

# The Audio Critic

---

## In this issue:

---

We discuss our attitudes, our goals, our methods.

---

We compare at length some two dozen preamplifiers, from \$260 to \$1800. (The \$260 one sounded better than the \$1800 one.)

---

We begin our search for the best of all possible speaker systems.

---

We reveal the dirty little secret of tone arm designers: they hate math.

---

We start monitoring the ads of audio manufacturers.

---

And more.

---

# The Audio Critic

---

Volume 1, Number 1 January/February 1977

---

Editor and Publisher	Peter Aczel
Associate Editor	Max Wilcox
Consulting Engineer	Bruce Zayde
Technical Consultant	Ted Lopatin
Graphic Design	Dick Calderhead
Business Manager	Bodil Aczel

---

**The Audio Critic** is an advisory service and technical review for consumers of high-priced audio equipment. It is published six times a year by The Audio Critic, Inc., and is available by subscription only. For subscription information and rates, see inside back cover. To maintain total dedication to the consumer's point of view, **The Audio Critic** carries no advertising by equipment manufacturers, distributors, reps, dealers or other commercial interests. Any conclusion, rating, recommendation, criticism or caveat published by **The Audio Critic** represents the personal findings and judgments of the Editor and the Staff, based only on the equipment available to their scrutiny and on their knowledge of the subject, and is therefore not offered to the reader as an infallible truth applying to all extant and forthcoming samples of a particular product. Address all editorial correspondence to The Editor, The Audio Critic, Box 392, Bronxville, New York 10708.

---

Contents of this issue copyright © 1977 by The Audio Critic, Inc. All rights reserved under international and Pan-American copyright conventions. Reproduction in whole or in part is prohibited without the prior written permission of the Publisher, which will be automatically denied if the reproduced material is to be juxtaposed to advertising copy or any other additional text serving a commercial purpose. **The Audio Critic** will use all available means to prevent or prosecute any such unauthorized use of its material or its name.

---

---

# Contents

---

## Here Comes The Audio Critic: A Statement of Our Point of View 2

By Peter Aczel, Editor and Publisher

## The Great Preamp Survey 6

By the Staff of The Audio Critic

Advent Model 300	13
AGI Model 511	14
Audio Research SP-3A-1	15
Audio Research SP-4	15
BGW Model 202	17
Dayton Wright SPS Mk 3	17
D B Systems DB-1/DB-2	18
Dynaco PAT-5	19
Epicure Model Four	19
GAS Thaedra/Thoebe	20
Luxman C-1000	22
Luxman CL-35/III	22
Luxman CL-350	22
Marantz 3600	23
Mark Levinson JC-2	23
Paragon Model 12	25
Quad 33	27
Rappaport PRE-1	27
Stax SRA-12S	28
Yamaha C-1	29
Yamaha C-2	29
Yamaha CA-1000	30

## Have Tone Arm Designers Forgotten Their High-School Geometry? 31

## While Waiting for the Perfect Speaker System 36

Duntech DL-15 (comment)	37
Acoustat X (comment)	38
Phase Linear Andromeda III (comment)	38
Infinity QLS (comment)	38
Dahlquist DQ-10 with DQ-1W (test report)	39

## The Admonitor Comments on Current Ads 42

## Box 392: Letters to the Editor 44

## Records and Recording: Why Does It Sound Like That? 46

By Max Wilcox

## Classified Advertising 48

# Here Comes *The Audio Critic*: A Statement of Our Point of View

By Peter Aczel  
Editor and Publisher

Before you get involved in our equipment reviews or anything else in our first issue, read this introduction to our philosophy. And keep it in mind as the plot thickens in future issues.

This publication intends to be a new voice and a new force in audio equipment reviewing. That resolve is, of course, founded on a number of premises, promises, principles and policies, which should be set forth at the start. Here they are, not necessarily in the order of their importance.

\* \* \*

**1** People who buy high-priced, "exotic" audio equipment are more than ever in need of advice and protection. The high-end market has become a jungle, where rip-offs are possibly even more frequent than they used to be on the low end of the business years ago, in the primitive days of the hi-fi boom. Today, a \$1500 power amplifier is more likely to be an overpriced piece of junk than a \$300 receiver, which generally delivers decent value for the money. Price is no longer a meaningful indication of quality; it has become a marketing gimmick.

The best source of advice and protection is probably still one of the few knowledgeable and ethical dealers catering to a sophisticated audiophile trade. Unfortunately, in many parts of the country there isn't even one of these to be found. And when there is, you can't expect him to be unbiased about the brands he doesn't carry. Can you imagine even the saintliest of them saying, "Yes, the Mark Levinson JC-2 is better than any preamp I can sell you here, but dammit, they won't give me the franchise."

\* \* \*

**2** The commercial, mass-circulation hi-fi magazines are of very limited use to the audio purist. Reviews of high-end equipment are few and far between, and when there is one it's usually a worshipful verification of the manufacturer's specs and confirmation that "the XYZ-1000 is indeed, to all intents and purposes, a straight wire with gain." Then you turn to page 29 and there's the XYZ-1000 ad.

Only *Audio* is an occasional exception, and only in the case of two of its reviewers. One is the utterly brilliant Richard C. Heyser, of whom we stand in awe and whose loud-speaker test reports would cause mass suicide among manufacturers (not to mention ad cancellations) if he were allowed to spell out in plain language what those esoteric measurements really signify. We wouldn't cross swords with Dick Heyser any more than with Zorro. The other reviewer is Bascom H. King, who occasionally gets away with hiding comparative evaluations between the lines of his extremely thorough and competent reviews of amplifiers and preamps.

\* \* \*

**3** The relatively most informative and honest critiques of high-end equipment are to be found in the new breed of underground audiophile reviews carrying no advertising by manufacturers. These have also turned out to be of limited use, however, for a number of reasons.

First of all, though they all started out with the intention of being periodicals, they ended up as yearbooks or, occasionally, semi-annuals. Secondly, their expertise in subjective listening evaluations is rarely, if ever, backed up by even a fraction of the technical knowledge that a Dick Heyser or a Bascom King brings to an equipment report. (One of them, for example, recently reported a peak at 16 kHz in a *power amplifier*. Not knowing the difference between frequency response and transient distortion can cause problems even in nontechnical reviewing.) Thirdly, by accepting advertising from retail stores, some of whom are very strongly identified with specific manufacturers, they raise the same issue of credibility as the commercial magazines, though of course to a lesser degree.

Nonetheless, the mere fact that some

deeply involved and at least aurally experienced aficionados are reviewing high-end equipment at their leisure (and without the most brutal commercial pressures) has become a great plus on the audio scene.

\* \* \*

**4** In view of all the above, a totally non-commercial publication or subscription service that reviews high-end audio equipment with both a "golden ear" and a modicum of technical sophistication, and does so with some frequency, is a clear and present need.

Enter **The Audio Critic**, published six times a year, available by subscription only, deriving all its income from subscriptions, carrying no advertising by anyone (except classified ads placed by its own subscribers), and devoted both to comparative auditioning in depth and to intensive laboratory testing.

\* \* \*

**5** Since the lack of an even vaguely predictable publishing schedule in the case of every single underground audiophile review has resulted in an exacerbated credibility problem on this subject, it must be spelled out what we mean by a six-times-a-year publishing schedule. We mean that, by the end of 1977, when the champagne corks are popping and the sweet strains of Guy Lombardo playing "Auld Lang Syne" are heard on the Sequerra tuner, you will have received six issues. We don't mean that you can look in your mailbox on the same day of every second month and find **The Audio Critic** there. We aren't a slick magazine. (We aren't even a magazine.) There will be inevitable delays, and some flexibility will be required. But by hook or by crook, we'll publish six issues in 1977, at *approximately* two-month intervals.

The availability of **The Audio Critic** by subscription only means exactly that. There will be no single copies on sale anywhere, nor will any be obtainable from us. Anyone who wishes to know what our findings and recommendations are, even in a single product category, will have to put up \$28. (Or \$33 if he lives overseas.) Those who are disappointed with their first issue may have the unused portion of their subscription refunded on request. (No questions asked.) Back issues will be available to subscribers only.

\* \* \*

**6** Publishing a new issue every other month or so will enable us to treat our tests, conclusions and recommendations as work-in-progress. When we're reasonably certain of a par-

ticular evaluation, we won't have to hold it back for fear that it would become carved in marble for the coming six or nine months. We'll be able to offer it as the best available opinion as of press time, subject to unembarrassed revision two months later. This way our subscribers will know what we know at all times and will be able to make use of that knowledge on a continuing basis. There are no eternal truths in equipment selection.

Our evaluations will always have two simultaneous thrusts. We will want to know what's the best, most accurate reproducer in a given component category regardless of price, size, convenience or any other consideration. At the same time, we will want to find out, whenever our top choice is extremely expensive, whether something for considerably less money comes respectably close to it. From the audio purist's point of view, these are really the only two selections that matter. Once they are specified, all other components become rather uninteresting. Until something new comes along.

\* \* \*

**7** Our methodology will be at all times pragmatic. We're committed to no fixed dogma concerning either our manner of obtaining equipment for review or our methods of aural and electronic testing. We will let the circumstances dictate the method according to our best judgment.

For example, we may either buy the equipment to be tested in a store (a la Consumers Union) or borrow it from a friend or obtain it from a manufacturer on memo. In the latter case, we trust our ability to determine whether or not the equipment has been tweaked for performance above and beyond production samples. (In high-priced equipment, that's not as easy as is commonly supposed.)

In general, we lean toward large-scale, comparative tests, since the availability of each different model at the same time, under the same roof, and in the same test setup unquestionably results in more precise evaluations than single-model testing against a reference standard. The latter, however, is sometimes the only feasible method.

Our rationale for the particular listening format used in a test will be given in the actual report on that test. Obviously, you can't audition headphones, for example, the way you do phono cartridges.

In our laboratory tests, we intend to eschew the repetition of work that has already

been done by reliable practitioners. That includes the manufacturer. Thus, unless we have reason to doubt that an amplifier has a power output of 180 watts per channel, we won't measure it, except possibly as the incidental fallout of some other test. We'd rather measure it for TIM, for example, or other characteristics that may throw light on its listening quality. We consider the role of laboratory testing to be mainly investigation rather than verification.

\* \* \*

**8** Our laboratory is exceptionally well-equipped for testing audio equipment, being far superior to many we have seen in the production facilities of high-end component manufacturers. We already have nine top-notch instruments by Hewlett-Packard, Bruel & Kjaer, General Radio and other leading makers, and we're adding others as we expand our test program.

We flatly refuse, however, to run look-Ma-I've-got-a-spectrum-analyzer photographs of tone-control curves or similar Mickey Mouse stuff. That's for the hi-fi slicks. We don't intend to involve our subscribers in our laboratory hardware unless there's some meaningful bearing on the subject under discussion. You will see charts, graphs, oscilloscope and spectrum analyzer displays in **The Audio Critic** from time to time, but not for the purpose of cosmetically enhancing the "scientific" image of our pages.

\* \* \*

**9** Despite our technical leanings, we firmly believe that the ear takes precedence over the laboratory in the evaluation of audio equipment. But not every ear is qualified. Specifically, an intense interest in audio equipment is insufficient qualification.

We know a number of people who became interested in transistors at the age of, say, ten but in music only at the age of twenty-two. Their involvement with the sound of music stems from their involvement with audio electronics or electroacoustics. Such people are generally unreliable judges of the quality of sound reproduction.

The ability to evaluate the realism, the quality, the you-are-there-ness of reproduced music is founded on early exposure to live performances at home and in the concert hall. If you've lived with the live sound of strings, woodwinds, brasses, the guitar, or the piano as a child and as an adolescent, their sound is

permanently engraved in your gut. You know when they sound like that (or almost like that) on a stereo system. Records and amplified rock concerts can't provide the same kind of aural conditioning. Nor can a soldering iron.

The staff and consultants of **The Audio Critic** were music people long before they became audio people. We wouldn't dare to ask money for our opinions any other way.

\* \* \*

**10** Unlike other audio publications (and that includes the undergrounds), we believe that a maker of audio equipment isn't entitled to any more tender consideration by a critic than a maker of movies or a recording artist. Like a movie or a record, an amplifier or a speaker is an entertainment product, offered by its maker as a means to the ultimate end of aesthetic delight and/or emotional arousal. For that reason, we would no more submit an equipment review to a manufacturer in advance of publication that John Simon submitted his unfavorable *New York* magazine review of *Barry Lyndon* to Warner Brothers and Stanley Kubrick. The fact that even the noncommercial audiophile publications feel obligated to do this shows just how inbred and conservative the whole audio business remains. As in George Orwell's *1984*, even the Underground is an extension of the Party.

Nor do we believe in letting manufacturers have the run of our pages to say anything they wish in print. We'll let them do that at their own expense in their advertising and their product literature. If a manufacturer has any *factual* information, however tenuous, to add to our reviews, we'll print his letter at the earliest possible opportunity. If we make a *factual* error in a review, or commit any objectively verifiable indiscretion of judgment, we'll print the letter (or the part of the letter) that points it out, along with a retraction and an apology to the manufacturer. Under no circumstances, however, will we print a vituperative letter whose sole purpose is to denounce our staff or impugn our integrity or assail our competence. Nor a letter whose sole purpose is to get extra mileage out of a favorable review by touting a few overlooked features.

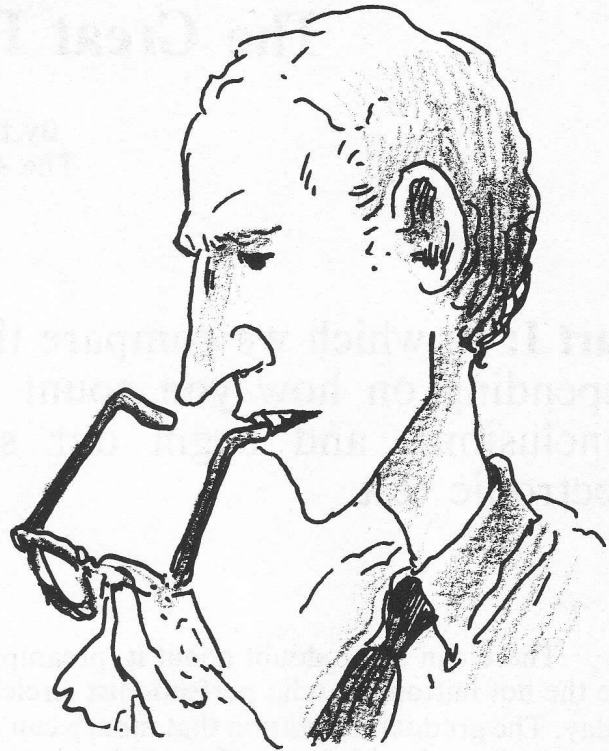
In other words—and in conclusion—our pages belong to our subscribers. Not to the industry. The only boss we have, the only authority figure, is you.

# In Your Ear

Calderhead



"The high end is grainy..."



...the upper midrange is hooded..."



...but from 250 to 400 hertz...



...I've never heard anything more liquid."

# The Great Preamp Survey

By the Staff of  
The Audio Critic

**Part I:** In which we compare the sound of 22 preamplifiers (or 23, depending on how you count it), come to some reasonably firm conclusions, and begin our search for a sonically correlatable electronic test.

There can be no doubt about it, preamps are the hot button in audio perfectionist circles today. The gradual realization that money can't buy happiness in this particular product category (or at least doesn't guarantee happy results) and that even the most advanced designs all sound different is causing considerable head-scratching and opinionated expertizing throughout the land.

It would stand to reason if the low-level amplification stages in a modern reproducer chain were its most flawless links. No moving parts. No current to speak of. None of the problems of the megahertz regions. Nothing but the simplest low-frequency voltage-amplifier circuitry. Engineers outside the audio field can't even understand what all the fuss is about. "What's the matter with you guys?" is their common reaction.

The matter is that to raise the amplitude of a 3-millivolt signal coming out of a phono cartridge to the 1 volt or so needed to feed a power amplifier takes a gain of some 51 dB. Add to that an extra 19 dB for RIAA equalization at 20 Hz and you've got a hell of a big climb. All kinds of bad things can happen to a supposedly perfect analog signal on the way there. And do. A significant portion of the inaccuracies we hear in phono reproduction is definitely traceable to the preamplifier. (One of our technical consultants has been saying for years, with characteristic candor, that "all preamplifiers are shit.")

We at **The Audio Critic** wanted to get this irritating problem out of our way as early as

possible, so we decided to do it more or less in one gulp and review every preamplifier that's even halfway promising in our first issue, with maybe a few stragglers to catch up with in the second issue—and that's all. That way we'd have a good starting point for a reference system and would need to test state-of-the-art contenders only one by one as they came along. Then we could devote our energies to the really fascinating problems such as speaker systems.

We soon found out, though, that preamplifiers and their design philosophy can be almost as fascinating, not to mention controversial.

## **The easiest way to get them was the hard way.**

First we had to get all these preamps together in one place. Because you can't compare the sound of something like, say, the Mark Levinson JC-2 and the DB Systems preamp by testing one in August and the other in November. Until we could choose a clearly preferred reference preamp, we wanted all units to be available in both the listening room and the laboratory simply by reaching for them. Right then and there.

Since we knew it would take up to a year before we could get that many different units on loan from their manufacturers, we went ahead and bought them all. (To be exact, 20 out of the 22.)

It was a hard decision to make, since a lot of money was involved (we aren't exactly Consumers Union), but we finally had to make



the investment just to get the show on the road. We want to emphasize that this wasn't a policy decision to keep **The Audio Critic** pure; it's very difficult for a manufacturer to "tweak" a preamp made with high-tolerance components even if he knows it's going to a reviewer. (It isn't like a tape recorder, with a large number of factory adjustments; a preamp is basically as good or bad as its circuit design.) We would have been perfectly willing to borrow the equipment, as we'll be willing in the future, but we're committed to six issues a year, and the stretchability of our deadlines has limits. So whatever benefits resulted, both in anonymity and in run-of-the-factory sampling, were purely incidental. As a matter of fact, we carried on a lively dialogue with a number of top designers to find out about their theories, if any, even though we had bought their equipment in a store without their knowledge. (More about that under the individual model descriptions.)

**In the laboratory,  
everything was too perfect.**

As we explain elsewhere in this first issue, our tests must be regarded as work-in-progress. We report six times a year all we have found out until deadline time. We trust, therefore, that our subscribers won't be too upset to learn that in Part I of this preamp survey we have no sensational laboratory test to report that correlates perfectly with sonic performance. It should be some consolation that the top preamp designers haven't found such a test, either. (But see Andy Rappaport's letter farther below for an implicit suggestion of one.)

We're working very intensively on this problem and should have some interesting things to report in Part II of this survey, in our next issue. Meanwhile, the laboratory situation looks like this:

All of the preamplifiers tested appear to meet their specs comfortably. The trouble is that there's no correlation between the standard specs and listening quality.

For example, *harmonic distortion* is simply nonexistent in these preamps. That includes the best and the worst-sounding ones. Our spectrum analyzer will quickly pinpoint any harmonic up to 50 kHz of greater amplitude than about -86 dB relative to the fundamental, which comes to 0.005% distortion. The residual distortion of our oscillator throughout the audio range is about the same. Sweeping through these units at various frequencies

hardly ever showed the slightest blip, and even in the rarest cases nothing worse than 0.01% at several volts out. To link any audible unpleasantness to these figures would be cultist nonsense, especially since they invariably related to lower-order harmonics. (So help us, we never, never saw a fifth or a seventh harmonic blipping out of the -86 dB noise floor of the analyzer, despite the claim in the Mark Levinson JC-2 literature that this is where their circuit is superior to others. Too bad. That looked like a promising test.)

As for *intermodulation distortion* measurements, the SMPTE method (60 Hz and 6 or 7 kHz, 4:1) is clearly a waste of time on present-day equipment, as even Matti Ojala (the Father of TIM) strongly implies in his latest paper. We quickly dispensed with that one. The CCIF method (two high frequencies 1 kHz apart, 1:1) has, on the other hand, served us well in other tests; but in the case of the 22 preamps—forget it. They passed the CCIF test just as easily as the THD test. Even with various high-frequency test signals spaced only 100 Hz or 50 Hz apart.

We had an amusing experience in connection with this type of test when a very hip young circuit designer was passing through town and visited our lab. We both shared a rather low opinion of the Dynaco PAT-5 preamp (it did poorly in our listening tests), but when he was told that this preamp measured as clean as a whistle he wouldn't believe it. Okay, he said (with the "wise guy" vocative unspoken but implicit), let's feed 19 kHz and 20 kHz into the phono input, one to one. We did, and there was nary a blip on the spectrum analyzer. No sidebands at 18 kHz and 21 kHz; no difference product at 1 kHz. "There's something wrong with your spectrum analyzer" was his last resort. Whereupon we increased the input until the PAT-5 went into hard clipping at God knows how many volts out and the CRT display bristled with spikes. The spectrum analyzer was working fine. He walked out of the lab muttering to himself.

