Major, Op. 42
Ravel: Gaspard de la Nuit

Audiofon 2007
Available from PM&J Productions, 2710 Ponce de Leon Blvd., Coral Gables, FL 33134.

First I must confess that, to my taste, Earl Wild can do no musical wrong. Everything I have heard him play has been done exactly the way I would do it if I were able to play the piano (which I most definitely am not). Audiofon, too, goes about its recordings the way I would. The miking is minimal, the recording is done in a real performing space rather than a studio, and the performer is encouraged to forget about the microphones and become immersed in his music, without being told, every once in a while, "Stop! There was a fluff during the last arpeggio! Let's retake it from 27." The final recordings might just as well be direct-to-disc, as editing is rarely (if ever) done. This not only preserves the unity and cohesion of a live performance, it also requires a high degree of technical proficiency on the part of the performer. Wild is the kind of technician who can pull off such a recording, and these are highly satisfying performances.

Unfortunately, the recording is not one of Audiofon's best. The distance to the piano seems indefinite, as does its location side-to-side. The instrument seems to spread almost from one speaker to the other, yet its apparent distance should have it occupying a much narrower included angle. And unlike most simply-miked recordings, this one has no magic volume level at which the loudness and the apparent listening distance suddenly come together. Also there are some modest but distinctly audible pre- and post-echoes, made all the more noticeable by the recording's very wide dynamic range. This may be unique to my pressing, but I very much doubt it.

It's not that the sound here isn't good—it is in fact excellent. But some of Audiofon's previous releases have been better in the ways I found this one deficient. I'll still recommend this highly, but it's more for the music lover who also likes good sound than for the rabid audiophile who also likes music. **JGH**

TCHAIKOVSKY

Symphony No. 5 in E minor, Op. 64

The Philadelphia Orchestra, Eugene Ormandy conducting.
Delos D/CD 3015

The Cleveland Orchestra, Lorin Maazel conducting.
CBS CD 36700.

Eugene Ormandy and the Philadelphia Orchestra offer one of the most boring performances of a Tchaikovsky symphony ever recorded. Which is a pity, because the orchestral playing is first caliber—especially the woodwinds in the first movement. In the third movement (a valse marked *Allegro moderato*), the totally soporific quality of Ormandy's conducting becomes painfully apparent. The fourth movement is an even bigger letdown—there is simply no visceral excitement at all (compare von Karajan's 1972 EMI/Angel recording). The recording isn't bad, however. It was made in Philadelphia's Old Met, which has a far better acoustic than the Academy of Music, and there is plenty of ambience—even a little too much, for my taste. There is a noticeable and distracting hum at certain points on the disc.

The Maazel/Cleveland performance on CBS is a much better buy. The recording quality is excellent—it is the finest CBS Compact Disc I have heard to date. On this basis alone it merits a recommendation. There are some peculiarities, however. Sometimes the brass seem to pop out in front of the speakers (what could the recording engineer have been doing?). Unlike Ormandy's version, the performance won't put you to sleep. The orchestral playing is fine—especially the horn introduction in the second movement. But I have the feeling that Maazel and the Clevelanders are getting through the music rather than getting into it. There is something rather cold and uncommitted about the performance—it doesn't sound Russian. The disc is worth buying to hear how well a major company can do on CD; otherwise, neither disc could be strongly recommended except to hear this music on the CD medium. TG

BASIE JAM

Count Basie, piano and organ; Louie Bellson, drums; Ray Brown, bass; Irving Ashby, guitar; J.J. Johnson, trombone; Harry "Sweets" Edison, trumpet; Eddie "Lockjaw" Davis, tenor sax; Zoot Sims, tenor sax. Pablo 2310-718

Pablo Records are manufactured and distributed by RCA Records—not exactly audiophile lineage—but in many ways this is a fine audiophile record, particularly if you have speakers that present a broad soundstage and pinpoint imaging that is rock solid. The drums and bass are center, the piano right, the saxes left, and the guitar far left—heard on some speakers, the guitar will appear to be several feet left of the left speaker, a rather startling phenomenon.

My only complaint is that the surfaces are only average. A Japanese pressing, which I have not heard, is available, and probably has better surfaces considering the general run of Japanese pressings.

The musicians could make up an all-star list of mainstream jazz, and the music really swings hard. Basie's spare technique just keeps getting better, and Sweets' uncharacteristically long solo on "One-Nighter" is marvelous, as is Ashby's. Ashby is the only member of this band that I had not heard in person. At one time a guitarist with the Nat King Cole Trio, he alternates between a Freddy Green rhythm role and a latter-day Charlie Christian style. Sims and Johnson are in fine form, Belson really boots things along, and Lockjaw Davis is a joy forever. So is the record—buy it. **RNO**

RENDEZVOUS

Richard Beirach, piano; George Mraz, bass. International Phonograph, Inc., 17 Lincoln St., Hamden, CT 06518.
This gorgeous recording, made with Mark Levinson electronics and tape recorder,

was produced by former Levinsonite Dean Roumanis, and was released over a year ago. It has been reviewed in at least two of the alternative audio magazines, whose reviewers seemed to have some appreciation of the sonic qualities but very little knowledge of the improvisational music called Jazz.

For some time this record has been one of my standards for evaluating audio components. Traditionally, most audiophiles use only records of symphonic proportions to evaluate equipment, even when they would be better off using more intimate and familiar music as a source.

The bass player here, George Mraz, came to this country from Czechoslovakia in the late '60s by way of West Germany, and has played with many prominent musicians: Zoot Sims, Oscar Person, Joe Pass, Roland Hanna, Tommy Flanigan, Ella Fitzgerald, and Stan Getz. I had not heard Richard Beirach before, but he is a fine pianist and the album notes expand this observation with a description of his strong background in classical music.

Now for the music (acoustic of course). The record is dedicated to the late pianist Bill Evans, and the music is a little reminiscent of the sides Evans made for the Riverside label in the late '50s and early '60s with the fabulous bassist Scott La Faro. I say a little because Evans' work was more like a classical recital with subtle syncopation. This recording is relaxed but innovative, and some of the tracks really cook.

Imaging is precise, with the piano on the right and the bass either on the left or (sometimes) center left. The perspective is slightly distant, as if heard in a very large room in a private home; definitely not a hall or club sound. The surfaces are very fine. The bassist, Mraz, is not merely in a timekeeping role here, but plays virtuoso lines—much like a guitarist. The interplay of piano and bass is fascinating, and a great check on the midbass qualities of your speakers. **RNO**

LINDA RONSTADT
What's New?
Asylum 9 60260-2

Remember "Growing up in Hollywood Town"? To some, that Sheffield classic "made" direct-to-disc recordings.

This *What's New* could do the same for popular CDs. Ronstadt is in ravishingly fine voice, and the studio multi-miked sound is actually very pleasing and realistic. Real walls, real instruments inside them, and that delicious voice sounding richer and fuller than before.

Try the title cut if you're not convinced. You won't find this traditional Ronstadt, but a new direction, and one most will like. **WS**