Checking the *RIAA equalization accuracy* proved to be just as unproductive. All of the preamps, good or bad, were accurately equalized. By that we mean within  $\pm 0.75$  dB or better, from 20 Hz to 20 kHz, which is good enough to eliminate the possibility of listening preferences on that score. Even the phono cartridge we used in the tests could have varied that much from day to day, owing to temperature and humidity changes. We're well aware of the  $\pm 0.2$

dB cult (or is it  $\pm 0.25$  dB?), whose adherents are convinced that any greater RIAA-cum-cartridge deviations will destroy the validity of A-B testing, but we found cruder audible differences from preamp to preamp than could be rationalized by such obsessions. In most cases we didn't change our listening preference between two preamps A and B even when we advanced or cut back the tone controls a notch on A only or B only!

*Hum and noise* had equally little to do with our listening preferences, although some of these preamps are both measurably and audibly quieter than others, and we note outstanding cases under the individual model headings. But the remarkable Rappaport PRE-1, for example, hummed more than it should have, and we'd still rather listen to it any day of the week than to, say, the Yamaha C-2, which was unbelievably quiet.

*Phono input overload* was our last hope among the more or less standard specs. There was a time, not so long ago, when only a few circuit designers were paying sufficient attention to this and the results showed it. But in the case of the thoroughly up-to-date preamps we're dealing with here, we could establish no correlation between the sine-wave overload figure and sonic performance, undoubtedly because the figure was never low enough to be a problem. There were some outstanding units (e.g., Advent Model 300) of the 100-mV-is-good-enough school (at 1 kHz, that is); other great-sounding ones like the Paragon Model 12 proved only that a much higher figure, like chicken soup, can't hurt. We defy anyone to predict the sound of a phono circuit from its input overload spec, as long as it isn't ridiculously low, which nowadays it apparently never is.

### **Those exotic Boston tests didn't reveal much more.**

During the past year or so, a number of unconventional preamplifier tests have been proposed, mainly by audio people in the Boston area. Preeminent among these is Tomlinson Holman, whose amazingly good, inexpensive phono circuit for the Advent Model 300 receiver certainly makes him a preamp guru to reckon with. His paper on the subject in the May 1976 issue of the *Journal of the Audio Engineering Society* is required reading for the serious student of preamplifier behavior.

Holman's first test is for "cartridge

inductance interaction." He proves, with irrefutable argument and documentation, that a preamplifier exhibiting perfect frequency response when driven from a voltage source can still have all sorts of horrible rises and droops at the higher frequencies when driven from an inductive source, such as the equivalent electrical circuit of a typical phono cartridge. Since correct input stage design can completely eliminate these high-frequency interactions, the test is undoubtedly useful for nailing unsophisticated circuitry, but it didn't help us in our search for the electronic cause of sonic differences. We found that, when a preamp sounded lousy, it kept sounding lousy even after we had switched to a completely noninductive source like a high-quality preamplifier fed by a moving-coil cartridge. Besides, as we explain below, the regular magnetic cartridge used in our listening tests had negligibly low inductance.

The other unconventional test proposed by Holman (whose paper also covers a lot of interesting ground we're bypassing here) is the measurement of the spectral content of square waves passed through the preamplifier after suitable RIAA preemphasis (to simulate the preequalized response of LP records). Since a square wave is theoretically the sum of an infinite series of odd harmonics of diminishing amplitude, the presence of even harmonics in the output is evidence of a form of transient distortion, which can be quantified on a spectrum analyzer. This is very different, as you will note, from the square-wave tests generally seen in the commercial hi-fi magazines, where they show you an oscilloscope (i.e., time-domain) photograph of a square wave fed through the high-level "aux" input of the preamp. (The phono input is nearly always neglected because, for some reason, these people don't own an RIAA preemphasis network.)

We're intrigued by the Holman square-wave test, which seems to pinpoint various asymmetries in the circuit characteristics, as well as slew-rate limiting. So far, however, we find it more useful for nailing an occasional baddie (not consistently, though) than for any kind of quantitative distinction between good, better and best. For example, the most irritating-sounding preamp in our entire survey, the BGW Model 202, did quite poorly on this test, but no sooner did we say "Aha!" than the almost equally irritating Marantz 3600

measured 16 to 18 dB better. And our old friend, the Dynaco PAT-5, which in some ways we liked even less than the BGW and the Marantz, did incomparably better than either. On the other hand, the best-sounding preamps all did well, so there may be *some* correlation; however, they didn't come out in the same order on the test as on listening preference, so there's really no fine-tuned correlation. Another highly active and enlightened Boston practitioner, Alvin Foster, has already published Holman square-wave test results on a number of preamps included in our survey here, and we see the same pattern: good checks out better than bad, but best doesn't necessarily check out better than good. Since we don't believe in remeasuring what other testers whose reliability we have no reason to question have already measured, we'll let this subject simmer on a back burner for a while, at least until we're able to have a more positive attitude toward it. We're certainly of no mind to publish detailed charts of our findings. On top of it, we've heard it rumored that Tom Holman himself no longer has confidence in this test. If that's true (we must emphasize that we didn't hear it from him directly), the whole matter may benefit from "benign neglect."

The above-mentioned Al Foster has also come up with a quantitative test of his own. He measures the output level where the preamp begins to clip at three different frequencies: 1 kHz, 10 kHz and 50 kHz. Ideally, he claims, all three clipping levels should be the same; however, if the 50-kHz clipping level is at least 50% of the 1-kHz level (say 4 volts or better at 50 kHz when it is 8 volts at 1 kHz), the preamp will sound "excellent" and indistinguishable from all others that pass this test. On the other hand, if this reading is 30% or less, the preamp will sound "veiled," according to Al. This seemed almost too good to be true, so we tried it—and it *was* too good to be true. For example, the D B Systems preamp and the Luxman CL-350 both did brilliantly on the test (the D B scored 91% and the Luxman 100%), yet the D B sounded unequivocally better. And the Rappaport PRE-1, which sounded even better than the D B (by a narrow margin but consistently), failed the test with a vengeance. There went another neat little trick.

It seems to us, since both the Holman square-wave test and the Foster clipping test are essentially measurements of slew-rate limiting from two different points of view, that slew

rate affects sonic performance in a more round-about way than is generally assumed to be the case. Quite possibly, slew rate has no significance as an absolute quantity and matters only with regard to the compatibility (or interface) of cascaded amplifier stages. (Again, we refer you to the Rappaport letter.) We shall have more to say on this subject as we gather further evidence.

### **There are many more tests still to be explored.**

There's no doubt in our mind that a sonically correlatable electronic test, or combination of tests, can and will be found one day. (Not necessarily by **The Audio Critic**, though.) Just as in the cruder days of audio THD and IM were correlatable quantities, with improved sound resulting from their reduction, today's more subtle and elusive distortions should also prove to be quantifiable and eventually controllable.

We plan to spend time in the laboratory on a number of promising new tests, including Matti Ojala's "sine-square" distortion test for TIM (we have already experimented with it on power amps but ran into some minor difficulties), Wayne Hetrich's highly intriguing gated asymmetry test (presented last October 29th to the AES convention), possibly some form of the square-sine-square test suggested in the Rappaport letter, an investigation of the effect of continuing the RIAA equalization well beyond 20 kHz, and several others.

Meanwhile, let's get down to what it's all about in the end. The sound.

### **The listening tests.**

Before you can begin to test preamplifiers by listening to them, you have some sort of faith in the ability of the human ear to detect very small differences in sound. That faith, founded on repeated experience and constituting the very essence of audiophilia, is occasionally undermined by simplistic come-on-you-guys-they-all-sound-alike generalizations, sometimes even from sources with high credentials. One recent example was an audiophile talk show on WBUR, Boston University's public service FM station, featuring as guest speaker another well-known Boston audiomafioso, Mark Davis, who has something to do with psychoacoustics at MIT. Mark, a circuit designer himself, flatly asserted that all preamps sound alike, from the two-transistor

phono circuit in the General Electric transistor manual to the most elaborate audio-freak unit money can buy, as long as certain conditions are met. These include exact matching of volume levels on A-B comparisons, no more than typically low THD and IM distortion, accurate RIAA equalization and, most important in his opinion, low phono input capacitance, which must be lowered if it's too high in order to prevent cartridge interactions that would invalidate the comparisons.

We're prefacing our explanation of our listening tests with these remarks (even though we have already covered the above criteria, except volume matching, and obviously arrived at totally opposite conclusions) just to make two points.

One is that it matters a great deal who does the listening. We, too, could have assembled a listening panel of reasonably intelligent, music-loving persons who wouldn't have heard the difference between the Mark Levinson JC-2 and the Dynaco PAT-5. The world is full of them. Some of them even know a great deal about electronics. (See also our remarks in the introductory article in this issue.) It takes a rather special listening attitude, not to mention experience, to sit through long-suffering comparisons of closely matched equipment and slowly but confidently zero in on the differences. We believe our staff is good at it, but we have very little faith in statistical surveys ("19 persons preferred A and 22 preferred B"). If value judgments of sensory perceptions could be arrived at that way, Johnny Walker would use census takers instead of professional tasters. We have a feeling that Mark Davis might have come to a different conclusion with a different selection of listeners.

Our other point is that highly exacting listening tests must be performed by inserting the device under test into an extremely high-quality system. The speakers, especially, must be the kind that are hard to please. The AR box speakers used in the Mark Davis tests are much too forgiving. That may be a good thing when you're trying to enjoy the music from a less-than-perfect program source. For preamp testing, forget it. We're probably dwelling on a perverse opinion at greater length than it deserves, but when we heard the hosts of the *tak* show conclude the discussion by chortling that another audio myth bites the dust, we got upset. (After all, impressionable young people were listening.)

Which brings us to our own unforgiving speaker system, the Dahlquist DQ-10. We used it for these tests, not because we think it's the world's best (we haven't decided yet what is), but because it mercilessly shows up the slightest flaws in the electronics behind it. A pair of DQ-10's, in combination with a pair of DQ-1W subwoofers, biamped with two Quatre DG-250 Gain Cell (analog multiplier) power amplifiers, was the reference system on which all the final conclusions of this survey are based. (See our Dahlquist DQ-10/DQ-1W report elsewhere in this issue for a rationale of this system.) Other power amplifiers we used, mainly to test compatibilities, included the Yamaha B-2 and the GAS Son of Ampzilla; in the early weeding-out phases of the survey we also used the DQ-10's without subwoofers.

Our "electronic crossover" was particularly suitable for these tests in that it was actually nonelectronic: a simple RC network inserted between the preamp under test and the two power amps, so that no additional active stage could add its own sound to the chain. (Again, see our Dahlquist report for details.)

The turntable used was the Luxman PD-121; the arm was the Formula 4, which turned out to be just a little too low in mass for ideal compatibility with our reference cartridge, but we left it alone after the tests were under way in order to maintain the constants of our survey unchanged. The choice of reference cartridge was, of course, the most important decision, and we finally selected the Grado Signature Model One by a process of elimination.

Initially, our leanings were strongly toward one of the better moving-coil cartridges, but we soon discovered that the insertion of an additional component between the cartridge and the preamp, namely a transformer or a pre-preamp, would make our evaluations much more prone to error. It's a considerably more straightforward process to judge A against B than A + C against B + C. Only about one third of the preamps tested are available with their own moving-coil electronics (either built in or as an accessory); some of these have already been checked out with a Denon DL-103, and a separate report on their performance with various moving-coil cartridges will follow in Part II of this survey in our next issue (March/April). The only common denominator of all these preamps, however, is the "mag phono" input, so we decided we had to use a magnetic cartridge if we wanted to test them

all identically.

Once that decision was made, the selection of the Grado became logical. It has by far the lowest inductance (55 millihenries) of any magnetic cartridge known to us, so the whole problem of cartridge inductance interactions is rendered irrelevant. With any phono input capacitance or tone-arm lead length this side of insanity, the Grado behaves electrically as a voltage source. This enabled us to concentrate on the inherent listening quality of each preamp circuit without the nuisance of "tuning" cable lengths, soldering capacitors in and out, etc. Furthermore, the Grado Signature Model One is a superior cartridge sonically, quite regardless of its electrical characteristics. Its smoothness and resolution of detail at the higher frequencies are second to none, making it an excellent tool for pinpointing small differences in preamp accuracy.

**On this reference system, every member of our staff could hear distinct differences between any two preamps in our test, in a few cases only after prolonged and careful A-B-ing, in most cases instantly and with ridiculous ease.**

We adjusted our methodology accordingly. With 22 units you have to remain flexible because, theoretically, you could end up with 231 separate, rigidly controlled A-B tests if you decided to test each of them against each of the others. That would have made about as much sense as setting up a formal blind tasting of 22 wines that included Gallo Hearty Burgundy as well as Romanee-Conti 1945. Since we had no intention to rank all these units from first place to 22nd, we could be more relaxed in our approach. We were interested in establishing only two rankings: the best-sounding preamp regardless of price and the best buy for the money. So the baddies could be quickly eliminated without any fuss and without trying to find out by endless testing which was the least bad.

Having all units available to live with on a prolonged basis made our job much easier than is usually the case in audio reviewing. We never had to wonder whether what we were hearing was as good as what we had heard six weeks earlier. The other unit was still there to be inserted into our reference system in a matter of minutes. It was as if, instead of being asked to judge a beauty contest, one had a chance to live in the same house with all the contestants for a few months. The choice of winners would become a lot easier.

Before you allow that thought to inflame your imagination, let us tell you how we A-B-ed the serious contenders. We have some rather strong opinions on A-B testing, and they all relate to our determination to zero in on audible differences in sound, no matter how small or insignificant, rather than to prove the fallibility of the human ear. Rapid A-B-ing is just great for the latter. Take two pieces of equipment that you know sound indisputably different after months of living with both, put them on an A-B switch, match your volume levels carefully, and yank the switch back and forth every few seconds while the music plays on. Lo and behold, A and B sound exactly the same. Not because there's no audible difference between them but because your ear tends to integrate the sound under these conditions. Now try listening to A for five minutes, stop for a moment (anywhere from ten to thirty seconds), go back to the *same* segment of the music, and listen to B for five minutes. The differences will be readily apparent.

We absolutely refuse to do any rapid A-B-ing when we're fine-tuning our perception of two components that are fairly close in quality. We invite comment on this from our subscribers (as, of course, on anything else within these pages), but it will take a lot of powerful persuasion to change our mind. Relatively long stretches of A and B on the *same* music, with a moment of silence between the two, is a procedure that has so far resulted in unanimous agreement among our staff members on the relative merit of every unit tested. We're satisfied that our method works.

A word about matching volume levels. Obviously, if A is distinctly louder than B or vice versa, you can't make an accurate judgment between two units of closely matched quality. (Between, say, the Mark Levinson and the BGW it doesn't make a damn bit of difference. You'll know which is better even if you listen from the shower.) We made an effort to match our volume levels within 1 dB or so on all the more demanding comparisons, by means of a 1 kHz tone on a test record and a quick meter reading. We made no attempt to match levels within 0.2 dB or 0.3 dB or anything of the sort, even though we're well aware that it's *de rigueur* according to the rapid-A-B cult. This is one of those alienated electro-techno-freak fantasies that bear no relationship to the practice of music in the real world. Real-world musicians aren't "flat" like signal generators and meters. They can't control their output within 0.2 dB from note to note and bar to bar. Even one of those supersmooth, pearly runs on the piano by, say, Arturo Benedetti Michelangeli will fluctuate more than that in volume. So if you cut into the music with your A-B switch

and the level changes by 0.2 dB after the cut, it may be either because A and B aren't perfectly matched in gain or because the performance has changed that much in level. You'll never know the difference: the net result is exactly the same. In audio testing, it sometimes helps to think musicians instead of millivolts.

We must keep emphasizing that, after months of steady exposure to all these preamplifiers, an intense preoccupation with methodology seemed to us pretentious, pedantic and a waste of time. We ended up knowing how each of them sounded, regardless of how we went about our listening. For that reason, we were also fairly casual about blind testing. The initial exposure of a staff member to a new piece of equipment nearly always took the form of a blind A-B test against an already familiar unit, mainly because it was more fun that way. But after everybody's preferences were fairly well established and it came to sorting out the finer points of difference, we paid very little attention to "security." The units were there on the shelf for anyone to look at. We firmly believe that all of us are objective and mature enough not to "want" a particular brand to sound better than another; that's kid stuff. And, again, from the point of view of ascertaining reality rather than the fallibility of the human ear, it helps to know that this is the Yamaha C-2 with the brittle highs we all heard yesterday; otherwise we would have to reestablish the same fact under a different blind code name today and possibly become confused because we might be less alert today than we were yesterday. Retained information can only help realistic testers; in the final analysis, elaborate blind and double-blind testing is a shell game played with your perceptions by withholding information.

### The source material.

One of the main problems in testing preamps (as against, say, microphones) just by listening to them is that you must start with a vinyl groove. Since there's no way of determining *objectively* what that groove holds in the way of total aural information, there's no way of judging the accuracy of the preamp in any absolute sense. What if the preamp cancels out inaccuracies in the groove by introducing equal and opposite inaccuracies, making the music sounds more natural than it would through another, more accurate preamp?

Here we really think that statistics become useful and valid. If a preamp makes fifty different records sound cleaner, more open, more detailed, more natural than other preamps, it's obviously a great statistical unlikelihood that this preamp "zigs" in distortion whenever each of the fifty records "zags." For that reason we used a good many records of at least a dozen different labels to arrive at our

conclusions. Of course, we had some favorites; a few recordings are so specific in certain aspects of their sonic character that they make particularly convenient tools for testing.

We went back again and again to the Messiaen "Quartet for the End of Time" on RCA (see also our *Records and Recording* column), the Bernstein "Carmen" on DGG, the "Siegfried" sung in English on EMI (not Angel!), the complete Prokofiev "Romeo and Juliet" ballet on London, the Copland "Billy the Kid" on Turnabout, Cat Stevens' "Tea for the Tillerman" on Island (not A & M), Pink Floyd's "The Dark Side of the Moon" on EMI Harvest, and (inevitably) the Sheffield Labs and Japanese Audio Lab records, dreadful as they are in musical content.

In addition, Associate Editor Max Wilcox contributed a few test lacquers cut from master tapes he had microphoned, produced, edited and mixed himself. That, of course, provided a particularly good fix on the original sound, without the usual uncertainties about the degree of accuracy represented by the groove.

Someone may ask at this point, what about other program sources such as a tuner or tape deck? Didn't we test the high-level inputs of these preamps? No, we didn't. We were testing *phono* preamps. If you never play phonograph records through your stereo system, you need only a source selector switch plus a good attenuator, not an expensive preamp. If we call the phono stage P and the high-level stage H, we were testing the accuracy of P + H. In some special cases we also tested P alone. But never H alone. We really couldn't care less which preamp has the most accurate H, all by itself. It's academic. We were trying to find the one with the most accurate P + H. If a slightly less accurate H is fed by a vastly superior P to produce the best P + H, overall, that's one we want for our reference preamp.

### What about other preamps beside these 22 (or 23)?

Obviously, we couldn't swallow the whole world in our first issue (although we tried). As it is, this is by far the broadest critical survey of preamps ever published anywhere, at least to our knowledge. We used two criteria in assembling this group. One was the posture taken by the manufacturer. If it was suggested anywhere in the manufacturer's literature or advertising that "This is it!", that he offered

the preamp as the best there is, or equal to the best, or state-of-the-art, or what have you, we tried to include that unit. Our other guideline was the prevailing climate of opinion among audio perfectionists, both amateur and professional. If we perceived that a unit is widely believed to offer outstanding performance, we tried to include it whether we agreed or not. Our rationale for inclusion is given under the individual model listings below, unless it's self-explanatory.

Even so, we missed a number of models we would have liked to include, and we're taking steps to obtain them for testing at the earliest opportunity. We're particularly interested in the Bravura, the Dayton Wright SPL Mk 2b, and the Trevor Lees kit, since each of these has been reported from supposedly credible sources to be state-of-the-art. Others that deserve to be investigated are the CM 300, the Dunlap Clarke, the Infinity FET (although we hear mixed comments about it from the field), the SAE Mark 2100, the Soundcraftsmen, and probably a few others that have somehow eluded us. We'll make an attempt to test them all.

**(FLASH! Near press time we're pleased to report that we have received the Trevor Lees kit, including all the latest mods, and that we plan to assemble it and test it in time for a report in Part II of this survey.)**

You may have noticed that the only Japanese preamplifiers we have included are the audiophile-oriented brands: Luxman, Marantz, Stax and Yamaha. (We missed the Accuphase, an omission that ought to be rectified.) Sony, Pioneer, Sansui, Kenwood, and Technics by Panasonic were omitted, even though they make high-priced preamps, because it was our judgment that these models represent a marketing decision by these companies to round out their commercial hi-fi lines on the high end rather than a sudden dedication of their efforts to the needs of audio perfectionists. We cannot conceive of any of these units as challengers that might change our rankings here. If we ever receive evidence to the contrary, we'll rush into print with it without the slightest hesitation and with profound apologies.