SAINT—SAENS
Carnival of the Animals

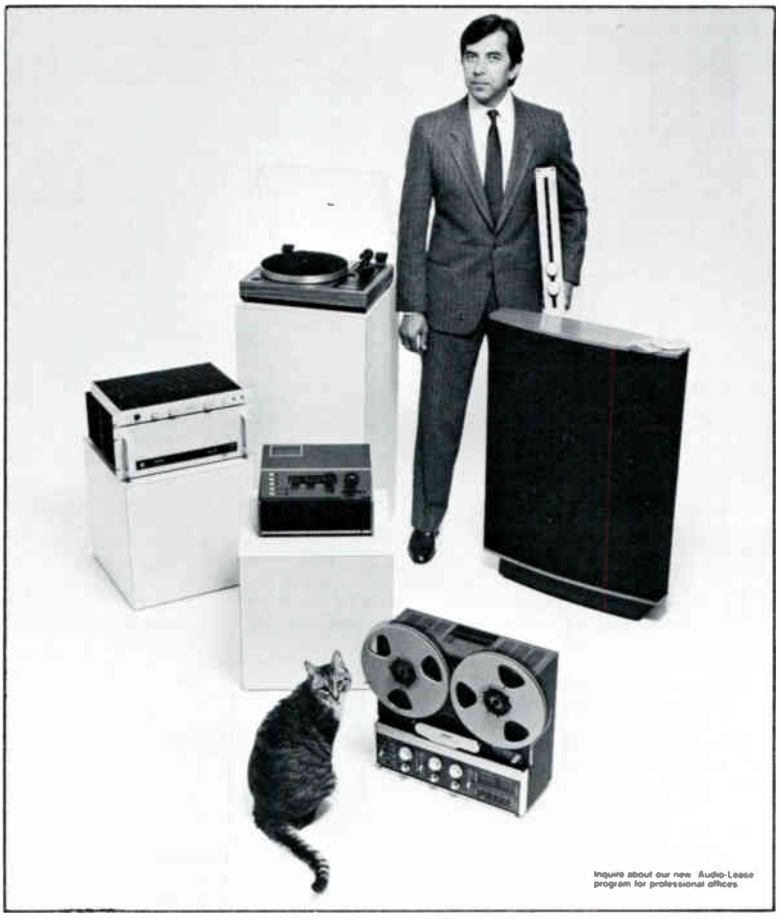
RAVEL
Mother Goose Suite

Pittsburgh Symphony Orchestra, Andre Previn conducting.
Philips CD 400-016-2

The whimsical *Carnival* with its nose-thumbing at Saint-Saens' contemporaries (e.g., a lugubrious "Can-Can," and a stately cello rendition of Berlioz' "Dance of the Sylphs," from *The Damnation of Faust*) is given a delightful treatment here, and put on one of the best-sounding CDs I've heard to date from a major record company.

Philips has been less up-front about the roots of their CDs than most other

AN AUDIO INVESTMENT FROM VICTOR'S STEREO



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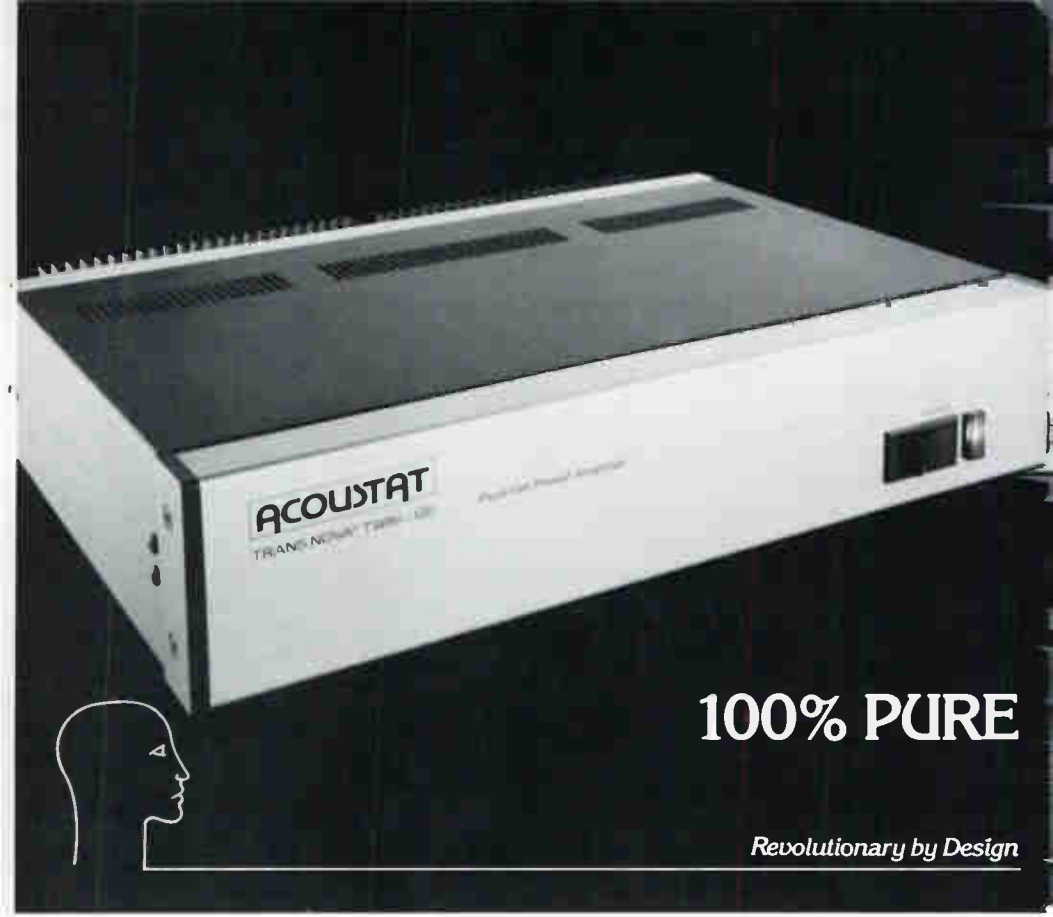
record manufacturers. In fact they have been downright sneaky about it. This release—billed prominently on the record jacket as a "Digital Recording"—sounds very much as if it was analog-mastered. This is certainly nothing Philips should be ashamed of, because this is a better-sounding recording than most digitally mastered ones. I can complain about the strange "wholpy" sound of the xylophone in "Fossils," but otherwise the recording has depth, very good instrumental balances (a nice mixing job!) and a lovely feeling of delicacy combined with immense power when the need arises. But dammit, there is still the traditional emphasis on the first violins, which have the apparently obligatory (if slight) steely edge.