And now—the individual reports.

## Advent Model 300

*Advent Corporation, 195 Albany Street, Cambridge, MA 02139. Model 300 FM Stereo Receiver, \$259.95. Three-year warranty; manufacturer pays return freight. Tested #JO 02876, owned by The Audio Critic.*

The very first unit in our alphabetical listing will recoup the subscription cost of **The Audio Critic** many times over for anyone who is looking for the greatest per-dollar value of all time in preamp performance.

The Advent Model 300 isn't even a pre-amplifier, but who cares? For \$260, you get a neat little FM tuner and a 15-watt-per-channel power amplifier thrown in free of charge. We haven't tested these, but we can assure you that they work. The Editor's two young sons are blasting away with our expropriated 300, straight through, even as these lines are being written.

The only reason for the inclusion of the Advent 300 in this survey was the announcement ad from Advent that asserted that the 300 incorporates "an entirely new phono preamp section that is audibly equal or superior to any separate preamp at any price." While we find ourselves unable to endorse that claim without any qualification, we must report that it's far from the usual advertising bombast and is substantially truthful. Only a small handful of the preamps we tested come even close to the Advent when you convert it to a separate pre-amplifier by removing two thick, U-shaped aluminum jumper wires in the back of the receiver. As we hint on our front cover, the Advent sounds better than, for example, the Yamaha C-1 at \$1800.

We still can't recommend the Advent to those who want absolutely the best, regardless of price. While completely open, free, neutral, and nonfatiguing in sound, with excellent depth perspective and very impressive dynamics, the Advent still doesn't possess the ultimate refinement of inner detail audible on the top four or five units in our survey. It would be grossly unfair to pit the Advent against each of these, freckle by freckle and eyelash by eyelash, since even the cheapest of them costs almost twice as much. What's more, even their narrow margin of superiority must be somewhat qualified.

Whatever slight blunting or veiling of detail the Advent may produce (and we must emphasize that it's very slight) is due, in our opinion, to the tone control circuit, which can-

not be switched out. This is the feature we liked least about the unit; in fact, we discovered in the lab that when the tone controls were set for dead-flat response on the right channel, there was a 2 dB bass boost on the left channel. Furthermore, the dead-flat position of the treble control was a few minutes past the 12 o'clock position. (Of course, we musn't forget that we're dealing with a \$260 stereo receiver here; it's really a schizophrenic situation! Next thing you know, we'll complain that the controls don't have that expensive feel. They don't, damn it . . .)

The point we're trying to make, though, is that when you bypass the tone control circuit and the volume control by testing the Advent at "tape out," unbelievable things begin to happen. We absolutely drove our keen-eared Associate Editor up the wall by going from those "tape out" jacks into the "remote phono" inputs of the Mark Levinson JC-2 and A-B-ing the phono stage of the Advent against the JC-2's own phono stage. He couldn't decide which one he preferred! After a long evening of agonizing reappraisal, we came to the reasonably firm conclusion that we preferred the JC-2 with its own phono stage. It seemed just the slightest bit higher in resolution of inner detail. Whew!

About the only thing to add is that the Advent Model 300 has rather low gain when used as a separate preamp, preferring to see a power amplifier with an input sensitivity of 1 volt or even less. And that all the lower-priced preamps in the world are dead, dead, dead.

## AGI Model 511

*Audio General, Inc., 1631 Easton Road, Willow Grove, PA 19090. Model 511 Stereo Preamplifier, \$400. Three-year warranty; manufacturer pays two-way freight. Tested #5460051, owned by The Audio Critic.*

This one gave us a hard time because, good as it is, we expected it to be even better. There's something about the AGI 511 that has great intellectual appeal to the audio purist. It's a stripped-down, strictly functional unit, without tone controls, filters or other frills, but very sturdily built, with obviously high-quality parts. (For example, the power switch that supplies current to the convenience outlets in the back is rated at 15 amps and will handle 20. You can plug in your monster amplifier. And the countersunk machine screws that hold the top

and bottom covers in place are made of unstrippable stainless steel. We could go on and on.) Most important of all, the circuit philosophy is all-out, obviously with nothing but the advanced audiophile in mind, and the gorgeous circuit board seems to reflect this. It all looks like a real bargain at \$400.

We have met Dave Spiegel, the designer of the 511, and can vouch for his utter dedication to the noncommercial, purist approach in engineering. He is even into Fourier analysis, and who in the audio industry goes even near that stuff? (Don't say Dick Heyser; he isn't a manufacturer.) So we really expected the world of this preamp and were somewhat disappointed when we got a little less.

The sound of the AGI is very smooth and free of distortion, against a very quiet background—definitely an audiophile's kind of sound. But when you listen for depth perspective and, in general, any kind of spatial information, there are problems. When the program material contains highs, the sound becomes more spacious, but the highs appear to come forward instead of being heard in correct perspective within the sonic fabric. When there are no highs, the overall sound stage seems to become smaller, as if somehow the ceiling had been lowered. When A-B-ed against a preamp that is flawless in this respect, such as the Rappaport PRE-1, the AGI has a closed-down, darker sound by comparison. On recordings particularly rich in depth information, such as the English "Siegfried" on EMI, the AGI creates constant ambiguities as to what's up front, what's in the middle and what's all the way in the back. These effects are of course slight (after all, this is still a superior preamp), but they're there all right and don't really change as you experiment with cartridges, power amps, etc.

We have a feeling we know what's wrong with the AGI 511, but we can't be absolutely sure. It may be that the 250V/uS slew rate of the phono stage (something of a world's record) is too fast for driving the high-level stage, which has a slew rate of only 30V/uS. The result could be some form of TIM. This is still frontier stuff (at least to us poor audio slobs, in case some NASA types are listening in) and remains to be verified.

Meanwhile, we have to rate the AGI Model 511 as the least satisfying in sound among the few really *good* preamps we have tested.



## Audio Research SP-3A-1

*Audio Research Corporation, 2843 26th Avenue South, Minneapolis, MN 55406. Model SP-3A-1N High Definition Stereo Control, \$795. Five-year warranty (vacuum tubes, two years); customer pays all freight. Tested #570290-1A-1, borrowed from owner.*

When we started this survey, we weren't even going to include the SP-3A-1, as we had heard it would be discontinued once the SP-4 was phased in. Besides, it had been the Editor's reference preamp for almost two years, long before **The Audio Critic** was conceived, and we really didn't think it would stand up under competition with the latest solid-state contenders for state-of-the-art. (We weren't far wrong.)

As soon as we found out that the Audio Research vacuum-tube line would be continued as long as there was a demand for it, we borrowed this fairly late production sample (made in December 1975). It incorporated all the modifications that had made the life of SP-3A-1 owners so eventful over the years, except the July 1976 mod (involving the removal of one pair of resistors and two pairs of capacitors), which even the factory contends is exceedingly subtle in effect. Since we didn't want to touch a borrowed unit with a soldering iron, and since the shortcomings of its sonic performance weren't all that subtle, we decided not to bother with this latest mod.

Well, what about the good old SP-3A-1? It's still as ugly as we remembered it, the controls are still as Mickey Mouse as ever, and the midrange is still as gorgeous as ever. Holy smoke, what a midrange! If the female voice is all you ever listen to, with maybe a few soft instruments plinking away in the background, this might still be the best preamp for you. Just for that, however, it's a little bit overpriced. But talk about depth and dimensionality. . . !

On complex, dynamic material, on the other hand, the SP-3A-1 had a distinct "electronic" glare under the scrutiny of our merciless reference system. (We have a feeling that the Magneplanars the ARC people sharpen their ears on are a lot kinder, though probably not quite as truthful, as the Dahlquist DQ-10's.) The clashing cymbals and clacking castanets of Carmen, for example, just didn't sound as nice as on a number of other preamps, both solid-state and vacuum-tube.

Nor did the violins. Not that the glare, or call it overbrightness, that we complain of had anything to do with the typical, cheap, transistory nastiness. This was still a "soft" vacuum-tube sound overall, but with a slightly unnatural, even unmusical, treble coloration.

We're aware that we're not the only ones to have noticed the SP-3A-1's slight garishness in the upper ranges. (The tubes, incidentally, were from Amperex, made in Great Britain.) Even the ARC people must have decided some time ago that the honeymoon was coming to an end and that it was time to begin the development of something like the SP-4.

All in all, we feel that the Audio Research SP-3A-1, like Joe Louis, should have gone into retirement while still the invincible champion.

## Audio Research SP-4

*Audio Research Corporation, 2843 26th Avenue South, Minneapolis, MN 55406. Model SP-4 High Definition Preamplifier, \$695. Plug-in head amp (not yet available), \$150. Three-year warranty; not clear whether customer pays all freight. Tested #76402005, owned by The Audio Critic.*

**Editor's Note:** As most of our subscribers know, this is the unit we delayed publication for. When our sample was finally delivered, just a few days before the end of the year and almost two months later than promised, we were very close to going to press, so that our comments elsewhere in this survey don't fully reflect the subsequent influence of the SP-4 on our opinions. We had to make a few editorial changes in various parts of our report for the sake of clarity, but they are few and far between. For that reason we have inserted the SP-4 review in its proper alphabetical sequence here, in the hope that the reader will keep our statements about it in mind when reading the remaining 18 reviews.

Our first impression of the SP-4 after unpacking it and listening to it for a few hours was: This is the one. The winner. Although, as you will see below, that wasn't our ultimate conclusion, our enthusiasm will be appreciated by anyone who has seen and heard this beautiful piece of equipment. Even if it isn't the undisputed winner of our survey, it's a winner.

The SP-3A-1, with the tremendous acclaim it had received over the years, was a hard

act to follow, and Audio Research would have been guilty of a real marketing blunder if they had stepped out of their role as the vacuum-tube hard-liners of the industry for the sake of anything less than an extraordinary solid-state product. Well, the SP-4 is no marketing blunder. In fact, it's a very clever bid for the Mark Levinson end of the audiophile market (especially now that the JC-2 costs almost twice as much as the SP-4), while hanging in there with the vacuum-tube crowd by retaining the SP-3A-1 in the line. A real pincer movement.

But the SP-4 is certainly no SP-3A-1 to look at. It's as sexy as can be. The 19-inch brushed-aluminum relay-rack-type front panel sports two large black handles. The rotary switches and controls are cylindrical with slightly squooshed-in sides, just asking to be fingered. The toggle switches are long, skinny isosceles triangles of aluminum, and when you operate them they go "snick" like the gearshift on a BMW 630CSi. The crackle-finished chassis suggests battleship-like solidity. Any audio freak who isn't turned on by all this has something wrong with his hormones.

As for the sound, the SP-4 has absolutely the uncanniest clarity of detail of any preamplifier we've ever heard. On a flamenco guitar recording, for example, even the fastest passages are completely unblurred, with every little pluck standing out in bold relief and with a distinct minimoment of dead silence between plucks. It's somethin' else. Unbelievable spaciousness, too. The sound stage is a mile wide and the ceiling is a mile high. Front-to-back depth is outstanding. (This is beginning to sound like a rave review, which it isn't.)

So what's wrong? It took us almost two weeks to discover what. The bass, first of all. It's there, all right, which is why we lived with it quite happily at first, but gradually we realized that it was lacking in dynamics. For example, those low string bass slams on Cat Stevens' "Hardheaded Woman" just didn't have the impact that makes them so exciting through the Rappaport PRE-1 and the Mark Levinson JC-2. This absence of genuine sock was also clearly evident on the London recording of Prokofiev's "Romeo and Juliet," where the bass simply wipes you out on the other two preamps. And let it be quite clear that we aren't talking about boom. We miss those real, low-down, dull thuds on the SP-4.

The other major problem is more subtle

and became apparent only after prolonged A-B-ing of the SP-4 with the Rappaport, our overall top choice in this survey. The SP-4 definitely had sharper delineation of inner detail, which at first gave it the appearance of greater transparency. But in the end this sharpness turned out to be just that. Sharp. The detailing was at the expense of a slight hardness and sibilance that eventually caused listening fatigue. By comparison, the Rappaport didn't make all the little clicks, snaps, taps, hisses and fricatives in the music quite as astonishingly clear, but they were embedded in the overall sonic fabric in what we judged to be a more accurate, true-to-life perspective. Quite aside from its superior bass, the Rappaport was just sweeter and somehow more musical, while still clearly reproducing all the detail that was actually there. We must add that this was by far the most difficult A-B test in our entire survey, really the only one that baffled us for any length of time. These are two great-sounding preamps. What's more, the SP-4 is certainly the better built of the two (second to none, in that respect, except maybe a brick outhouse), as well as lower in hum and noise.

We also have a suspicion that the SP-4 might have given an even better account of itself on a reference system with a higher tolerance for hardness and other sonic irritants than ours. The Dahlquist DQ-10's are unable to forgive even the minutest amount. Since the SP-4 undoubtedly received its factory shakedown through the new Audio Research D-100 power amplifier and Magneplanar speakers, it would certainly be worthwhile to audition it that way. We intend to do so at the earliest opportunity. This isn't a disclaimer of the validity of our test; what we found out was reality all right. But sometimes 100% reality is less agreeable than 98%.

And what about the Mark Levinson? We found the JC-2 to be as noticeably superior to the SP-4 in bass impact as the Rappaport and possibly even more so in nonfatiguing, nonirritating long-term performance. But switching from the Audio Research to the Levinson resulted in an almost startling collapse of the space in which the music was located, as if the total sound stage had been reduced to half its width, height and depth. This, of course, is the Achilles heel of the JC-2 and the main reason why we must rate the Rappaport over it in combination with most

power amplifiers (not all, though). The Rappaport and the SP-4 are rather closely matched in spaciousness, with the Rappaport possibly a bit more stable and definite in the spatial location of instruments and voices. These three units constitute the current elite of preamplifiers in our opinion, and the audio perfectionist owes each of them the more careful attention.

A word about the Analog Module, which is Audio Research's trade name for the epoxy-encapsulated amplification stages in the SP-4 (as well as the D-100). In their promotional literature, ARC attempts to suggest that the Analog Module is a new and fourth amplification concept after the vacuum tube, the bipolar transistor and the FET. We found it peculiar that no startling new inventions in this area have been reported in the technical press, yet here's a small company already using it in a highly developed application. We called up ARC, identified ourselves, and tried to obtain some information, without the least success. They're being very cagey about this, ostensibly to prevent cheap commercial imitations, but our impression is that they consider the resulting aura of mystery to be good for business. Nowhere in their literature do they use the words "solid state" (they refer to the Analog Module as a device that acts as a "super tube"); in fact, it's our distinct impression that they wouldn't mind some speculation among the fans that maybe there's a wee little tubes in them there modules. (Nuvistors? No way. Not at this price and not in those tiny capsules.)

We'll take an educated guess here, mainly in the hope of smoking out the old foxes in Minnesota. The Analog Module, friends, is nothing but an IC. A very good one, maybe with some sophisticated new wrinkles, but still a chip. Or group of chips, if Frito-Lay should insist you can't have just one. Audio Research claims a gain-bandwidth product in excess of 10 MHz for the Analog Module, as well as less than 0.05 to 0.5% THD or IM distortion before feedback. There are some nice new chips that meet those specs, and there's no reason why Honeywell, ARC's subcontractor for these modules, couldn't do a real job with them. Those guys are really good.

If this is all hogwash, all that Audio Research has to do is write us a letter denying that there are IC's in there, and we'll print it in boldface. We don't claim infallibility, but

neither do we have much patience with artificial mysteries.

Meanwhile, congratulations to Bill Johnson and his crew on a very impressive job.

## BGW Model 202

*BGW Systems, PO Box 3742, Beverly Hills, CA 90212. Model 202 Stereo System Control Center, \$599. Warranty not clear from material enclosed with original factory container. Tested #760418, owned by The Audio Critic.*

This one is a disaster. The reason for its inclusion here was the tone of various BGW spec sheets, which make fierce noises like "no-compromise design effort . . . new techniques had to be found . . . significant improvements to conventional preamp design . . . unsurpassed performance . . ."—you get the idea. It ain't so.

The BGW 202 had the hardest, most irritating, most ear-distressing sound of any preamp in this survey. As soon as we turned it on, anyone near the listening area would inevitably say, "What is that? Will you please turn it down!"

After that, it mattered very little that the unit is well built, has extremely flexible and nice-to-handle controls, and can provide very impressive amounts of gain. Just in case it may cross your mind that we had a defective unit—we didn't. We measured low distortion, accurate RIAA equalization; only the Holman square wave test was rather bad (but see our earlier comments anent the Boston tests).

In view of this company's proudly advertised share in supplying the sound system for the movie *Earthquake*, we can't resist remarking that, for \$599, we expected something more earthshaking.

**Editor's Note:** Close to press time comes word that the price of the BGW 202 has been lowered by \$200. How come, fellas? Was there anything wrong with it?

## Dayton Wright SPS Mk 3

*Dayton Wright Associates Limited, 350 Weber Street North, Waterloo, Ont., Canada N2J 4E3. SPS Mk 3 Professional Preamplifier, \$525. Tested #3457, on loan by courtesy of The Listening Room, Scarsdale, NY.*

Anything from Dayton Wright is strictly for the audio purist; we only regret that it

wasn't the top-of-the-line SPL Mk 2b that we obtained for testing, since it's advertised as "a refined and developed SPS type circuit" plus pre-preamplifier. Well, here's the unrefined SPS, and it's damn good.

This is a tone-controlless, basic preamp a la AGI or D B, perhaps a little eccentric in physical design with its brick shape, an unusually small front-panel area, and all inputs and outputs on top, but we still rather liked its visual and tactile characteristics.

Its sound is good enough to have made us think, when we first turned it on, that this might be it—the best of them all. It didn't quite end up that way, but that doesn't make the SPS any less smooth, natural and detailed in sound. It's definitely of audio-freak caliber. We would rate it somewhat above the AGI, for example; maybe just below the D B (the D B seemed to give our final top choices closer competition on direct A-B testing) and somewhere in the same league with the GAS Thaedra, though we'd be inclined to favor the latter if pressed for a decision.

As you can see, we don't feel very strongly about any negative characteristic of SPS. The "eliminator" that removed it from our group of finalists was the Rappaport PRE-1. Compared to the Rappaport, the Dayton Wright seemed slightly darker, heavier, less spacious in sound. Front-to-back information wasn't quite as explicit. Nothing really disturbingly worse, just not quite as good.

Here was one isolated case where RIAA equalization error may conceivably have contributed to the slight fault we heard. Relative to 1 kHz, the EQ was off by +1 dB at 40 Hz and -0.5 dB at 5 kHz, so that the response with RIAA preemphasis was a straight slanting line between these frequencies, steadily tipping up toward the bass end but still fitting into a  $\pm 0.75$  dB strip. Could that have caused the slightly "chocolaty" sound, as one of our staff put it? It's possible, but we doubt it. (At the higher frequencies, the response tipped up again slightly, reaching +1 dB at 20 kHz. Strange.)

In any event, if this is only Dayton Wright's second-best preamp, their best must be awfully good, and we can hardly wait to test it.

## D B Systems DB-1/DB-2

*D B Systems. PO Box 187, Jaffrey Center, NH 03454. DB-1 Precision Preamp, \$350, with DB-2 Power Supply, \$75. Five-year warranty; manufacturer pays return freight. Tested #1080624/#2180521, owned by The Audio Critic. Backup samples #1271128/#2271128, on loan from manufacturer.*

There's no justice in the world. Until just a few months ago, the D B was probably the world's most accurate preamp for anything less than the insane price of the Mark Levinson JC-2. A super product and a great bargain as well. Suddenly, there are the Rappaport PRE-1 and the Audio Research SP-4, which we're virtually certain haven't even been seen yet within the walls of the D B company. And there's also the Advent 300 for 39% less than the D B. Here are some nice people in New Hampshire doing absolutely the right thing and, boom, the roof caves in. That's show biz. (You don't think audio is show business? You're dead wrong.)

Even today, if we were forced to name the most accurate preamp for no more than \$500, we'd have to say the D B. The most accurate, mind you. The prettiest-sounding might well be the GAS Thoebe or even the Advent. And not for \$575, mind you. You can get a Rappaport PRE-1 for that.

Of course, the D B is a diminutive, tone-controlless, basic preamp without any frills (except some rather nice filters, low and high), so you might not think that \$425 is such a fantastically low price for it. But it's beautifully made, with very high-quality parts, no conventional wiring (everything is buttoned down on printed-circuit boards—the back panel itself is one of the boards!), and very ambitious circuitry. We have spoken to Dave Hadaway, the D B's designer, on several occasions, and it's quite clear to us that he is a relentless perfectionist who believes in eliminating any kind of distortion or inaccuracy that can be measured in any way, without arguments as to its audibility or lack thereof. With the D B, you are in deepest audiophilia.

The sound of the D B is extremely clean, open and neutral, with excellent transient detailing, good depth perspective, and perhaps just a slight lack of low bass impact. (That last observation is somewhat paradoxical, since the D B is one of the few preamps whose measured

response goes way down into the subsonic region, so this is something we'll have to look into once more, in Part II.) In direct A-B comparisons it lost out to both the Rappaport PRE-1 and the Mark Levinson JC-2, in each case after some hesitancy on our part. Compared to these two pre-amps, the D B seemed a touch more "transistory" in quality, with the upper midrange somehow more forward and aggressive. It just isn't quite as classy a sound—but it's a small difference. The GAS Thaedra also sounded sweeter, rounder, somewhat more spacious—in a word, prettier—but we weren't convinced that it was letting as much information through as the D B. The latter is a warts-and-all reproducer.

We also did a quick check on the D B using its own pre-preamp (DB-4, \$150) and a Denon DL-103. Its relative ranking with respect to the Mark Levinson (with System D) and the Thaedra (with its own head amp) remained about the same. More about this in our detailed pre-preamp and head amp report in Part II.

If none of this sounds sufficiently enthusiastic, let us conclude with the statement that we'd be perfectly happy to live with the D B on a permanent basis if these other pre-amps didn't exist. The D B may not be absolutely the best there is, but it's certainly good enough for anyone, including us.

## Dynaco PAT-5

*Dynaco, Inc., Coles Road & Camden Avenur or PO Box 88, Blackwood, NJ 08012. PAT-5 Preamplifier (factory wired), \$399. One-year warranty; manufacturer pays return freight. Tested #33544867, owned by The Audio Critic.*

It's one of life's great mysteries to us why this preamplifier should have any standing in audiophile circles. But it does. Again and again, we see both editorial comment and letters about it in publications that ought to know better, referring to it as close-to-the-best-for-less. Maybe it's the Volkswagen syndrome; more than a few VW owners like to fantasize that, after all, they're driving something not far removed from a Porsche.

Well, the PAT-5 is very far removed from a Mark Levinson. Overall, we'd rate it as the poorest-sounding preamplifier in this survey. It has a pinched, hashy, edgy, nontransparent,

transistory quality that's neither accurate nor musical. A staff member, having been told by another that the PAT-5 at least didn't stick needles in your ear like the BGW202 or the Marantz 3600, said: "Oh, but those two still have some class. This one sounds like a kitchen radio." A small exaggeration, but indicative of the relative ranking of the PAT-5.

Again, we must point out that we weren't listening to a defective unit. In fact, we were amazed in the laboratory how impeccably the PAT-5 measured in every respect. (See also our earlier comments on the lab tests in general.)

About the only thing we can think of to explain this vast discrepancy between our findings and those of others (who aren't, after all, deaf) is that Dynaco's large volume may require the substitution of "equivalent" circuit components from various suppliers as they start new production runs. And these supposedly equivalent IC chips, transistors, capacitors, or what have you, may, in reality, add up to a different sound at the output than the last set of components. It's just a wild guess, but not nearly as wild as the sound of the PAT-5 we tested.

## Epicure Model Four

*Epicure Products, Inc., One Charles Street, Newburyport, MA 01950. Model Four Stereo Preamplifier, \$450. Five-year warranty; not clear who pays freight. Tested #10313, owned by The Audio Critic.*

Two things attracted us to the Epicure preamp, prompting us to include it in this survey. One was that, even though it's a big, bulky black box, it weighs absolutely nothing. Light as a feather. This smacked of high technology. The other was the owner's manual we had seen, which talked engineering and "state of the art" page after page after page. Even the TIM test with the 500 Hz square wave and 6 kHz sine wave was there (probably taken from the Tektronix 5L4N literature)—but only through the high-level stage! Anyway, this was one we had to try.

It was a waste of time. The only thing that can be said for the Epicure is that it doesn't sound downright unpleasant like the BGW 202 or the Marantz 3600. It won't drive you out of the room. Its style is unaggressive. But it sounds completely inaccurate and unmusical. Closed-down, nasal, honky. Our

Associate Editor illustrated its sound by cupping both hands in front of his mouth and nose, and continuing to talk that way.

We really have nothing further to say about the Epicture except possibly to exclaim with Elton John: "Get back, Honky Cat!"

## GAS Thaedra/Thoebe

*The Great American Sound Co., Inc., 20940 Lassen Street, Chatsworth, CA 91311. Thaedra Servo-Loop Preamplifier, \$909. Five-year warranty; customer pays all freight. Tested #500790, later replaced by #500961, owned by The Audio Critic. Thoebe Servo-Loop Preamplifier, \$509 (not tested separately).*

This is the unit you can count as two units, in which case our survey covers 23 preamplifiers. The manufacturer declares that "Thoebe shares with Thaedra identical servo-loop electronic circuitry and sonic performance," and we have no reason to doubt his word. So, to test the mag-phono sound of this

product, we only listened to Thaedra. Our conclusions should apply equally to Thoebe. Dealers in the field have by and large confirmed this claim of equivalence—on mag phono only. With a moving-coil input, the signal travels through two stages in Thaedra, as against three stages in Thoebe with its accessory head amp Goliath. This makes Thaedra a theoretically more sophisticated preamplifier for moving-coil cartridges, a point that will be explored in greater detail in Part II of our survey.

Thaedra will undoubtedly be considered the finest preamplifier money can buy by a considerable number of audio enthusiasts, and we know that nothing will change their minds, not even our disagreement with that ranking. This preamplifier always sounds beautiful. It never does anything nasty; never sounds hard, edgy or transistory; always gives you a nice sense of space around the instruments or voices; at the same time, it's absolutely clean, transparent and grainless. In a solid-state unit, it gives you

## Say *Bongiorno* to Servicing Hassles

As you can see elsewhere in this report, we consider the GAS Thaedra to be a truly fine preamplifier. We even respect the opinion of those who believe it's the best-sounding preamp there is, although we aren't willing to go quite that far. But it was the only unit that conked out on us in the course of these tests, and the experience we had trying to get it repaired at the factory is something our subscribers ought to know about.

We were well along in our laboratory and listening tests of Thaedra #500790 when we gave it an ever-so-slight jostle while making some connections. It was just the teeniest tap of the elbow, really nothing, and the unit didn't even budge an eighth of an inch. But a few seconds later it emitted a most alarming cough and several minutes later its gain dropped to virtually zero, from input to output. And we mean all inputs, all outputs, both channels, any control position. We later found out that the relay circuit is occasionally sensitive to such upsets, but in any event the unit obviously needed more than routine servicing.

Since the dealer who had sold us our Thaedra is located about a fifty-mile round trip from our area (and a lot of it suburban shopping-

center driving), we decided to contact the factory directly. Not as **The Audio Critic** (hardly anyone knew about us at the time) but just as the average Joe Customer. We now wish we had gone back to the dealer, who later assured us that he would have handled the whole affair, logistically and financially, without involving us in any way.

We called up the factory, long-distance, and were told by somebody named Vince that if we airfreighted the Thaedra to them they would keep it only three working days, repair it and test it, and airfreight it right back. The day we figured they must have received it, we gave them another ring, just to make sure. Vince informed us that they had indeed received it but, if we wanted it back, we must send a certified check or money order for the return airfreight: \$15.86.

We said, wait a minute, the only time we had ever been asked to bring a certified check was when we picked up a \$6000 car. It was bad enough that the company didn't pay return freight on the repair of a brand-new unit, but to assume that someone who had paid \$909 for a preamplifier might be passing bad fifteen-dollar checks—really! Vince said sorry, that's the way it is.

By the sheerest coincidence, we met Jim Bongiorno, the scrappy little president of the GAS company, that very evening. He had come east to demonstrate his new Ampzilla II, and the dealer in whose showroom the demonstration took place introduced us to him, still not as **The Audio Critic** but as a good customer. We complained to him about the certified-check nonsense, but he remained very hard-nosed and asserted that it was the only way GAS could do business because they were holding a lot of small checks that had bounced, including return-freight COD's. We said, look, this is one of your trusted dealers; he knows us and will vouch that our check is good. Just save us the trouble of running to the bank or the post office. Sorry, he said, it wasn't his department, anyway. Our final remark was that GAS seemed to be trading in some very small losses against a lot of bad will with this insulting policy. "I'll take the bad will," he said.

We realized that the man obviously believes that you just have to go to GAS if you want the best equipment, whether you're pleased with their policies or not. We had no choice, so we sent them a postal money order the very next morning.

everything you always liked about tubes and most of the things you always liked about transistors. Unfailingly musical, too; it's impossible to be an audiophile and dislike Thaedra.

Nevertheless, we don't consider this preamplifier to be 100% accurate. When Thaedra gets zapped with a hard but clean transient, it sort of wraps it in whipped cream instead of letting it through hard and clean. There's an ever-so-slight rounding of sharp corners, a taming of spikes and bristles, that many musical ears may even find a welcome relief from the aggressive quality of typical transistor preamps.

The point is, though, that the Mark Levinson JC-2, the Rappaport PRE-1 or the Audio Research SP-4 aren't typical transistor preamps. When the whole orchestra digs into a fortissimo chord, with a downstroke of the bows, these preamps reproduce it the way you hear it in the concert hall. With a clear-cut snap. Through Thaedra it's a slightly spongy thud. Same thing on piano reproduction. The impact of the felt hammers on the strings is

softened by Thaedra; a Steinway begins to sound like a Baldwin, all velvet glove and no iron fist.

We're virtually certain that this type of sound is what the designer of Thaedra prefers; it didn't just come out that way as a result of some abstract circuit philosophy. It's a formatted sound, deliberately created to appeal to a certain taste.

Another thing we find hard to accept about Thaedra is that it's so heavy and gets so hot. You'd think that the heaviest and hottest preamp in our survey would be a vacuum-tube unit. No, it's Thaedra. You can hardly lift it, and you can hardly touch it. We know there are good and sufficient technical reasons for this, but we prefer the sound of several preamps that have good and sufficient technical reasons for being light and cool. We must admit, on the other hand, that Thaedra is very solidly built, with a beautiful feel to the controls and an aura of quality throughout. It's also the only top-notch preamp we tested that has a

Then—nothing. No Thaedra for a week. No Thaedra for two weeks. During this period we spoke to Vince at the factory several times. The first time, we found out that they hadn't touched our unit for a solid week after its arrival. Some urgent export business had to be taken care of first, we were told. (So the airfreight had been a waste of money.) Then we were told the unit had left the plant and was on its way. It wasn't. When it finally arrived, three weeks had elapsed from the day of the original failure, despite our instant action and two-way airfreight.

But that, of course, wouldn't be cause for this kind of report. Now get this: When we put the Thaedra back into our system, we discovered that the five-position mode switch was completely busted. It wouldn't even go into its first two positions and could be twisted about ninety degrees past its last position, where it hummed like a vacuum cleaner. It had been perfect when we returned the unit, but we figured one of the large anthropoid apes shown in the GAS ads must have twisted it in the service shop because no *H. sapiens* in the audio business would have been capable of that kind of brutality.

Somehow we managed to find the stereo mode, regardless of what

the knob was pointing at, and started to do some listening. The denouement came a few minutes later. Our Thaedra went out of commission with exactly the same defect that had made us return it in the first place. No gain. Hardly any output. Obviously it hadn't been repaired. Back to square one after three weeks.

Needless to say, we were on the phone with Bongiorno almost immediately. And this time he was all sweetness and light. Whether he had found out meanwhile that we were **The Audio Critic** (he didn't say so) or is merely a man of many moods, we'll never know. But he said he wanted happy customers, not unhappy ones, and he would immediately arrange for the exchange of our defective unit against a brand-new one through the original dealer. That, of course, took the wind out of our indignant sail, and we actually thanked him for the fairness of his offer.

The trouble was that our dealer had no new Thaedras in stock and the factory couldn't deliver any for another two weeks. Lots of finished units, we were told, but they were all lacking knobs. (Those anthropoids again?) We could have our unit when the knobs came in.

By the time we finally had our beautifully working and really excellent new Thaedra #500961, we had

been without a usable one for well over five weeks. And we were out about fifty bucks for airfreight and long-distance calls, which we weren't reimbursed for. Luckily we had started testing the Thaedra fairly early, and we had at least 18 other preamps on hand during those weeks. But what about the average customer? Especially if he doesn't live near a dealer?

We aren't suggesting that this is what will happen to you if you buy a Thaedra. Nor that the same couldn't possibly happen to you if you deal with any other company. (Although other audiophile companies like Audio General and Rappaport will pay two-way freight on bona fide warranty repairs, and still others like DB Systems will pay at least return freight.) But this is precisely what happened to *us*, and the company happened to be GAS. You can draw your own conclusions.

We'll even admit that it's a stroke of bad luck for a company when the customer to whom this sort of thing happens is in a position to publish the story. But that's the way it is, Jim and Vince. Never give a masked stranger a hard time because he could turn out to be the Lone Ranger.

headphone jack (not counting the power amp that comes with the Advent 300).

It must also be remembered that, since the head amp in Thaedra completely bypasses the signal path of the mag-phono preamp, testing it with a moving-coil cartridge is a whole new ball game. So it could either rise or drop in our ranking in Part II.

And the one last thing we said about the D B applies equally to Thaedra. If no better preamp existed, we could live with this one happily and never miss a thing. Not much.

## Luxman C-1000

*Lux Audio of America, Ltd., 200 Aerial Way, Syosset, NY 11791. Model C-1000 Control Center, \$895. Three-year warranty; manufacturer pays all freight. Tested #D6100162, owned by The Audio Critic.*

As the flagship preamp of an exclusively high-end-oriented new Japanese line in America, this one is quite inadequate. For just under \$900, you get a beautiful front panel with luxurious controls (they reminded us of a Mosler safe), a wooden furniture cabinet that clashes awkwardly with the technological feel of the front panel, no facilities for moving-coil cartridges (the design must be years old), and clean but undistinguished sound.

The C-1000 is pleasant to listen to, low in distortion, free from obvious sonic vices, but it takes only about two minutes of critical listening to relegate it to a distinctly lower category than, say, the ten best preamps in this survey. Its sound is insufficiently open; depth perspective is relatively poor; you could even argue that there's a wee bit of transitory aggressiveness to be heard from time to time; it just isn't a thoroughbred. Switching from the Mark Levinson JC-2, for example, to the Luxman seems to lower the spatial ceiling of the sound to about half its height, and the JC-2 is far from the best preamp from that point of view.

It's too bad, especially since Lux Audio seems to be making a truly sincere effort to get on the right side of the American audiophile; what's more, they have already done so with their excellent PD-121 turntable (our reference).

## Luxman CL-35/III

*Lux Audio of America, Ltd., 200 Aerial Way, Syosset, NY 11791. Model CL-35/III Stereo Control Center, \$745. Three-year warranty; manufacturer pays all freight. Tested #F6101923, owned by The Audio Critic.*

This is a vacuum-tube unit, and it came to us with a good grapevine reputation as a possible state-of-the-art contender. That it isn't, but it's a good preamp nonetheless; it wasn't really wiped out by any other in our survey, although it can't survive A-B comparison with the best.

You could call the sound of the CL-35/III a typical tube sound (in the good sense): completely free from top-end hardness, beautifully dimensional and detailed in the midrange, a little plump in the bass (pleasingly but at the expense of accuracy), very good in depth perspective, though it isn't quite as open as we'd like it to be. It does have one rather subtle, elusive aberration that baffled us; there's a peculiar kink in the spatial image it presents—you could call it a buckle in the sonic canvas—so that the midrange seems to separate from and fold behind the higher frequencies from time to time. If this sounds confusing to you, it's because it *does* sound confusing when you hear it and is hard to describe. Since it's not unlike what we heard on the AGI 511, we're inclined to ascribe it to some kind of slew-rate-related phenomenon.

The controls on the CL-35/III are a joy, especially the excellent attenuator-type volume control with its click stops. The tone controls, too, are unusually flexible (rather similar to those on the C-1000, though not quite as elaborate); we amused ourselves by completely flattening out the RIAA equalization curve on the phono input with them. Try that on your preamp. Plug-in sockets for the Lux step-up transformers for moving-coil cartridges are also provided.

Everything considered, this is still not where it's at in tube preamps. If you can't kick the tube habit, what you need is the Paragon 12.

## Luxman CL-350

*Lux Audio of America, Ltd., 200 Aerial Way, Syosset, NY 11791. Model CL-350 Solid State Control Center, \$495. Three-year warranty; manufacturer pays all freight. Tested sample owned by The Audio Critic.*

There's something depressing about the fact that the front panel of this unit is absolutely identical to that of the CL-35/III, except for the shape of two knobs. Since this is a solid-state preamp, that's a little bit like your choice of chocolate or vanilla in the same package. Matter of taste, sir. We sell 'em both.



To us the CL-350 doesn't taste as good as the tube version. The only reason why we included it in our survey was that a number of audio people whom we know and respect had started a ground swell for it as by far the best-sounding preamp in the Luxman line, despite its lower price, and one of the best preamps at any price. We disagree.

The CL-350 has a more open sound than the C-1000 but at the expense of introducing a touch of nastiness. Certain instruments take on a slightly nasal, ugly coloration through the CL-350. There's some hardness at all times. It's not really a very listenable preamp, although it's far from one of the out-and-out baddies in our survey. Nor is it nearly as musical in sonic texture as the CL-35/III. We can't understand what our informants were talking about.

What we said about the control flexibility of the CL-35/III is of course equally applicable to the CL-350. Every position of every control is the same. But why can't any of these 15-knob jobs sound as good as the Advent?

## Marantz 3600

*Marantz Co., Inc., PO Box 99, Sun Valley, CA 91352. Model 3600 Stereo Control Console, \$499.95. Three-year warranty; manufacturer pays return freight. Tested #1118, owned by The Audio Critic.*

Here's another preamp whose audiophile reputation seems totally inexplicable to us. One reviewer, not long ago, put it in the same class with Mark Levinson and Audio Research. He must have been listening to it on some kind of AR box speaker with the tweeter control turned all the way down.

Saul Marantz, whose illustrious name this product carries (and sullies) although he hasn't had anything to do with the Marantz company for many years, could tell you what's wrong with the 3600. As a Dahlquist partner, his reference speakers are probably the same as ours, and the DQ-10's reveal grievous aggression by this preamp at the higher frequencies. The needles it inserts in your ears aren't quite as excruciating as in the case of the BGW, which can lay claim to the longest and the sharpest, but the Marantz is a shoo-in for second place in this respect. Once you have to dive for the volume control for fast, fast relief, it becomes rather academic that the 3600 has beautiful, deep, tight bass, one of the best in the business. Or that it's quiet or even that it

has all kinds of goodies on the front panel for extra flexibility. It just isn't listenable.

We must also add that the Superscope 3600 (sorry, Marantz 3600) was the only preamp in our survey other than the Dayton Wright and the Paragon—both of which, unlike the Marantz, are products of tiny audio-freak companies—that came without even a single piece of paper or connecting hardware in the original factory-sealed carton. Our efforts to obtain a manual took several months of repeated long-distance and local telephoning. When it finally arrived, the warranty page in it was stamped with a big VOID. Real communications.

Oh yes, you can also have this preamp with built-in Dolby B system, in which case it's called the 3800 and costs \$100 more. Who cares.

## Mark Levinson JC-2

*Mark Levinson Audio Systems, 55 Circular Avenue, Hamden, CT 06514. JC-2 Preamplifier, \$1050 (delivered with System A for magnetic cartridges). Plug-in System D for moving-coil cartridges, \$175 extra. Tested #1924 A, owned by The Audio Critic.*

This is generally spoken of as the Rolls Royce of preamps, a reputation difficult to live up to but essentially confirmed by our tests. That doesn't mean it's the one preamp we'd want to own if we were allowed only one choice. But since it happens to be our good fortune that we can own more than one, we're going to hang on to this outstanding unit for a long time. In some respects, it's the best of the lot. (On the other hand, if you're looking for a Marantz 3600 in mint condition, we know where you can get one cheap.)