Previn's *Mother Goose* doesn't have quite the dreamy sensuousness of the old Koussevitsky on 78s (re-released in mono on RCA LM-1012) or even of the 1960s Ansermet on London, but the combination of generally lovely sound and an excellent performance is just too much to resist. This, in other words, is one of the best releases on CD to date. Highly recommended. **JGH**

Philips has been less up-front about the roots of their CDs than most other record manufacturers.



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FURTHER ADVENTURES OF A CARTRIDGE BUFF

By Sam Tellig

I have a friend—we'll call him Lewis—who owns an expensive moving coil. About a year ago, he saw a rave review for the cartridge in a certain publication and ran right out and bought one sight unseen and sound unheard. At the time, it was The Best Cartridge in the World—now it's headed for his cartridge graveyard.[1]

About my friend's highly esteemed moving coil. The damned thing cost over $300, weighs nearly 10 grams, doesn't track worth a damn, and is extremely fussy about VTA adjustment. Plus you'd better keep your listening room heated to at least 68° F., or the sound turns to dirt.

"Maybe someone could invent an electric dust cover with heating coils," I suggested to Lewis. "Or a little space heater that you tuck under the dust cover."

Ha, ha, ha—Lewis had a few laughs as he poured me another glass of his brother-in-law's home-made beer. Until some British reviewer suggested shining a lamp on the tonearm to keep the cartridge warm in winter. Lewis now uses a lamp.

Here's what really got to my friend (and caused me so much glee): his first-rated moving coil was rated only ninth-best in the world a year later (by the same magazine)—that's progress, you know. Now he just *has* to buy one of the other eight—even though there's plenty of tread life left on his present cartridge. He's working on persuading himself that the stylus on his now ninth-best is worn.

"You know there are better cartridges around these days," he said to me as he adjusted the vertical tracking angle for the umpteenth time.

"Yes," I replied, pointing to his copy of that certain journal, "there are no less than *eight*. I don't think I'd want to own The Ninth Best Cartridge in the World either."

How expensive was it for Lewis to own that moving coil? Well, let's say he retires it after 300 hours. The cartridge cost him roughly $1 an hour. Of course, it could have been worse. He could have bought a $1,000 moving coil and used it for 300 hours, in which case he would have paid $3.33 an hour—that's three times as bad!

The point is, it's expensive to own a moving coil. Perhaps 300 hours is a little low for most people—maybe 500 hours' use is more typical. Let's say you pay $850 for a Goldbug Brier and get 500 hours before the cartridge is worn out or you get worn out listening. That's $1.70 per hour.

How does this compare with a Shure V15-VMR? Well, the Shure lists for $275. Let's assume 500 hours on the stylus—that's 55¢ an hour. Some difference. Actually, the cost of listening to the Shure would probably be far less. *No one* pays list price for a Shure, and because the Shure tracks at 1 gram you can probably

get closer to 1,000 hours of use before retiring the stylus. You might be listening for 25c an hour! Or even 15c an hour when you're on a replacement stylus! That's a baagin', as they say in Massachusetts.

Now please understand. I'm not down on the Goldbug Brier (I keep wanting to call it the Goldberg Brier after Mr. Goldberg, my tobacconist). I understand it's an excellent cartridge. Who knows, you may think it's worth the money. My neighbor drives a Mercedes, while I'm happy driving a Volkswagen.

Here, I'll help you decide whether an expensive and exotic moving coil is for you. Consult this chart and figure your comparative costs per mile—I mean hour. I'm figuring 500 hours and I'm using list price in every case:

Cartridge	List Price	Cost per Hour
Accuphase AC-2	$ 475	$0.95
Argent Diamond Sapphire	$1200	$2.40
Audio Technica AT35E	$ 250	$0.50
Boston Acoustics MC1vdH	$ 200	$0.40
Denon 103M	$ 195	$0.39
Dynavector 13D Nova	$1500	$3.00
Kiseki Lapis Lazuli	$3500	$7.00
Linn Asak	$ 495	$0.99
Ortofon MC100U	$ 250	$0.50
Talisman S	$ 300	$0.60
Shure V15-VMR	$ 275	$0.55
Shure MR stylus only	$ 125	$0.25
Carnegie Hall, Downstairs ($20 ticket; 1 hour,40 minute concert)	—	$12.00
Carnegie Hall, Top Balcony ($12 ticket)	—	$7.20

For the price of the Lapis Lazuli I could be at Carnegie Hall every night! I'll take Carnegie Hall, thank you. And the Carnegie Delicatessen, too, come to think of it (although Woody Allen has spoiled it for us long-time regular, what with the long lines). If you go to Carnegie Hall, get the cheap seats—the sound is better the higher up in the balcony you sit. And if you go to the Carnegie Deli, get the Deli Double—a corned beef/pastrami on rye combination —and split a side order of potato salad. In one night you will have experienced the glories of New York!

You've got to keep cartridges in perspective. Do you get fourteen times as much pleasure from going to Carnegie Hall as you do from listening to a Shure? Well, I do. A factor of fourteen sounds just about right, in fact; you get to those lower factors (like seven, three, and one) and I'm not convinced. **ST**

MISCELLANY

Under The Sun

It is often said that there's nothing new under the sun. While this is patently false, it does often happen that discoverers of earthshaking phenomena later learn that they have merely reinvented the wheel.

Who first described transient intermodulation distortion (TIM) as a potential problem in feedback amplifiers? Scratch any audiophile and he'll tell you, "Matti Otala, of course." Not so. The phenomenon was described in a paper entitled "Negative Feedback Amplifiers, Overloadiing Under Pulse Conditions" in the English magazine *Wireless Engineer* in—1952, believe it or not!

This little gem was gleaned from the 1953 edition of *The Radiotron Designer's Handbook*, which was the electronics designers bible until it ceased publication. ('53 was apparently the last one.) It's on page 1475, in case you have a copy of that tome lying around.

Santa Fe Opera 1984

Scheduled for the Summer '84 season are Zemlinsky's *A Florentine Tragedy*, Korngold's *Violanta*, Mozart's *The Magic Flute*, Cimarosa's *Il Matrimonio Segretto*, R. Strauss's *Intermezzo*, and the American premiere of Henze's *We Come to the River*.

For ticket info write SFO Box Office, P.O. Box 2408, Santa Fe, NM 87504.

Doppler From Discs

One of our readers, Raymond Kilmanas, sent us a reprint of an interesting paper he wrote, published in the *Journal of the Audio Engineering Society* (Sept.1982), on the subject of Doppler distortion due to the offset angle in pivoted tonearms.

The mathematics supporting his contention is pretty fierce, but the conclusions are so self-evident that we are amazed no one has drawn attention to this phenomenon before. It is obviously recognized in some quarters, because it is the basis of the tonearm resonance test on Ortofon's #0001 test record.

What Mr. Kilmanas has managed to prove is that any spurious lateral motion of an offset pivoted tonearm is translated into stylus motion in line with the groove. (See diagram.) And it is clear that any such motion will cause a variation in the speed at which the groove passes the stylus.

The nature and effect of these variations will be identical to those caused when a woofer is simultaneously reproducing bass and middle-range signals: The middle range will be Doppler-modulated upward or downward in frequency by the bass frequency, according to whether the cone is moving outward or inward. Doppler distortion—or rather, freedom from it—has in fact been promoted for many years by Paul Klipsch, whose horn-loaded speakers have less of it than direct radiators do. But since no one else had ever seemed to feel that Doppler distortion was important, Klipsch's claim never attracted much attention. In the case of a phono pickup, most lateral arm motion is going to occur at the system's mass/compliance resonance frequency, which is usually in the range below 15 Hz but is nonetheless excitable by higher harmonics. And lateral vibrations due to arm-tube resonances could also cause lesser amounts of the Doppler distortion.