Our initial purchase of a JC-2 for testing didn't go without a hitch, and in view of the rather holy self-image this company conveys to the audio community, the facts must be set down. First of all, the System D moving-coil boards we had ordered in addition to our basic System A unit didn't come packed with the latter. It took weeks before our dealer finally received them—mixed up with a repair order. Also, the top cover of our JC-2 had some very strange nomenclature for inputs. It turned out to be the misplaced top cover of a Mark Levinson LNC-2 crossover (the size and the holes were identical—but where on earth was Phono 1?). Finally, our unit just happened to fall into a recalled series (from #1855 to #1931), not unlike the typical Detroit recalls. It seems that

the line driver modules in some of these 77 preamps were suspected of an audible but unmeasurable flaw, and Mark Levinson decided to replace them all. (We may be able to tell you in Part II of this survey whether or not the recall was a case of audio-hypochondria.) In the end, everything was fine and dandy; we got the correct top cover; we got the latest (and supposedly best) line driver modules; we had both System A and System D in perfect working order. What's more, our numerous telephone contacts necessitated by these mix-ups had all been with unfailingly courteous, cooperative and intelligent people at MLAS. This company may not be as perfect as they'd like you to believe, but still—it's got class!

When it comes to judging the sound of the JC-2 as critically as its renown and price tag demand, we must single out, before anything else, its magnificent highs. Nothing, repeat, nothing sounds cleaner, more neutral, more transparent, more delicate, more grainless in the high-frequency range than the latest JC-2. We're even tempted to say, not even a straight wire, but we haven't so far gotten around to a suitable bypass test that works through a phono stage. The bass is almost equally impressive: tight, detailed, with tremendous impact on transients, but without the slightest heaviness. In between, the midrange is a little more arguable (more about that in a moment), but its clarity cannot be denied. What ultimately had us sold on the JC-2, though, is its behavior when passing really brutal transient. It just never lets go; everything comes *out* as tight, as together as it went *in*. There's no softening of orchestral *sforzandi* nor of the attack transients of the piano. At the same time, there's absolutely no hardening of the sound under these stressful signal conditions, either. In the reproduction of sonic texture, there's really no preamplifier we know of that surpasses the JC-2 in accuracy.

Spaciousness and depth perspective, particularly in the midrange, are another matter. On our reference system, with the Quatre DG-250 power amplifiers (slew rate 40 V/uS), the JC-2 is strikingly inferior to the Rappaport PRE-1 and the Audio Research SP-4 in resolving spatial information. The sound stage becomes smaller in all three dimensions, but especially in depth, when you switch from either of these preamps to the JC-2. It's through the Yamaha B-2 (slew rate 60 V/uS,

the highest in our collection) that the JC-2 comes into its own. Through this power amp, which we rate below the Quatre because of a slightly brittle top end, the JC-2 sounded indisputably more beautiful than any other preamp in our test, including the Rappaport. (But we had no opportunity to test the SP-4 through the Yamaha before press time.) This was a truly synergistic combination, eliminating most of the high-frequency hardness of the Yamaha as well as the depth-imaging problems of the JC-2. A quick telephone call to John Curl, the consulting engineer who designed the original JC-2 circuit (hence the model designation), brought forth the information that the JC-2, with its superfast high-level stage (over 100 V/uS), is happiest with a very fast-slewing power amp. (Cf. the Rappaport letter.) With all other power amplifiers, however, we preferred the Rappaport, as it sounded considerably more like live music in its rendering of spatial detail, while sharing most of the virtues of the JC-2 (except possibly the ultimate in top-end smoothness).

A quick check of the System D version of the Mark Levinson, with the Denon DL-103 cartridge, left its relative ranking unchanged with respect to other preamps that accept moving-coil cartridges. Details will be forthcoming in Part II of this survey.

In view of its stratospheric price, some comments on the JC-2's construction details are in order. The basic concept of an ultraflat, ultralight unit appeals to us. For one thing, it's less likely to get banged up when moved around. (Like an attache case vs. a suitcase.) Whether the quality of circuit components, switches, pots, etc., justifies the price is hard to judge. We haven't seen anything better; on the other hand, some other very beautifully made units cost a hell of a lot less. We have a feeling that (a) Mark Levinson has made the price part of the JC-2's elitist appeal and (b) Mark Levinson's profit margin (strictly on the hardware) is higher than, say, Audio Research's. We'll never know for sure.

It could even be argued that the high-quality construction of the JC-2 has an artsy-craftsy rather than technological thrust. When you take off the top cover, you see an almost amateurish tangle of wire between the controls and the circuit boards. It makes a kit builder feel right at home. This is not the way Hewlett-Packard makes an expensive piece

of electronic gear. On the other hand, the Teflon wire is the best money can buy. *Everything* in there is the best money can buy. Like a wealthy gourmet's home pantry or an executive's Sunday paintbox.

Incidentally, those interchangeable plug-in circuit boards drove us right up the wall. To extricate the D system, for example, and insert the A system requires the patience of Job and the skill of an eye surgeon. We used a fiberglass TV alignment tool that was strong enough to pry with but not hard enough to chip anything; even so we ended up with bent prongs. (They can be straightened out; like everything else on the JC-2, they're well made.)

Suddenly we understood. The Mark Levinson JC-2 isn't the Rolls Royce of preamplifiers. It's the Lamborghini Countach. Its eccentricity and its quality are part and parcel of the same quirky, single-minded concept.

**Editor's Note: At press time we hear that the JC-2 has acquired a new power supply, a new power supply filter module, and new super-deluxe jacks that don't mate with standard RCA-type plugs. What's more, its price is going up by several hundred dollars. The more you sock it to those Lamborghini types, the more they love it, eh Mark?**

## Paragon Model 12

*Paragon Audio, 997 East San Carlos Avenue, San Carlos, CA 94070. Model 12 Preamplifier, \$850. No warranty information enclosed with original factory container. Tested #7609182, owned by The Audio Critic.*

What we said about the GAS Thaedra is possibly even more applicable to the Paragon: to some audio enthusiasts this will be the world's best preamp, and nothing will change their minds. We must confess that we, too, were instantly seduced by the sound of the Paragon; however, it turned out to be a seduction that wasn't followed by marriage in due course.

The Paragon Model 12 (we aren't talking about the older Model 10, mind you) is a vacuum-tube preamplifier that offers you the fabulous midrange of the Audio Research SP-3A-1 (or at least a midrange within a hairsbreadth of that all-time standard) without any of the SP-3A-1's glary, irritating upper frequencies—in fact, the highs are beautiful and very detailed—and adds to it all a tremendous, authoritative spaciousness, especially front-to-

back depth, plus a kind of Technicolor gorgeousness of timbre. It's irresistible; we love it and will hang on to our unit for further testing; but we really don't think that this is the sound of "a straight wire with gain." It isn't 100% accurate. We could still turn out to be wrong; a number of respectable golden ears disagree with us; but we must call them as we hear them. Besides, no one who listened to the Paragon at length on our reference system is among the dissenters.

With some combination of components the slight colorations introduced by the Paragon are easily identifiable. For example, with the GAS Son of Ampzilla driving the Dahlquist DQ-10's, the Paragon has a fat upper bass and lower midrange. Even with the Yamaha B-2, which appears to be more compatible with it, it tends to soften piano transients and wipes a little bit of rosin off the bows of a string quartet. In other words, it's still a tube preamplifier—although the best we've ever heard.

Mark Deneen, the Paragon's obviously very knowledgeable designer, told us that he believes tubes are vastly superior to other amplification devices, even at low signal levels, and that the next, still more sophisticated preamp he is working on is also a vacuum-tube unit. He also believes in very high slew rates (we found that the Model 12 clips at 38 volts peak-to-peak at 50 kHz!), very extended high-frequency response, and no RF filtering. He is convinced that the presence of any kind of RF filter circuit is audible in the audio range.

As a result, the Paragon 12 is hypersensitive to RFI (radio frequency interference); if there's intensive CB activity in your immediate area, the Paragon will be simply unlistenable. (It happened to us for a solid week; then the ten-four-old-buddies suddenly pulled out of our neighborhood and there were no further problems.) We understand that Paragon Audio has been extremely cooperative in finding individual solutions to this problem for various customers.

Our recommendation, then, regarding the Paragon is: listen to it. Especially if you've always been a tube freak. But don't just listen for five minutes because then you'll surely buy it, and it isn't cheap.

## Are Openness and Depth Simply a Matter of Low TIM?

*Editor's Note: We were so taken with the sound of the Rappaport PRE-1 that we decided to ask Andy Rappaport, its phenomenally young and articulate designer, whether it incorporated a special circuit philosophy. His reply was interesting enough to be reproduced here in its entirety.*

To the Editor:

The key to the sonic performance of the PRE-1 is a design that minimizes the effects of time delay distortion. Careful study of the causes and effects of varying the subtle time elements of recorded music has enabled me to develop design criteria for components which, I feel, accurately reproduce depth and openness, and also perform well on all of the standard laboratory tests.

When the ear perceives depth, it relies very heavily on time delay information. Because the speed of sound in air is a constant (for any given ambient temperature), the greater the distance is between a source and a sensor, the longer it will take for a sound to travel from one to the other. Thus, if two sources that are at different distances from a sensor emit sounds simultaneously, they will be perceived as two distinct sounds, separated by a delay proportional to the distance between sources. It is this phenomenon that the ear uses in registering depth. Therefore, it is important that this time delay information be retained and properly processed by an audio system intended to reproduce a "depth image."

One factor that causes the deterioration of such an image is Transient Intermodulation Distortion (TIM). This is introduced in amplifiers with high open loop gains, employing large amounts of negative feedback. An overshoot is produced, in such amplifiers, during the time when an input signal is present with no output to be fed back. (This period is the forward propagation delay of the amplifier circuit.) An overshoot of sufficient amplitude will often exceed the overload ceiling of the input stages, and the signal will be "clipped."

If a square wave is introduced at the input of an amplifier exhibiting much TIM, an overshoot will result for each leading edge. If this square wave is stepping a sine wave, the overshoot will cause a small segment of the sine function to disappear. Furthermore, if the sine wave is modulated by two square waves, slightly out of phase, it would disappear between the two leading edges, causing the two square

waves to appear as one (approximately). If the two waves represent sounds emitted simultaneously by two musical instruments, and the phase angle between them is proportional to the distance between the sources, the little piece of sine wave which has disappeared is important in retaining the depth information. When it is lost, so is the depth image.

The PRE-1 was designed to minimize TIM. The open loop gain of the phono stage approximates the RIAA equalization curve, so that when the small amount of feedback is applied it is a constant for all frequencies. (Most phono preamps have extended open loop bandwidths, which result in increased feedback at high frequencies, in order to reduce the gain in accordance with the equalization curve.) Because the open loop gain at high frequencies is low, the overload ceiling is quite high. Thus, even the open loop amplifier is impervious to overload by the output signals of standard phono cartridges. In addition, overshoot is reduced by a very small propagation delay and lack of phase shift in the audio range.

Another unique feature of the PRE-1, intended to minimize time delay distortion, is that it is slow. The slew rate of the phono stage is a mere one volt per microsecond (as compared to 20V/uS for the Mark Levinson JC-2), and the high level stage will slew at no more than 20V/uS (as against more than 100 V/uS for the JC-2). I am told that in slowing down my preamp, I am being technically backwards, but my reasoning is simple:

If an amplifier with a gain of twenty decibels sees an input that changes fifty volts in one microsecond, its output would have to change five hundred volts in the same microsecond. If it is incapable of such a slew rate, the signal would become severely distorted. (Consider the example used above, of two out-of-phase square waves and a sine function. If the two square waves rise too fast, they would appear as one, resulting in time delay distortion.)

Thus, the slew rate of any stage in a chain of amplifiers must be no less than the product of its gain, times the slew rate of the preceding stage. Remembering that power amplifiers are usually quite slow (the fastest power amplifiers that I know of, which are listenable in all other respects, slew at a little more than 40V/uS) and have high voltage gains, the faster the preamp, the worse the depth imaging.

The slew rate of the phono stage of the PRE-1 is the minimum value for such a stage (its bandwidth is limited to a little more than twenty kilohertz at five volts rms) and the high-level stage was designed to be slightly faster than required to allow for optimum performance with sources that are slightly faster than the phono stage. Of course this is a bit fast for perfect results when used with currency available power amplifiers, but if the preamp were any slower, its high-frequency distortion would be too high. The solution, of course, is to develop a faster power amplifier.

I find that the PRE-1 works best with amplifiers combining fast slew rate with relatively low voltage gain (i.e., low power and low sensitivity). To obtain higher power levels, two fast, low-power units should be used in a monaural mode (one channel inverted). This way, increasing the power also increases the slew rate, as in mono, an amplifier with a 40V/uS slew rate will slew 40V/uS positive in one channel, while the other channel goes negative at the same rate, resulting in an effective slew rate of 80V/uS.

I hope that I have shed some light on a complicated subject. Should you have any further questions, please contact me, as I would be happy to discuss them with you. I am currently preparing an engineering paper which discusses these ideas in a somewhat more technical and involved manner, and I hope to make it available shortly.

Thank you for your interest,  
Andrew S. Rappaport  
President  
A.S. Rappaport Co., Inc.

## Quad 33

*Acoustical Manufacturing Co. Ltd., Huntingdon, Cambs. PE18 7DB, England. Quad 33 Control Unit, \$265. One-year warranty; customer pays all freight. Tested #62675, owned by The Audio Critic.*

Nothing with the Quad label on it has ever been a negligible product from the audio purist's point of view, which is why this preamp is in our survey, even though its price is in the "popular" category. Besides, its physical construction, finish and production details are of a caliber seldom seen in equipment at twice or even three times the price.

If it weren't for the new Advent 300, the Quad 33 would also be the greatest sonic bargain discovered in our survey. This is no \$265 sound. It's unfailingly clean, sweet, musical, and nonirritating. Typical units in the \$450 to \$500 range, such as the Marantz 3600 or the Epicure, don't even come close. But the Advent, for \$5.05 less, wipes out the Quad. The latter has a somewhat puffy fatness and slight looseness to its upper bass and lower midrange, as well as a lack of truly extended and detailed highs, that put it in a distinctly lower category.

On the other hand, the Quad 33 has the most sophisticated and useful high filter in the business. The variable corner frequency *and* variable roll-off slope allows you to filter out exactly as much garbage as necessary, no more and no less, without throwing out the music with it. No other preamp at any price has anything comparable.

It must also be remembered that, since the Quad 33 is designed to work with the high-gain Quad 303 and Quad 405 power amps, it doesn't mate too well with typical American and Japanese amplifiers having higher input requirements. With the 405, especially, it comes into its own, and the two together form quite an impressive \$675 package.

The grapevine has it that Quad may soon be out with a new preamp, which should be very interesting if it beats the 33 by as much as the 405 did the older 303 in power amps.

## Rappaport PRE-1

*A. S. Rappaport Co., Inc., Box 52, 146 Bedford Road, Armonk, NY 10504. Model PRE-1 Stereo Preamplifier, \$575. Three-year warranty; manufacturer pays two-way freight. Tested #1022, owned by The Audio Critic.*

Rappa who? This one got into our survey by the merest chance, as we had never heard of

it. Luckily, one of our trusted consultants had, and we were on our way to our most rewarding discovery thus far in the labyrinthine byways of the audio industry. Right now, as we report this, the preamplifier in our reference system is the Rappaport PRE-1.

The story of this new product is very American. A young Princeton student by the name of Andy Rappaport decided that the way they were teaching him electronics in class would never lead him to bigger and better things in audio design, which was his consuming passion. So he quit college and started to manufacture his own highly unorthodox preamp design. For a kid who didn't know what he was doing, it would have been a pretty flaky thing to do. We have met Andy, have quizzed him about his theories (we ended up with a long letter from him, which we're reproducing here), and have concluded that it was a smart and gutsy thing to do. The preamp is now beginning to make waves in avant-garde audio circles.

Just to look at, the Rappaport PRE-1 isn't particularly awe-inspiring; it's a cute little black box, not very much bigger than the D B minipreamp, even though its power supply is self-contained and a full complement of controls (including bass, treble, high and low filters, tape 1/tape 2 monitor, etc.) is included. (This shoehorning, as we shall see, is actually the cause of the one minor flaw of the PRE-1.) We rather like its understated look, but it's no techno-turn-on for sure.

Since the circuit philosophy is completely explained in the letter from its designer, we'll go straight to the sound of the PRE-1. It's thoroughly clean and tight. Bass impact is tremendous, without a trace of heaviness or hangover; the midrange is extremely vivid, almost palpable; the highs are for once properly and realistically embedded in the overall sonic fabric instead of jumping out at you. Spatial relationships, especially front-to-back depth but also width and height, are reproduced with unprecedented accuracy; you could say that what the Audio Research SP-3A-1 does for midrange perspective 100%, the Rappaport does for the entire audio range about 98%. The highs of the PRE-1 aren't quite as astonishingly pure and delicate as the Mark Levinson JC-2's, but they're accurate and nonfatiguing. On our reference system, through the Quatre DG-250, the Rappaport was clearly the preference of our entire staff over the Levinson; through the Yamaha B-2 the reverse was the case, the JC-2

sounding even cleaner and smoother overall, as well as more nearly perfect on transients. (We refer you to our Mark Levinson review for full details.) Through the GAS Son of Ampzilla, the Rappaport was again our top choice; it just seems to beat the JC-2 on more systems than not, mainly on account of its superior reproduction of depth and other spatial information. These two units are both quite exceptional, and in view of their totally different techno-personalities (the Rappaport is essentially very well made but doesn't make a religion of component quality) the choice is ultimately up to the individual audio enthusiast on the basis of his own priorities. The price ratio is about 2 to 1.

**Editor's Note:** In the end, the new Audio Research SP-4 proved to be the toughest competition for the Rappaport, but it survived that challenge, too. (See the SP-4 review above.)

Is there anything wrong with the Rappaport? Of course. For one thing, it hums. Not that you'll ever hear the hum under ordinary operating conditions. At normal playing levels it will be far enough below the signal level to be unnoticeable, although we *measured* considerably worse hum in the right channel than there should have been according to the spec sheet. (The left channel was comparable to the JC-2!) The main hum problem is under the rather irrelevant condition of *no* signal output, with the volume control turned all the way down. In a carpeted room with low ambient noise, the hum will then be audible, especially through efficient speakers connected to a fairly high-gain power amplifier (e.g., Quad 405 or Yamaha B-2).

The reason for this small boo-boo is that the transformer is too close to the signal-carrying leads in that tight little box. Two fixes are possible. One is to connect a 10K resistor between Main Out 1 and Main Out 2 and another 10K resistor between Main Out 2 and ground. Do this on both channels and use only Main Out 2. This acts as a voltage-divider circuit that knocks the hum level down another 6 dB under the no-output condition. That should make it inaudible, at the expense of a 6 dB decrease in gain (no problem) and an increase in output impedance (could be a problem but not likely). The better solution, if you're a purist, is to wait until February, when the PRE-1A chassis (\$515) with separate PS-1 power supply (\$200) will become available. (In other words, the D B and Mark Levinson route.) If you don't feel like spending the

extra \$140, all we can tell you is that in a typical installation the hum problem doesn't seem to be an issue. (A Rappaport head amp is also coming in February.)

Speaking of purists, don't worry about the tone controls on the Rappaport. They can be completely bypassed with the flick of a switch, and even when you switch them in the difference is barely (and we mean *just* barely) audible in their centered position. This is a sophisticated design.

If the PRE-1 were, say, a new McIntosh preamp, we'd call it a remarkable achievement. For the first product of a very young man and a very small company, it's a tour de force.

## Stax SRA-12S

*American Audioport, Inc., 909 University, Columbia, MO 65201. SRA-12S Integrated Amplifier for Ear Speaker, \$500. No warranty information enclosed with original factory container. Tested #E1210, owned by The Audio Critic.*

The ads for this preamp state that "it doesn't have enough knobs to look at" but that "it sounds better than preamps costing up to twice as much, so some dealers are afraid of it." Aha, we thought, they feel it puts the GAS Thaedra or even the Mark Levinson JC-2 to shame; this we've got to test. We did and our finding was: no way. The sound of the SRA-12S is definitely flawed.

This unit is actually more than just a preamp; it includes a main amplifier stage with a gain of 60 dB, specifically designed to drive the Stax electrostatic headphones. We didn't test it in that application (although we intend to when we do a comparative review of headphones); we're only reporting here what it does at "pre out."

The preamplifier section itself it set up in such a way that you can use the phono stage (gain: 40 dB) all by itself to go directly into your power amp or, if that amount of gain is insufficient (it usually is), you can switch in the high-level stage, which Stax calls the inter-stage amplifier (gain: 20 dB). Since we don't really like the sound of the Stax either way, we don't feel that a highly analytical discussion of the slight sonic differences between these two models would be productive. We listened mainly with the I.S. amplifier switched in; we just didn't have enough gain for our reference cartridge through the phono stage alone. (With a pre-preamp or transformer, you don't need

the I.S. preamplifier; or, alternately, you could plug the moving-coil cartridge directly into the preamp and in most cases have sufficient gain when the I.S. amplifier is switched in.)