For an 8-Hz system resonance of typical amplitude, Mr. Kilmanas' calculations yielded peak-to-peak flutter figures ranging from .96% to 3.99%, which certainly should be audible. He then conducted listening tests using the LF reso-

nance test on Ortofon's #0001 record. This has two midrange signals, about 600 Hz apart in frequency and superimposed on the LF sweep, to reveal the system resonance point. Ortofon's instructions for that test explain that arm wobble at the resonance frequency will cause the pitch of the middle-range tones to "move up and down." They do not explain why.

The listening tests showed that while flutter was clearly audible at resonance with offset tonearms, it was inaudible with straight-line (linear-tracking) arms, and was also inaudible from a pivoted arm without offset which had been adjusted for tangency on the test band. All of which would seem to prove Mr. Kilmanas's point: that a major difference (if not *the* major one) between the sound of pivoted and linear-tracking arms is due to the latter's freedom from Doppler distortion.

This would also seem to be a persuasive point in favor of viscous-damped arms, whose damping will act not only to control runaway low end (and limit power demands on the amplifier and speakers) but also to minimize the kind of tonearm wobbles which cause doppler distortion.

If you're interested in reading this paper, it can be ordered for $3 from: AES, 60 East 42nd St., New York, NY 10165.

Dynamic Range

During our comparisons between a recent Compact Disc release and its digitally mastered analog equivalent, we encountered a puzzling thing.

The CD sounded as if it had wider dynamic range than the analog disc, which of course is what we would expect in view of the former's vastly greater S/N ratio. So we decided to collect some figures on the subject. We ran pen-recorder traces of the last five minutes of both discs, spanning sections that ranged from very quiet to full-blast. When we superimposed one trace over the other (on a light board, so we could see them both at once), we were amazed to find that, except during one moment when the recorded sound level got hung up on the analog disc's noise floor, there was no difference whatsoever between the traces. The CD and the analog versions had identical dynamic range, insofar as RMS values were concerned.

We could only guess that the apparent difference was due to the CD's faster transient response, which was clearly audible but was not resolvable by our relative slow-acting pen recorder. But what about the CD interests' promotional claims that CDs have "wider dynamic range"? Are we once again going to get a new medium whose potential fidelity is compromised for "practical reasons"?

HOT NEWS

• A new firm called Compusonics generated some excitement in audio circles by announcing the imminent production of two digital audio recording systems -- a home model and a studio model -- claimed to provide up to 1 hour of recording on a 5-1/4" computer floppy disc! Yet at summer CES the firm did not even have a working prototype to show. Although predicting deliveries of both units in "the first quarter in 1985," Compusonics is still awaiting a sample of the special disc from their "supplier." Don't hold your breath on this one.

• A rumor that Telarc Records has been observing "very variable" sound from one CD pressing to another was denied by Operations Manager Charles Zurowski. "I know who started that one," said Zurowski, "and I know how he got that idea. I was talking about analog pressings; he thought I was talking about CDs." Zurowski added that there is no way CD pressings can vary in sound. "Either the correct numbers are there, or they aren't. And if they aren't, you don't get distortion, you get a glitch." (A click or a mute.)

• CD pressings can vary, though. Sony confirmed that discs from a competitor's processing plant have "less distinct" pits, which are likely to be mis-read by some CD players, producing frequent error interpolation. Several manufacturers are having to modify their laser systems for higher reliability.

• Sheffield Records introduced 11 Compact Discs at Summer CES (rather than the 6 that were rumored). Drawn from analog and digital backups of past direct-to-disc sessions, the first releases range in time from the 1971 "Missing Linc II" to the 1984 James Newton Howard Quintet. JGH and DO feel they're better than the analog discs; LA isn't so sure.

• Pioneer Artists' LaserVision disc of Verdi's opera "Don Carlo" is the first such disc with audio mastered on Sony's little PCM-F1 processor. Further evidence that professional users are taking this inexpensive PCM system seriously are the efforts being expended in several quarters to produce peripheral devices -- editors and time-code generators -- to confer truly professional capabilities on this "semi-professional" unit.