On program material without a wide dynamic range and concentrated mainly in the mid-frequencies, the Stax sounds like a first-rate preamp, airy and well-defined. But let somebody hit a suspended cymbal or tinkle a triangle, and you'll think your telephone is ringing. Some people we know call this fizzy, ringing reproduction of the high frequencies "the Japanese sound;" that seems like an overly glib generalization to us, but we *have* heard it on a number of Japanese units. (The Yamaha C-2 is the most egregious example.) Others attribute this type of sound to FET's (the Stax is an all-FET design, but so is the Yamaha C-1, which sounds smooth as silk); we have no opinion on the subject at this stage of our investigations. In general, when the music gets complex and dynamic, the sound of the Stax SRA-12S hardens audibly.

Our recommendation: get a D B for \$75 less or an Advent for \$240.05 less. And if you're the last of the big-time spenders, get a Rappaport for \$75 more.

## Yamaha C-1

*Yamaha International Corp., PO Box 6600, Buena Park, CA 90620. NS Series C-1 Stereo Control-Amplifier, \$1800. No warranty information enclosed with original factory container. Tested #1951, owned by The Audio Critic.*

On the basis of its overwhelming visual and tactile presentation, its unique Star Trek techno-gestalt, its staggering price tag—this has got to be It. The world's greatest preamp. Thirty-one (count them, 31) knobs and switches up front, many more in the back, a pair of magnificent peak-reading meters, LED's lighting up all over the place, a built-in test oscillator and pink-noise generator—shall we go on? Beam us aboard, Scotty; give us a reading, Mr. Spock.

Too bad the sound is no match for a \$260 Advent, let alone the top two or three preamps in our survey.

Not that the C-1 sounds bad. Yamaha couldn't get away with that. It sounds smooth, so smooth that in the early phases of our survey we called it the homogenized-milk preamp. Distortion is extremely low; long-term listening is nonfatiguing. If you never compared the C-1 to anything else, you could easily persist in the belief that you got your \$1800 worth. It so happens, though, that the D B was the very

next preamp delivered to us after the C-1, and there was just no comparison. The C-1 was wiped out. It simply can't deliver the completely free, open, spatially and texturally detailed, highly dimensional sound of today's top preamps. Overall, we'd rank it maybe 11th or 12th among the 22 units we tested, no higher. Switching back to the C-1 from something like the Rappaport makes an audible ceiling descend on the sound stage, as if lowered by pulleys. That you-are-there openness just vanishes.

Another serious shortcoming of the C-1, despite its formidable battery of features and facilities, is the complete absence of provisions for moving-coil cartridges. Just as though they didn't exist. After you've paid \$1800, it's still your problem how you're going to bring up the level of your moving-coil cartridge to the 2-millivolt input sensitivity of the C-1. (It's possible that the design was finalized before the current popularity of moving-coil cartridges took hold.)

By the way, that built-in oscillator with four test frequencies (70 Hz, 333 Hz, 1 kHz and 10 kHz) is strictly a promotional gimmick. So is the pink-noise generator. Look at it this way. A Krohn-Hite 4100A push-button oscillator (0.01 Hz to 1 MHz, about 0.005% average distortion in the audio range) costs \$695. A General Radio 1382 white/pink noise generator costs \$675. A DB Systems preamp costs \$425. Total: \$1795. So, for \$5 less than the price of the Yamaha C-1, you can get two superb professional lab instruments plus a better preamp. And the Krohn-Hite alone has 40 controls on its front panel, nine more than the C-1, if that's what your heart desires.

Our overall judgment of the Yamaha C-1 is that it's probably the ideal prestige preamp for the successful young Wall Street man who, between the stock market, the tennis club and the Ferrari Daytona, has no time left for the concert hall. But for those who are regularly exposed to the sound of live music, there are more satisfying preamps at less than one third the price.

## Yamaha C-2

*Yamaha International Corp., PO Box 6600, Buena Park, CA 90620. NS Series C-2 Stereo Preamplifier, \$650. No warranty information enclosed with original factory container. Tested #02147, owned by The Audio Critic.*

Since the Yamaha B-2 power amplifier is an exceptionally fine piece of equipment (more

about that in our second issue), we were really disappointed that the companion preamplifier that's supposed to go with it, the C-2, isn't nearly up to the same sonic standard. Here was Yamaha's chance to do everything right the second time around—and they muffed it.

The Yamaha C-2 is obviously a bid for the role of a poor man's Mark Levinson; it has the same flat, black styling, very sexy, but much, much heavier on account of the self-contained power supply, full complement of controls, and built-in moving-coil pre-preamp. Beautifully finished, too; the top and the front, for example, are a single extrusion; no small American audio-freak company could afford this kind of production engineering. It would all be a marvelous package for \$650 if it weren't for the sound.

When you first turn on the C-2, the Mark-Levinsonesque impression is confirmed, since the noise level of the unit is absolutely the lowest in the business (fantastic!) and the sound is beautifully open and detailed. You say to yourself, "Hey, they did it!"—and then, kshhhh, there comes the "Japanese sound" on the high-frequency transients. In the case of the C-2 this is even more pronounced than on the Stax; here the tinkling of the triangle is without exaggeration like the ringing of your telephone (somebody please pick that up, I'm listening to music). Cymbals, attack transients in the highest reaches of the violins, snare drums, castanets—everything way up there is falsified. If it hadn't been for this one disastrous flaw, we would have needed a runoff A-B test of the C-2 against our top choices; it's that good otherwise.

The most remarkable part of all this is that a slight brittleness or overbrightness is the B-2 power amp's only vice, so that the C-2's flawed high frequencies are even further exaggerated through it. This is compatibility? The Mark Levinson JC-2, for example, mates much better with the B-2.

Here again, we may be into a slew-rate interfacing situation. We'll look into that question more deeply as our test program evolves.

## Yamaha CA-1000

*Yamaha International Corp., PO Box 6600, Buena Park, CA 90620. NS Series CA-1000 Stereo Pre-Main Amplifier, \$600. No warranty information enclosed with original factory container. Tested #22066, owned by The Audio Critic.*

Here's the ultimate paradox in the Yamaha line: for \$50 less than the C-2, they

offer you an integrated 75-watts-per-channel stereo amplifier, in which the preamplifier can be used separately (as in the Advent 300) and sounds better, in some ways, than either the C-1 or the C-2. You even get a built-in moving-coil pre-preamp.

Again, we didn't test the power amp section, since for the purposes of this survey we were interested only in the preamp, which we had decided to test in view of its underground reputation for surprising quality. The rumors turned out to be reasonably close to fact; the preamp section of the CA-1000 sounds more open than the C-1 and is more listenable on the top end than the C-2. If it lacks the vices of its stablemates, it doesn't quite share their virtues: it doesn't sound as smooth as the C-1 nor as open as the C-2. And it isn't quite free of that slight transitory hardness characteristic of nearly all commercial solid-state equipment, the sound that says "electronics" even when it produces no major irritation. The closest thing to this type of sound in our survey was the Luxman CL-350; if anything, the Yamaha CA-1000 is a little better.

If we sound a tiny bit bored with this one, it's because neither its pluses nor its minuses are very interesting to the audio purist. There's very little reason to get involved in this piece of equipment; the Advent 300 is better, as a pre-amp, at less than half the price, and there are about a half dozen other preamps in this survey that beat the CA-1000 on both sound and price. On the other hand, if you're looking for a pretty good preamp along with a pretty good medium-powered amplifier at a pretty good price, the CA-1000 is hard to beat.

But pretty good isn't the name of the game we're playing here, is it?

## Recommendations

With the reminder, once more, that all of the above is work-in-progress and that our conclusions may change as this survey goes into its second part, here are our present recommendations to those who wish to buy a pre-amplifier immediately.

**Best sound through mag phono, regardless of all other considerations: Rappaport PRE-1 (with the caveat about hum—see review).**

**Alternate choice for better system compatibility in specific cases: Mark Levinson JC-2.**

**Close to the best at a much lower price: Advent Model 300.**



# Have Tone Arm Designers Forgotten Their High-School Geometry?

Correct geometry in a pivoted tone arm costs the manufacturer no more than incorrect geometry. But you still can't buy an arm that's 100% correct.

There are two kinds of design problems to solve before coming out with a new tone arm. The hard ones and the easy ones.

The hard ones are being widely discussed. The proper relationship between tone arm mass and cartridge compliance. Standing waves in the arm and their termination. Pivot bearings and damping. Bias compensation—whether and how to do it. Lead wire stiffness. And so on. All of which we shall explore in depth when we come to our comparative tone arm reviews.

But nobody talks about the easy ones. The correct shape of an offset arm. The correct offset angle and overhang for an arm of a given length. The relationship between these parameters and the amount of tracking distortion. In other words, the simple geometry of the tone arm.

When the audio enthusiast buys an expensive new arm and takes the shiny instrument out of its polyurethane container, he generally assumes that these elementary problems have been solved by experts and that he is getting an optimized design. He is certainly of no mind to question, let alone recalculate, those super-precise mounting instructions. Alas, his simple faith is unjustified.

The shape of a tone arm is all too often determined by industrial designers and marketing men, rather than engineers. ("Remember, Hiroshi, American hi-fi nut loves snaky-looking tone arm.") The offset angle is just as often dead wrong for the arm length, and you'll never know whether it happened out of ignorance or sheer mathematical laziness. On top of it, the mounting instructions are likely to be far from optimum even for the given dimensions of the arm. (That, at least, you can

do something about. Unless the arm comes as an integral part of a turntable system.)

## **Be suspicious if it looks sexy.**

Let's look at the easiest problem first. What shape is correct for a pivoted tone arm? (I.e., just about any tone arm other than the Rabco and Bang & Olufsen straight-line-tracking arms.) A sexy S? A skinny C? A slightly straightened-out J? Or just a plain obtuse-angled L?

The whole thing is ridiculously simple. We all know that, in order to reduce tracking error, the cartridge has to be mounted with an offset (for the moment, never mind how large) and the stylus has to overhang the turntable spindle (again, never mind how much). Now, consider an arm of length  $L$  from stylus tip to pivot. (You don't need a diagram; just imagine you're looking down on the turntable from above.) If you draw a line right down the middle of the headshell, coincident with the stylus beam, there will be an angle  $\beta$  (beta) included between this line and  $L$ . That's the offset angle. If you now mount the arm with an overhang  $D$  (drilling your mounting hole the distance  $L-D$  from the spindle), the tracking geometry of your setup is fixed and unalterable.

So, as far as tracking error is concerned, it matters considerably less than one small hoot in hell whether the arm tube that carries the offset headshell is straight as an arrow or undulates from here to the bathroom and back again in baroque curlicues. It can't change the value of  $L$  or  $\beta$  or  $D$ . Those sexy, snaky curves aren't calculated to reduce tracking distortion. They're calculated to reduce your sales resistance. Even at the risk of unnecessary compromises in design.

### **In a tone arm, straight is better than curvacious.**

Since it's the offset angle  $\beta$  rather than the curve of the tube that determines the inherent tracking geometry of a tone arm of fixed length, it should be excruciatingly obvious even to math haters that the simplest, and therefore best, solution is a straight tube.

A straight line is the shortest distance between two points. (At least in Euclidean space, where presumably all tone arm designers operate.) A straight tube between the offset headshell and the counterweight will have the lowest mass and the greatest torsional rigidity for any given thickness. (We're pleased to see that Dual has broken the industry's uncomfortable silence about this fact of life and is advertising it in connection with the CS721 turntable.)

If the headshell is attached to the straight tube in such a way that the cartridge's approximate center of gravity will coincide with the tube's longitudinal axis, there will be little or no lateral imbalance in the arm and therefore no need for an eccentric counterweight, let alone an outrigger lateral weight. The Grace G-707 is a case in point, as well as the arm on the Dual CS721. Of course, the four-point gimbal in these designs would prevent twisting in any case, but it helps that the twisting force isn't there to begin with, so there can be no torsional bias on the bearings.

An eccentric counterweight, if necessary, is still a fairly elegant solution, as it creates a small torsional counterforce in the simplest and most controllable way. The Formula 4 PLS4/D is a perfect example. Its unipivot suspension responds to the tiniest lateral imbalance with a definite tilt of the vertical hub and a resulting misalignment of the stylus. With most cartridges a slight twist of the eccentric counterweight will restore perfect balance, without in any way compromising the basic straight-line tubular design of the arm.

Mind you, we aren't endorsing any of these arms by pointing out the correctness of their straight configuration. Our comparative tone arm tests are yet to come, and there's a lot more to an arm than its basic shape. But correct shape is at least a good start.

Is there any justification, then, for a

curved arm or are their designers just plain wrongheaded? The answer would be very simple if it weren't for detachable headshells.

The fact is that all straight tubular designs have permanently attached headshells. The arm meets the headshell at an angle, at the corner or on the side of the shell, never in the back. Why this configuration is unsuitable for detachable headshells isn't quite clear to us; it could be a hardware problem involving the size and shape of standard 4-prong connectors. Even that shouldn't be an unyielding obstacle to a technology that put a man on the moon. (A separate, slide-out cartridge holder isn't a good solution, since it just about doubles the mass of the headshell.)

In any event, whether you like it or not, all detachable headshells have the connector coming out straight from the back, meeting the locking ring on the arm in a continuation of this straight section. The ring begins to bend only well past the locking ring.

Even if we accept this compromise as unavoidable, there's no reason why the arm should be bent in a deep S (a la Technics, Marantz or Pioneer) or a fat J with a sizable outrigger weight (a la SME). That can only create unnecessarily large moments of inertia around the axis of symmetry as well as greater susceptibility to ringing in high-Q materials. The solution is to have two gentle and opposite bends in the arm, no greater than is necessary for the proper offset and lateral symmetry, with perhaps just a tiny outrigger weight for fine-tuning the lateral balance. That's still as close as possible to the pure, straight-tube design. An excellent example of this is the fascinating new SAEC arm (WE-308), which we shall review in depth in the near future.

All of this is pretty elementary stuff, requiring nothing more from the tone arm designer than the basic willingness to think mathematically. When we come to the correct values of  $L$ ,  $\beta$  and  $D$ , the math gets a bit thicker, but luckily all the groundwork has already been done by some very bright people, so that today's designer needs no greater mathematical sophistication than the ability to look up numbers in a table of trigonometric functions.

## Why get trapped in a problem that somebody has already solved?

The relationship between tracking distortion and tone arm geometry was analyzed in considerable mathematical detail by Benjamin B. Bauer in the 1940's and, even more searchingly, by Dr. John D. Seagrave in the 1950's. Ever since, it has been possible to decide on a practical length for a tone arm and then make both its offset angle and overhang mathematically correct, meaning that any other combination of values would result in higher distortion. It's as cut-and-dried as that.

Why even the costliest and most carefully made tone arms deviate from the dimensions worked out in this basic research is beyond our comprehension. But they do. We don't know of a single commercial design in which  $\beta$  is optimum for the given  $L$  or vice versa. Nor is the  $D$  specified in the mounting instructions optimum even for the given values of  $L$  and  $\beta$ .

Most designs make at least token obeisance to the first principle of minimizing tracking distortion, namely that the distortion is directly proportional to the tracking error and inversely proportional to the radius of the groove. But this is almost universally interpreted as, "Make the tracking error zero at the innermost groove and you're cool." And that happens to be a depressingly lazy, not to mention sloppy, approximation.

Those neat little protractors furnished by tone arm manufacturers for cartridge alignment (and unquestioningly accepted even by some equipment reviewers) fall into this very trap practically without exception. For example, both the SME and the Formula 4 protractors have their alignment point for zero tracking error at a radius of 2.375 in. (60.325 mm), which is the standard spec for the innermost groove before the leadout spiral under the most extreme conditions of groove squeezing. We don't believe we own a single LP recorded that close to the label. Dr. Seagrave specified 2.40 in. (61 mm) as the most extreme case, but quite regardless of that his study proves that a properly dimensioned and mounted arm does not go through zero at the innermost groove. Rather, it zeros twice: the first time somewhere in the middle of the recorded area and the

second time close to, but not quite at, the innermost groove. To those who understand the geometry of tracking this should be intuitively apparent, but the actual proof is there in the mathematical analysis.

The Grace G-707 specifications are fairly sophisticated in this respect; when mounted according to the template (no protractor is furnished), the arm zeros at a radius of 110 mm and again at 70 mm. But not even this well-designed arm has absolutely optimum geometry, as we shall see in a moment.

The basic mathematical approach to all this was to solve equations for minimizing, at all points between the first and the last groove, the distortion index  $m$ , which is defined as the tracking error divided by the groove radius. (That comes out in degrees per inch or centimeter or millimeter.) The value of  $m$  is of course zero where the tracking error is zero, but the value of interest is its maximum value with different combinations of  $L$ ,  $\beta$  and  $D$ . It is this maximum value which must be kept as small as possible.

Since this isn't really a technical journal, we won't track through all the math here but are merely reproducing a very detailed and useful *Universal Design Graph* summarizing the conclusions. The curves are correct for 12-inch LP's only, where the largest groove radius ever encountered is assumed to be 5.70 in. (145 mm) and the smallest 2.40 in. (61 mm). If you happen to be the village atheist and can't accept these given limits at face value, you're out of luck, since the curves are too much bother to recalculate and hardly worth it for the tiny correction factors involved. We are satisfied that the limiting values are realistic for today's records.

There are two things you can do with this graph. You can start from scratch and design a 100% correct arm, using only the simplest table of trigonometric functions. Or you can take an existing arm, correct or not, and at least mount it with a 100% correct overhang for its particular dimensions. For that you don't even have to look up anything in the tables, if you're willing to fuss with your measurements a little bit.

## How to use the graph.

First, let's define our terms again. The distance  $L$  is the length of the tone arm from stylus tip to pivot. The angle  $\beta$  is the offset angle, measured between the line from the stylus tip to the pivot and the line from the stylus tip down the middle of the headshell. The distance  $D$  is the overhang, measured from the stylus tip to the center of the turntable spindle when the line  $L$  passes through the spindle. (Thus the pivot is at the distance  $L - D$  from the spindle.) The distortion index  $m$  is the maximum value ("never more than") of the degrees of tracking error per inch under the conditions indicated. The subscript  $o$  indicates the optimum case. A very accurate approximation of  $D$  can be calculated by obtaining the value of  $D_i$  from the chart and equating  $D = D_i [1 + \frac{1}{2}(D_i/L)]$ . Just don't confuse  $D_i$  with  $D$ !

To measure  $L$  and  $\beta$  on an existing tone arm, all you need is an accurate steel ruler and a plastic protractor divided in half-degrees (not to be confused with the parallel-ruled paper protractors supplied with tone arms). But if you have a triangle with accurate scales on it, you can even dispense with the protractor as well as trigonometric tables or a slide rule. Because the most striking aspect of these design curves is that a single linear dimension, namely  $L \sin \beta$ , determines the correct  $D$  and the best obtainable  $m$  for a tone arm of a given length  $L$ .

All you do is measure the length of the perpendicular from the pivot point to the extension of the line that passes through the middle of the headshell. Simply lay the right-angled edges of your triangle on the tone arm in such a way that one edge passes through the center line of the headshell and the other edge through the pivot point. The distance from the pivot to the right-angled corner of the triangle is  $L \sin \beta$ . Now read the corresponding  $LD_i$  from the chart, measure  $L$  with the ruler and calculate  $D_i$ , then obtain  $D$  from the approximation defined above. That's all there is to it.

The really devastating fact revealed by the chart is that, for an absolutely optimal arm,  $L \sin \beta$  is always 3.68 in. (93.5 mm). Whether the arm is a little shorter or longer, whether it is offset a little more or less, as long as it is designed for 12-inch LP's, that dimension ought to be 3.68 in. But it never is. Don't ask us why. Math is very painful.

For example, on the template of the Grace G-707 we measured 3.48 in. On the actual arm we measured 3.375 in. (Tolerances

or shaky hands?) Either way, it's close but no cigar. Most other arms don't even approach the correct value.

## Does it really matter one way or the other?

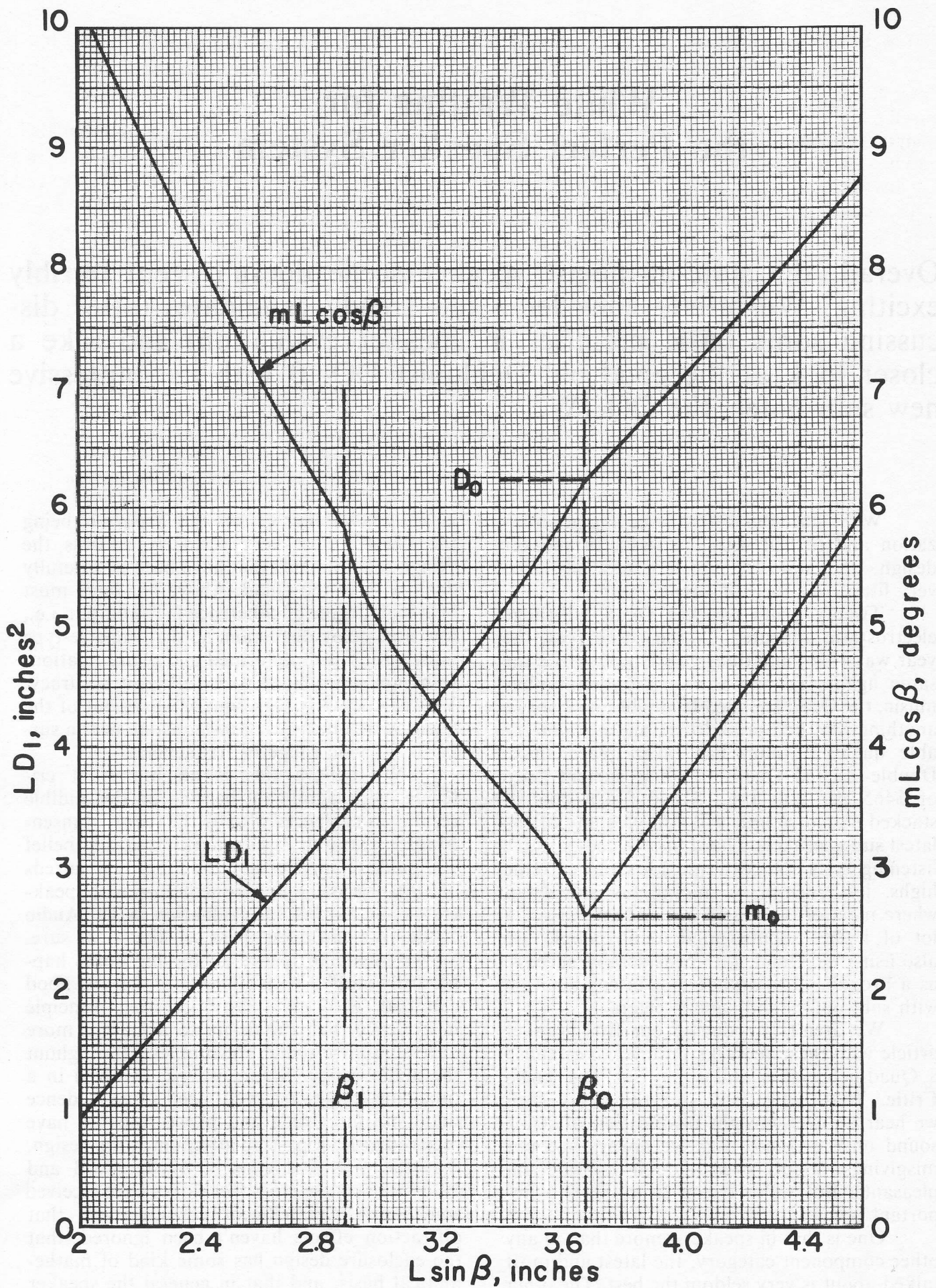
We must keep things in perspective. Minimizing tracking error probably isn't the most important consideration in tone arm design. (Mass and resonances, for example, have undoubtedly higher priority, but we shall discuss that in a future issue, as we've said.) All the damage that tracking error can do is a little second-harmonic distortion on single frequencies and IM distortion on complex signals. There are so many other possible sources of that in the chain of reproduction (a lot of it is cut right into the groove) that the net cleanup effect of correct tone arm geometry is relatively mild. We're inclined to believe that the garbage we hear in typical phono playback is due mostly to other causes. (In the wild and woolly days of the New Yorker Hotel "audio fairs," Walter Stanton used to twist his cartridge about 30 degrees in the headshell to demonstrate that it didn't make an audible difference. On the equipment he used at the time, it really didn't.)

There's also the complication of skating force. Reducing the offset and overhang to incorrectly low values will also reduce skating, so that in tone arms without anti-skating bias there may be a beneficial trade-off. (Somebody ought to do a rigorous mathematical analysis of that.) But since nearly all the better pivoted tone arms incorporate anti-skating (even if Joe Grado thinks it should be left disconnected), the question is rather academic. The stylus only knows that it's in equilibrium, not how large the equal and opposite skating and anti-skating forces are. And if the anti-skating bias is incorrect, the stylus knows only the net difference between the two forces.

So next time you're listening to an arm you really like, you can be reasonably sure of this: It sounds good because the top-priority problems in its design received proper attention. It doesn't sound good because of its geometry. It sounds good in spite of it.

Which brings us to the basic consumer issue of the matter. When an audio enthusiast pays a three-figure price for a tone arm or close to a four-figure price for a complete turntable system there's no reason why he shouldn't get the benefit of every little measure of perfection that won't raise the price of the unit even higher.

And, to the best of our knowledge, good math doesn't cost a penny more than bad math.



### Universal Design Graph

(For tone arms tracking a 12-inch LP. See text for explanation.)

# While Waiting for the Perfect Speaker System

Overall, the state-of-the-art speaker scene doesn't seem terribly exciting. We briefly consider a few trendy candidates (after discussing some basic premises in speaker evaluation) and take a closer look at the good old Dahlquist DQ-10 with its impressive new subwoofer, the DQ-1W.

We'll start this with a sweeping generalization and to hell with the risks. In speaker design, the state of the art has advanced very little over the last twenty years.

Twenty years ago the Quad full-range electrostatic appeared on the scene (yes, the year was 1956) and things were never quite the same again. To any ear accustomed to live music, the Quad sounded laughably superior to anything that had preceded it, and no comparable quantum jump has taken place since. Double-stacked Quads, at their current price of \$465 per unit (i.e., \$1860 for a double-stacked stereo setup), will still give any of the latest superspeakers a hard time in comparative listening tests. No extreme lows, no extreme highs, just exemplary smoothness and detail where most of the music is. For that reason, a lot of highly sophisticated audio people are also using the Quad, with considerable success, as a broadband midrange unit in combination with subwoofers and supertweeters.

We aren't introducing our first speaker article with these remarks in order to establish a Quad-ueber-alles philosophy for **The Audio Critic**. That really isn't our thing. (In fact, we hear an ever-so-slight falsification of string sound on the Quad, which we always had our misgivings about, even though it isn't unpleasant.) But we're trying to make two important points.

One is that in speakers, more than in any other component category, the latest and most talked-about is very seldom the best. The other

is that any speaker system that aspires to being the "best" must very seriously address the design requirements that have been so carefully dealt with in the Quad. Above all, there must be a high degree of coherence in the output, i.e., low time-delay distortion, so that impulse-type information isn't deformed and phase relationships are reproduced with sufficient accuracy. You can actually pick square waves out of the Quad with a measuring microphone over a surprisingly wide range of frequencies.

We believe this is an important criterion, with significant bearing on the audible results (as evidenced also by the recent Hansen-Madsen research in Denmark), and that belief will guide us in screening the literally hundreds of high-priced and upper-medium-priced speakers on the market for evaluation in **The Audio Critic**. We can't test them all, that's for sure. So we intend to ignore all the big boxes haphazardly stuffed with all sorts of drivers, good and bad, with no other organizing principle in evidence than the desire to achieve a more or less uniform sound pressure level throughout the audio range. Before we get involved in a time-consuming test, we'll need some evidence that both amplitude and phase response have received at least passing attention in the design, that the pros and cons of 6-dB, 12-dB and 18-dB-per-octave crossover slopes have received some sort of intelligent consideration, that diffraction effects haven't been ignored, that the enclosure design has some kind of mathematical basis, and that in general the speaker

has a specific theoretical foundation, no matter how tenuous. That alone will eliminate most candidates and allow us to zero in on reasonably promising developments.

We must admit, though, that for one brief moment about six years ago we thought that Camelot was at hand and that all of the above would soon become irrelevant. The patent issued to the late Lincoln Walsh for his single-cone loudspeaker invention made such brilliant reading, and early prototypes, though faulty, were so exciting in performance, that it seemed someone had finally made an end run around all the unnecessary complications of speaker design and come up with a supersimple approach to perfection. It promised to cut across all price ranges and supersede all other designs, even as the zipper had replaced the buttoned fly in both cheap and expensive pants.

Alas, it was not to be. "Between the idea/ And the reality/. . . Falls the Shadow," as the poet said. The mind-blowing two-dimensional mathematical model of the Walsh speaker didn't translate so easily into three dimensions. And the small company that obtained the exclusive patent license, Ohm Acoustics, didn't have the R and D megabucks to solve all the problems. Someday, maybe. Meanwhile, the smallest and lowest-priced version of the Walsh speaker, the Ohm G, is by far the best. But—wouldn't you know it—it has been discontinued (at least temporarily) because its relatively modest power-handling capability made it a slow seller. A top-of-the-line 15-inch version, we're told, is a possibility by Consumer Electronics Show time in June.

In the absence of epochal breakthroughs, then, let's have a look at some speaker systems that are at least talking a good design.

### **Duntech DL-15**

We were going to do a detailed test report on this excellent product, but two developments have made that somewhat academic.

The first was the full Richard C. Heyser treatment of the same subject in the August 1976 issue of *Audio*. Anyone who would remeasure a speaker after it has been measured by the brilliant Dick Heyser has got to be out of his mind. All we're willing to do here is to make some comparative observations that he wasn't allowed to make in a commercial magazine.

The second, and even more relevant, development is that Duntech Labs is meanwhile out of business. (Another case of an engineering-oriented company seemingly without a solid business foundation.) You may still be able to locate a pair of these speakers, however, and quite possibly at less than their original list price of \$449 per side.

The DL-15 design deserves not to be quickly forgotten, though, because it accomplished something no one else has been able to do. It took three perfectly ordinary drivers (15" woofer, 5" midrange, 1¾" tweeter) of the kind available from "raw speaker" houses, mounted them in a rather sophisticated way (minimizing diffraction) in an enclosure having no special acoustic loading gimmicks, and achieved, if not state-of-the-art performance, something respectably close to it. Plus tremendous efficiency. In a large room that communicates with another fairly large room through an archway and with an upstairs floor through an open stairway, we were never able to measure even momentary amplifier peaks of more than 36 watts, no matter how loud we played the Duntechs. The power-handling headroom you get with that kind of efficiency is especially good for piano reproduction, which was the DL-15's strongest suit.

Overall, its sound could be described as "Fulton J junior." A bit on the heavy side (others might say "solid") but extremely clean, authoritative and musical. The slight impression of heaviness may be due to the apparent Q of 1 of the second-order enclosure (sealed box) configuration, since the response seems to be up about 1½ dB at the system resonance of 35 Hz according to the Duntech spec sheet. We prefer a Q of 0.707 ("maximally flat"). But on rock-pop material the very slightly looser bass resulting from a Q of 1 may actually be preferred by some listeners who aren't accuracy freaks like us. The slight stridency in the 3 kHz region that Heyser comments on was evident from time to time, but we didn't find it especially disturbing.

The shortcomings of the DL-15 from the perfectionist point of view became apparent when we A-B-ed it against the Dahlquist DQ-10. It just didn't possess the super clarity, openness, imaging and transient detail of the Dahlquist. Switching back to the Duntech for prolonged listening became most unsatisfactory in

the course of A-B-ing; it sounded positively dim and muffled by comparison, which of course it isn't when listened to by itself. The fact that the Duntech took with ease some peaks that mildly distressed the Dahlquist didn't change our ultimate preference. Nor did the less extended bass response of the Dahlquist (without subwoofer).

Still, the DL-15 was one hell of a nice speaker. *Requiescat in pace.*

### **Acoustat X**

This large full-range electrostatic system has a great deal of purist appeal, as it is not only crossoverless, with each electrostatic panel reproducing the full audio range, but is also permanently wedded to its own power amplifier, specifically designed to drive these panels optimally. And at \$1895 for a complete stereo pair, including amplifiers, it is merely expensive rather than prohibitive.

We haven't tested the Acoustat X under our own roof yet but have taken steps to obtain a pair for review in one of our earliest issues. Meanwhile, we have listened to it as critically as we could, using our own records, at a nearby audio dealer's showroom. Our initial impressions were mostly favorable.

Even to our Dahlquist-conditioned ears, the Acoustat sounded quite open, transparent and accurate in detail. That alone would put it in a small elite group of topflight speaker systems. We detected a bump in the upper-bass/lower-midrange response, which could have had a number of causes: room placement, amplifier control over the moving system (we hope that wasn't it!), or the equalization network used in the speaker to counteract the boundary effect of the rear wall. We'll never know until we test the speaker ourselves.

In any event, this is a rather exciting development for the audio perfectionist, especially since the size of the Acoustat X, while large, is still on this side of tolerability in a reasonably permissive house. Whether it has completely solved the classic design problems that have prevented electrostatics from decisively taking over the high-end market remains to be seen.

### **Phase Linear Andromeda III**

We haven't heard this new speaker, but on paper it appears to have some interesting things going for it, including what looks like

electronic correction for phase and transient effects in the moving system. Also, a dedicated audio freak whose ears we trust has reported to us in glowing terms on the sound of the Andromeda III.

None of this would be sufficient cause for even the briefest commentary without some previous listening exposure, if it weren't for a false note in Phase Linear's introductory ad that has set our critical juices flowing.

The ad proudly announces "two twelve-inch woofers mounted in a 7th Order Chebechev formula." Quite aside from the misspelling (it should be Chebyshev, at least according to the learned journals we've seen), the capitalization of "order" indicates that they consider the whole thing rather impressive. Just on the face of it, we're not so sure.

The higher the order of a filter (or in this case the alignment order of a vented enclosure), the greater its complexity and the worse its impulse-response behavior. (A sealed box, for example, is a second-order filter.) What's more, a Chebyshev alignment always introduces ripple into the response profile and has poorer impulse response than a Butterworth alignment of the same order, even though it provides greater bandwidth for a given output capability (probably the reason for its choice by Phase Linear). A C<sub>1</sub> alignment is about as extreme from the point of view of degraded impulse response as we've ever heard of. If the Andromeda III has no hangover on bass transients, practice has triumphed most handsomely over theory.

### **Infinity QLS**

We had a chance to hear Infinity's new all-out speaker design (advertised as though they were planning to give up on the unreliable Servo-Statik) side by side with the Acoustat X. Same showroom, same records, same equipment (except, of course, for the addition of a power amplifier), same occasion as discussed under the Acoustat commentary above. We must repeat that this was a casual audition, not a test.

The Acoustat X sounded far superior. Cleaner, more open, more focused, more accurately detailed, with superior imaging. Considering that the QLS costs \$1100 per side (i.e., more than \$3000 for a stereo setup with a first-rate amplifier, against the \$1895 price of the Acoustat), this wasn't a favorable comparison.



The dealer claimed, however, that the QLS wasn't set up optimally; they were still experimenting with it.

Supplementing this experience comes the information from one of our staff members that he had the opportunity to do a quickie measurement on the QLS, and the midrange drivers showed a peak of 10 to 15 dB at about 1.5 kHz. He also found that the horizontal dispersion of the "Line Source" tweeters was only fair and their vertical dispersion nonexistent. As for the Infinity-Watkins woofer, he found he could easily overdrive it with organ music.

All of this may be nothing more than teething problems in the infancy of a complicated new product. The trouble is, we don't feel very comfortable with the two-voice-coil Watkins woofer even from a purely theoretical point of view. When the original article by William H. Watkins on his new woofer design first came out in the December 1974 *Audio*, it was privately greeted with hoots of derision by the mathematical academicians in the tight little world of electroacoustics. Their arguments are beyond the scope of this brief discussion (the issue was mainly the exact electrical and mechanical interaction of the two voice coils), but it was rumored that a very distinguished scholar had proposed the article as a possible candidate for the Order of the Purple Bullshit Award.

"If this be error and upon me proved"—if the Infinity QLS should in the end turn out to have obsoleted all existing speaker technologies, as the Infinity ad claims—we'll make a red-faced recantation in Macy's window at high noon.

Meanwhile, we'll stick with our good old Dahlquist, a full report on which follows.

## Dahlquist DQ-10 with DQ-1W

*Dahlquist, Inc., 27 Hanse Ave., Freeport, NY 11520. Phased Array Model DQ-10, \$395. Tested #10766 and #10767. DW-1W Low Bass Module, \$275. Tested #0023 and #0024. All units owned by The Audio Critic.*

"The Dahlquist is a great speaker but it has no bass." You've heard that one before, and it was always a pretty good half-truth. Well, now it has bass. Very accurate bass, too, because the new DQ-1W subwoofer has been designed with the same disregard for plebeian

preferences in sound as the DQ-10 itself.

Although the DQ-10 has been widely recognized by audio enthusiasts as a purist's speaker, not too many of them realize just how puristic it is. This is a design that relentlessly, almost desperately, pushes toward the abstract ideal of an output which is linear both in amplitude and in phase. What's more, it does that without permitting itself any prohibitively costly excesses of design, with respect to either components or construction. What the Walsh speaker tried to accomplish with one elegant stroke, the DQ-10 approximates more successfully with brute force. Five drivers per side (not counting, of course, the new subwoofer), an extremely complicated baffle arrangement, an equally complicated crossover network, a rather awkward shape—and it all works. It's almost as if Jon Dahlquist had been standing over his brainchild with a bludgeon in his hand and shouting, "You *will* be flat and coherent, damn you, if it kills you."

We have a feeling that whatever faults the speaker has—and it isn't by any means faultless, but what speaker is?—are due to this straining for perfection within a given price limitation, since that approach leaves no room for easy trade-offs. For example, the use of a relatively inexpensive piezoelectric horn super-tweeter is probably responsible for an occasional touch of hardness on the top end, although this is partly dependent on the associated electronics. Without this somewhat quirky driver, the DQ-10 would still have good highs, but not dead flat out to a zillion hertz, as it does now. It's very easy to give that up, sacrifice some definition and transparency, and end up with a nice, unproblematic, slightly rolled-off response that most reviewers would call smooth. But that's not Jon Dahlquist's way.

The DQ-10 is the only speaker we know of that can be proven truly flat in pressure amplitude response. The speaker has a "sweet spot" (much like a golf club or a tennis racket) where our Bruel & Kjaer 4133 measuring microphone reads an almost amplifier-like straight-line response on the screen of our Hewlett-Packard 3580A spectrum analyzer. When you move the microphone, the response curve breaks up into the usual peaks and valleys exhibited by multiple-driver systems. But the existence of the sweet spot seems to indicate that the phased-array baffle mounting *does* make the response coalesce in at least one

dimension and that the low-diffraction design has eliminated the ordinarily intractable squiggles from that source. This ridiculously flat response is observable, by the way, from just above 40 Hz on up into the 20-to-40 kHz octave, where we didn't bother to locate the exact roll-off point. (Bats and dogs should worry.) The DQ-1W subwoofer extends the response downwards, of course, but not by as many hertz as you would think. That's not its main virtue. We'll give you exact numbers in our second issue, where we begin our comparative subwoofer tests (Dahlquist vs. Janis, among others).

Back to the naked DQ-10 for a moment. We listened to it both without and with the factory-authorized substitution of mylar capacitors for the electrolytics in the crossover network. It makes an audible, though unmeasurable, difference. The sound is distinctly sweeter, less strained with the mylar mod. (The theory that two capacitors of the same value but different construction can sound different in the same signal path is also shared by Luxman. They claim to have verified it in amplifiers.) We were also going to perform the factory-authorized mirror-imaging mod on our DQ-10's but never got around to it. In any event, it can only improve the accuracy of the stereo image, not the basic texture of the sound.

What about that sound? Even without the subwoofer, it stands up favorably in just about any company. With carefully matched electronics and an impeccable program source, no speaker we know of sounds more open, transparent, clearly detailed—in other words, more accurate—than the DQ-10. Some speakers handle power more gracefully and show less distress when zapped with nasty transients. But these speakers lack the crystalline clarity of the Dahlquist. The DQ-10 can't roar and thunder, but at reasonable living-room levels it sounds more like real music than the roarers and thunderers. Its midrange may still be surpassed by the Quad, by a narrow margin, but overall the Dahlquist lets through more information. It's also a completely unforgiving speaker that will make mediocre power amplifiers, preamps and cartridges sound ridiculous. Owners of such equipment will invariably hate the Dahlquist. As we said, it isn't the People's Speaker.

What are the negative aspects, then, of the DQ-10 (still without subwoofer)? Other than being a bit light on bass and lacking authority on the hugest climaxes, its only

possible fault is the slight hardness or glare noted above, which we'd be inclined to attribute either to the piezoelectric horn or conceivably to the highly complex crossover network. Even this very subtle sonic anomaly varies considerably with the electronics used, especially the power amplifier. We found that the Quatre DG-250 Gain Cell (an analog multiplier device about which we'll have a lot more to say in our next issue) tamed the DQ-10 more successfully than either the Yamaha B-2 or the GAS Son of Ampzilla. It sounded rounder, sweeter, less "angry" with the Quatre even on difficult material, without losing openness or transient detail. A synergistic combination. (The Quatre can deliver about 150 watts into the load represented by the DQ-10; 200 watts would be even better.)