• English tonearm manufacturer SME, recently bailed out of bankruptcy, is back with a Series V tone arm that looks as if it may be all things to all perfectionists. Numerous adjustments include VTA, while playing a disc.

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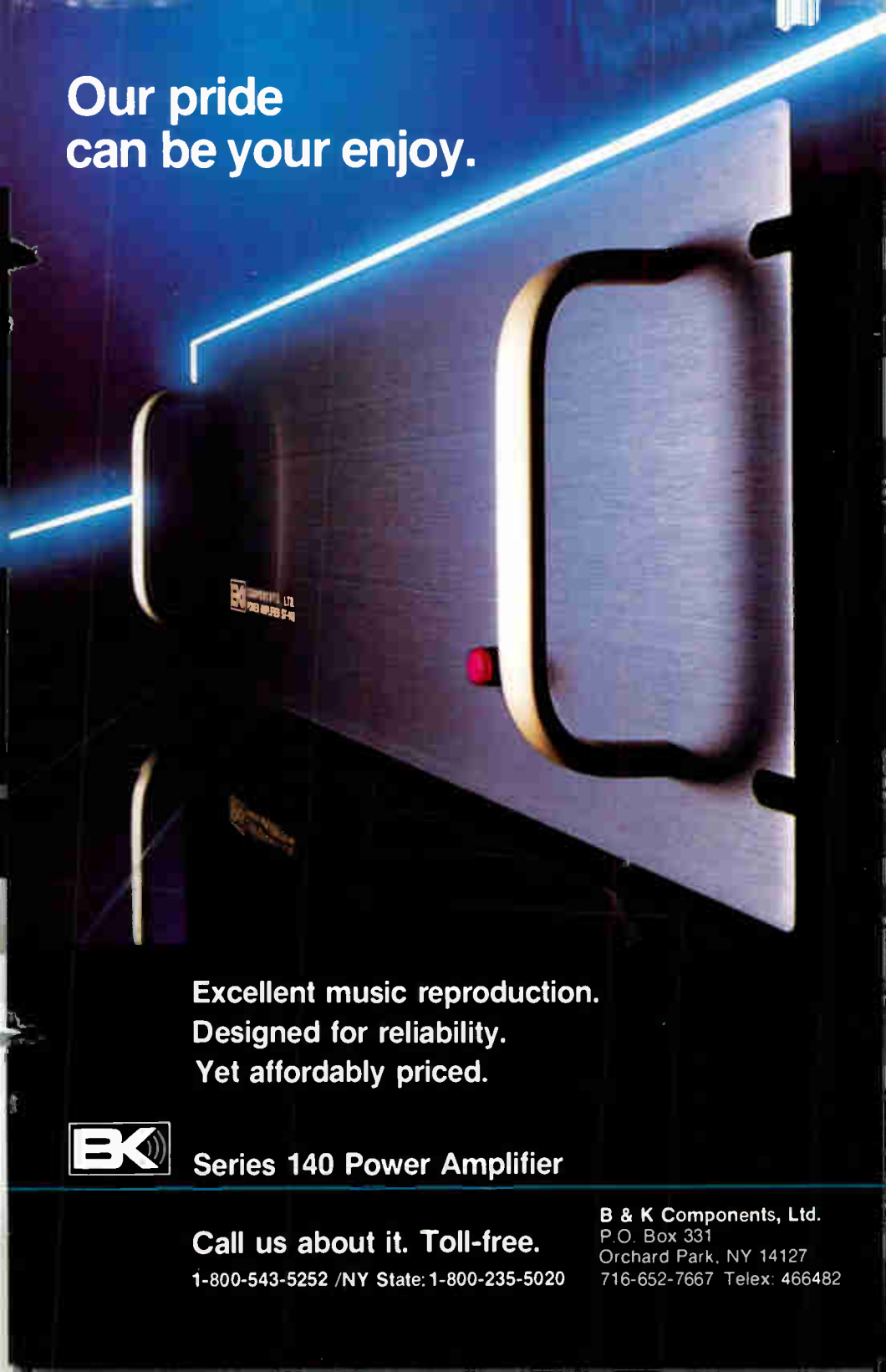

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