Okay, enter the DQ-1W subwoofer. To avoid any misunderstanding, our opinion of it is based on a totally uncompromising, purist installation. First of all, we got two of them instead of one. That means we didn't use the Dahlquist DQ-MX1 passive crossover network (\$125), which matrixes the left and right bass signals into a single woofer. Nor did we use the Dahlquist DQ-LP1 electronic crossover (\$250) because it wasn't available yet. We used two Quatre DG-250 power amps, one driving the two DQ-10's and the other the two DQ-1W's, and we placed a home-brewed 6-dB-per-octave passive crossover network between our preamp and the two power amps. The crossover frequency was 60 Hz, Dahlquist's recommended optimum. Although there's nothing better than a 6-dB-per-octave passive network for accurate transient reproduction, with a 60-Hz crossover it's down only 24 dB at 1 kHz, and the DQ-1W has enough flux density to be still going strong at that frequency. It should really be rolled off at 18 dB per octave, as it will be in the Dahlquist electronic crossover. To get more roll-off, we blocked off the front of the subwoofers by placing the DQ-10's directly in front of them, so there could be at least no forward radiation of the higher frequencies. This certainly isn't a standard setup, and our one-on-one judgment of the DQ-1W against other subwoofers will therefore have to wait until the next issue.

But the sound, friends. Ah, the sound. It changed completely. The DQ-10 was no longer an accurate but light-sounding speaker. It became an accurate speaker, period. Round and sweet and solid from top to bottom. The

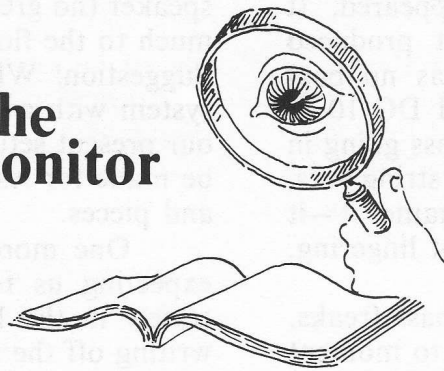
occasional edginess virtually disappeared. It still wasn't full-sounding, since it produced absolutely no bass when there was no bass going in, even outdoing the naked DQ-10 in this respect. But when there was bass going in—organ pedals, bass drum, plucked string bass, Pink Floyd's "heartbeat," you name it—it came out. With impact and without lingering. Just as in real life.

So this is no subwoofer for bass freaks. It won't remind you from moment to moment that you've got expensive bass in your system. The enclosure alignment is second-order Butterworth with a Q of 0.707. That means it's well damped. It won't "woof up" slightly like the second-order Chebyshev alignment with a Q of 1. The system resonant frequency is approximately 38 Hz, which isn't very low but results in decent efficiency in a less than 4-cubic-foot enclosure with a 13" driver. This kind of tuning won't give you 20 Hz flat, if you're one of those who believe they can hear 20 Hz as a pitch. (We can't.) The DQ-1W isn't even a *sub*woofer strictly speaking. It's simply a very high-quality woofer, the kind the DQ-10 should have come with in the first place. It would have changed the overall shape of the

speaker (no great loss!) without adding all that much to the floor space needed by the system. Suggestion: Why not a vertical phased-array system with a built-in DQ-1W? We'd trade in our present setup for it. And it could probably be made for less than the sum of all these bits and pieces.

One more thing. Some readers may be expecting us to comment on that notorious review in the English magazine *Hi-Fi News*, writing off the Dahlquist DQ-10 as a mediocre speaker. We really don't know what to make of this aberration by the highly knowledgeable John Crabbe and his staff. Arguments have been going back and forth to the effect that the DQ-10's tested were faulty or damaged, that the review was the last-ditch stand of desperate English snobbism against Yankee encroachment in elitist speakers (but how could anyone feel that way about a nice Swedish-Italian boy like Jon?), and so forth and so on. Frankly, we couldn't care less. Anyone with a reasonably educated ear can hear that the DQ-10 is a top-flight speaker, whether or not it's the "best." And anyone who dismisses it as worthless raises doubts about his own credibility, not the speaker's.

# The Admonitor



*In this column, which we plan to be a regular feature, we monitor the ads addressed to audio enthusiasts, admonish (get it?) the ones that aren't telling it like it is, and occasionally give the good guys a pat on the back.*

## **Pioneer HPM-200**

In the March 1976 issues of the hi-fi slicks, Pioneer announced with gorgeous full-color gatefolds its intention to stake a belated claim in the high-end market. The advertised item was the Pioneer HPM-200 speaker system, a big \$500-per-side floor-standing unit featuring their "revolutionary" piezoelectric film tweeter and possessing no deep bass even according to the response curve shown elsewhere in their promotional literature. (Maybe 30 Hz is bad for those Japanese paper walls.)

"In the last 24 months," headlined the outer flap of the ad, "11 companies have introduced 'super amplifiers' that you can't fully appreciate until you hear them through these speakers." When you opened up the gatefold, it said inside: "Introducing HPM-200. The first speakers designed to deliver all the sound expensive, high-power amplifiers can produce."

Imagine that. There you were with your Yamaha B-1 or your Dynaco Stereo 400 (these happened to be among the expensive power amps actually photographed with the Pioneer speaker for prestige rub-off) and you were asked to feel frustrated because so far you could hear your amplifier only through, let us say, Magneplanar Tympani IIIA's or Fulton J's or (in especially underprivileged cases) double KLH Nines. Holy credibility gap!

We had a chance to hear the HPM-200 shortly thereafter, and our ears confirmed the response curve in the spec sheet. No bass. The rest of the range wasn't bad, for a Pioneer speaker. Nor was it phenomenally good. But all that was long ago and this is a newsy publication, right?

Well, here we are ten months later, looking at the January 1977 issue of *High Fidelity*. Would you believe it—there's the same gatefold. They didn't even bother to change the words "24 months" and "11 companies." Apparently these super amplifiers come out with cyclical regularity, always 11 of them every 24 months.

Now the one thing that distinguishes sophisticated hype from amateurish bull is follow-through. We don't expect a bottom-line oriented company like Pioneer and their high-powered advertising agency to talk to the consumer with the restraint of, say, a Dahlquist. But when they stretch the credulity of the high-end buyer to the limit, they could at least follow through and give him credit for a ten-month memory. Audiophiles read all the speaker ads all the time. The original ad was smooth double-talk, at best. Repeating it ten months later unchanged is either the rankest cynicism or just plain incompetence.

(Incidentally, have you noticed that Pioneer has been running the same few full-color ads over and over again? For a company that makes so many different products and has such a huge advertising budget, that's not very informative—nor imaginative.)

## **Dual CS721**

In our detailed article on tone-arm geometry in this issue, we have parenthetically commended Dual for their advertising stand on the superiority of straight arms over cosmetically curved arms. Here we just want to make it official.

Audio equipment advertising should be informative, and here's an example of solid engineering fact laid on the line by an influential company in a particular product area. It's nice to see simple high-school physics-class reality prevail where pseudo-technical fantasies are the general rule.

We haven't tested any of the new Dual turntables yet (it's really only the CS721 that belongs in a high-end oriented publication), so we can't possibly vouch for their advertising claims. But we're quite certain that the shape of the tone arm isn't one of the weaknesses, if any, of Dual's design approach.

### **B.I.C. "Dynamic Tonal Balance Compensation"**

Here's a fatuous speaker gimmick with an advertising handle that probably works beautifully wherever the word "flat" is poorly understood.

Imagine a speaker that changes the shape of its frequency response curve from moment to moment while the music is playing! It has got to be the Fletcher-Munson misinterpretation of all time—and there have been quite a few.

The B.I.C. Venturi ad (we last saw it in the December 1976 *High Fidelity*) shows a dead-flat response curve and labels it "The 'perfect' speaker." Superimposed on it is a hill-shaped curve peaking at around 2.5 kHz and labeled "What your ear hears." The headline proclaims: "This is the 'flat' response curve produced by a theoretically perfect loudspeaker . . . as your ear hears it!" The copy explains that the response of the human ear isn't flat and that it's unflat to varying degrees at different sound pressure levels. Ergo, what you need is the exclusive B.I.C. feature that compensates for this obnoxious variation *continuously* in accordance with the dynamics of the music.

What the brainstorm troopers at B.I.C. apparently forgot is that in real life the frequency response of the concert hall remains constant even though the music varies in dynamics. And the hearing of the musicians and singers is every bit as unflat as yours, the listener's, so they instinctively adjust their loudness at different frequencies to make everything sound the way you ought to hear it. Without the necessity of varying the frequency response of

the air between you and them dynamically.

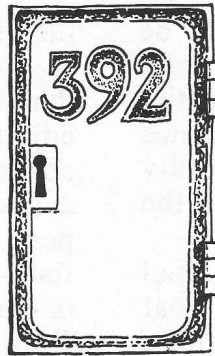
So if in reproduction you make a further dynamic adjustment, it's in effect a double adjustment. That peaked curve in the B.I.C. ad is totally misleading. Through a "flat" speaker, you won't subjectively hear a 2.5 kHz peak. You'll hear the world exactly as it is. Not flat—because even ideally the world isn't flat. (Columbus knew better than B.I.C.) Just real. Only the reproducer is supposed to be flat.

Of course, the concept of a *constant* (not dynamically varying) loudness contour is another matter altogether. If you listen at a level 20 dB below what the musicians had in mind, you could lose some of the low notes, so that fixed loudness compensation in accordance with the -20 dB equal-loudness curve would have some appeal for background music. That's probably at the root of the B.I.C. howler. Even in their misinterpretation, though, the B.I.C. people were a bit behind the times, since recent research shows that the Fletcher-Munson effect is valid only at low frequencies and that people with normal hearing respond to the higher frequencies quite equally at different levels. The B.I.C. contour is hinged in the middle and compensates for both highs and lows.

We called up the B.I.C. Venturi engineering department (cleverly disguised as the average gullible audio freak) and asked a few wide-eyed questions about all this. We were told that the automatic compensation is accomplished by means of a thermistor that responds very slowly, so "it doesn't breathe like an expander." But what happens when the music has been soft for a while, the thermistor circuit has settled down to a nice, fat bass boost and there's a sudden fortissimo with bass drum? Wow. Anyway, we were told, you can always switch off the automatic mode and use the manual control, which acts more or less as a conventional loudness control.

We have an even better idea. How about using another speaker? For the price of the top-of-the-line Formula 7 incorporating this Mickey Mouse feature, you can buy a Dahlquist DQ-10 and have a nice piece of change left over.

Are we going to test the B.I.C. Formula 7? We doubt it very much. Maybe we're prejudiced, but so was the movie director who refused to audition Peter Lorre for the role of Abraham Lincoln.



## BOX 392

### Letters to the Editor

*The sole criterion for the reproduction of letters in this column is the degree of interest to our subscribers. Letters may or may not be excerpted, at the discretion of the Editor. Ellipsis (. . .) indicates omission. Address*

*all editorial correspondence to The Editor, The Audio Critic, Box 392, Bronxville, New York 10708. All of the letters printed in this first issue are, of course, in response to our initial announcements and advertising, rather than our editorial contents.*

The Audio Critic:

Anyone who would send you \$28 to subscribe to yet another audio-freak magazine must be crazy!

Now that we have established my state of mind, you will find my check for \$28 enclosed.

Good luck on your ambitious undertaking. I hope the quality of your reviews and your publication schedule live up to my expectations and your advertisements.

Sincerely,  
Richard S. Wasserstrom  
McLean, VA

The Audio Critic:

Here is my \$28 subscription for your first six issues.

I certainly hope your publication lives up to your standards as propounded by your advertisement in *Audio* magazine. Even a magazine as good as your ad has described (in such glowing terms!) will have to be very fine indeed to warrant an expenditure of such magnitude.

By the way, this was written with a 19 cent Bic pen. I just can't find my damn quill!!

Yours truly,  
Joel M. Ellingsworth  
San Antonio, TX

The Audio Critic:

I would like to subscribe to your magazine. Enclosed is a check for (whew!) \$28. While this seems excessive, it will be worth it if your magazine is everything you say it will be.

Hopefully, in the first few issues, you will have a "golden-ear" evaluation of some of the "state-of-the-art" loudspeakers, including the Dahlquist DQ-10 with subwoofer (*no sooner said than done—Ed.*) and the Infinity QLS.

Sincerely,  
Mike Kuller,  
Long Beach, CA

The Audio Critic:

I have been intrigued by your ads in *Audio* for the past few months, but I (and friends of mine) have been hesitant to subscribe for we have heard grand promises before but not at such a high price.

Well, after reflection I have decided to take a chance and subscribe; enclosed is my check for \$28. If you do what you say, then your potential is great and worth the price. If you cannot fulfill your promises, then I have the feeling that you may have some irate readers on your hands.

In any case, best of luck in your adventure and I look forward to receiving the first issue.

Respectfully,  
Collins Beagle  
Charlottesville, VA

*The above four letters are fairly typical of one particular group of subscribers and call for some comment.*

*First of all, we're not a magazine. You'll never see a pile of **The Audio Critic** on sale either at a newsstand or even in an audio store. You can't grab a copy to read on the bus. Call us an advisory service, a technical review, a private journal, a newsletter, or whatever you wish, but not a magazine. Besides, the magazines tell you what everybody already knows, whereas we try to tell you what only a few people know.*

*Then there's the \$28 price for six issues. It amazes us that so many hard-nosed and technically hip people only see the price on the package and never bother to figure out the price per unit. **The Audio Critic** costs you \$4.67 per delivered issue, first-class mail only. Calculated on the same basis, the 1977 subscription cost of the "other" publication most frequently mentioned by our letter writers comes to \$3.50 per issue, or 25% less than **The Audio Critic**. So that's what the whew!-ing and moaning is all about. Twenty-five lousy percent—and without even comparing the contents!*

*Which brings us to the main point. On the one hand, we feel no moral obligation to sell a leisure-oriented service that we consider superior for less than we can get for it. After all, we aren't fixing the price of milk for babies. And, on the other hand, no one forced our prepublication subscribers to subscribe. They could have waited until the first issue was out, borrowed it from somebody else and then decided whether or not **The Audio Critic** was worth the price we asked for it. But you, Richard and Joel and Mike and Collins, you just couldn't wait. It was unbearable to you that something like **The Audio Critic** should exist without your being in on the action from Day One. That's because you're "audio freaks," bless you. We love you for your addiction and cater to it, but it just isn't right that you should attempt to make us feel guilty for it. You were hooked long before we came on the scene.*

*Furthermore, it simply isn't true that you're "taking a chance." Because, at any point, if you aren't satisfied with our contents or our schedule, all you have to do is drop us a line and the unused portion of your subscription will be refunded. Without a murmur. We figure that an "irate reader" is a lot worse than one less reader.*

*Let no one form the impression, though, that our mail is predominantly skeptical. On the contrary, most of the letters we've received so far are like the one that follows.*

—Ed.

The Audio Critic:

Please enter my subscription for one year. I applaud your intentions to publish a high-end magazine for the audio enthusiast on a regular basis.

Yours truly,  
William D. Patterson, MD  
Nashville, TN

The Audio Critic:

I have enclosed a check for a subscription to your audio publication. It is about time someone came out with a publication to tell it like it is.

I hope your publication does not emphasize products made in Japan because there are a lot of American companies just as good or even better.

Sincerely yours,  
Thomas P. DeFlumeri  
New Haven, CT

*We would put it a little differently. No matter how good a Japanese audio product is, there's usually a small, specialized American company (not "a lot of American companies") that makes something even better. For example, the Yamaha B-2 is a superb power amplifier in the light-heavyweight category, but we like the Quatre DG-250 even more. (See our March/April issue.)*

—Ed.

The Audio Critic:

Please send subscription . . .

. . . If, during your testing and evaluating, you discover that certain combinations of components sound especially good, natural, warm, horrible or whatever, please make an effort to publish these results.

So many of the existing publications state that certain components sound good only when used in the right combination, but they never say what exactly these combinations are!

Well, good luck and I hope I like your first issue.

Sincerely,  
Richard P. Quill  
Dayton, OH

*We're with you there, one hundred percent. See our comments on that very subject under the Mark Levinson JC-2 and Dahlquist DQ-10 reviews.*

—Ed.

We already have too many "high end" audiophile mags. and they all take sides. all your doing is making it worse.

All you want to do is put your hand into some money and power and all you have to do is sit on your ass and Listen to music.

GIVE UP!  
(Unsigned)  
Postmarked Royal Oak, MI

*You forgot one thing, Royal Oak. When we're finished sitting, we still have to write something. And that means grammar, spelling, punctuation and capitalization. So it isn't such an easy life after all.*

—Ed.

The Audio Critic:

Please send 1 year's subscription, 6 issues.

I am 70 years old and have gone through all the rest. I wish you success, but I don't think you will make it, at any subscription price.

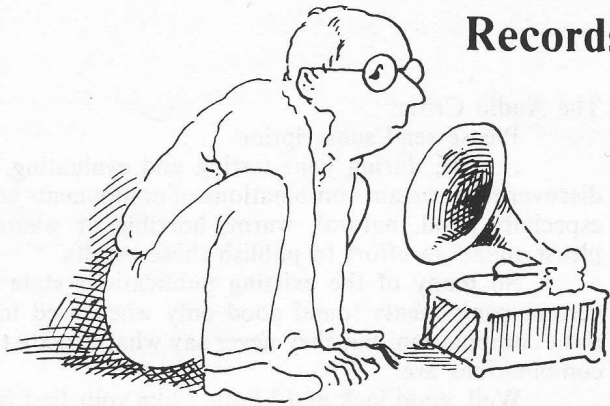
Other publishers of such material are from 6 months to a year behind on the product delivery. What good is this?

The large, regular audio magazines are up-to-date but tell nothing. I have never read a bad report.

I find that most equipment is fair; much too high-priced; a lot of it comes in new and doesn't work; guarantees are limited; nothing stands up. Before a dealer gets delivery on a *new* item, the manufacturer is advertising a newer model—much better! They can bankrupt the average small dealer, making new models every week.

Don't ever try to get a part. Why did I ever pick this as a hobby?

Bob Miller  
Owner  
S. A. R. Company  
(audio dealer)  
Babson Park, FL



## Records and Recording

### Why Does It Sound Like That?

By Max Wilcox

*Editor's Note:* This column will be mainly the bailiwick of our genial Associate Editor, Max Wilcox, although we all intend to get in our two cents worth from time to time. We have known Max for quite a few years and have followed with solicitude his evolution from Establishment producer at RCA to maverick free-lancer experimenting with unconventional recording techniques and equipment. (Like the B&K 4133 calibrated condenser mike, the same insanely expensive instrument we use for measuring loudspeakers.) Some of the leading RCA artists, such as Rubinstein and Peter Serkin,

are still recording with him even though he is now an independent. We consider his production (and let him blush with modesty) of Messiaen's "Quartet for the End of Time" (RCA ARL1-1567) to be as accurate a reproduction of a small chamber group as we know of. Put that in your pipe, all you RCA-denigrators, and smoke it. (We put it on our turntable and used it as one of the reference records in our preamp survey.) Max will be doing record reviews from the sonic point of view, but first he wants to get some general observations off his chest.

You put one record on and it sounds warm, spacious and natural. The next one sounds shrill and restricted in dynamics. Yet another sounds overly "engineered" with artificial balances and instrumental timbres. With some recordings you can sit back and enjoy the music (which hopefully was what everyone involved in the production of the recording had in mind), and yet with others the sound seems to intrude between you and the performers.

Why can't we all make equally great-sounding recordings? Surely (a record buyer must think) recording equipment is relatively standardized throughout the world (Ampex and Studer tape machines, Neumann, AKG and Schoeps microphones, Scotch and Agfa tape), and it has been demonstrated that superb results can be achieved with that equipment. Why, then, do recordings vary so much in sound and quality?

As an active producer in the classical record industry, I certainly have my own technical and musical prejudices. Still, within the limits of my own knowledge and with what

I hope is an open mind, I'd like to discuss why they sound like that.

Since this is not a minor topic to be disposed of in a few hundred words, I'd like to cover a variety of subjects in the next few issues: performers, producers, engineers, halls and studios, microphones, consoles—all the elements that determine the quality of a recording. Let's begin by talking about the people who are responsible for a recording, their functions in a production, and how their responsibilities are different in America and Europe.

The main personalities who determine the technical character of a recording are the producer and the engineer. They control the choice of acoustical site, microphones, microphone placement, style of recorded balance and perspective, and the final editing and mixing. The producer and engineer are responsible to the listener for reproducing the performance, and the final impression that performance makes will certainly be affected by their skill. Let's see what their specific responsibilities are.

First, let's examine how producer-



engineer teams operate in Europe. It's quite different from how it happens in America. At English Decca (London), Philips and Deutsche Grammophon, a recording engineer is a *Tonmeister*. The technical areas of the recording are completely his responsibility, and he is the one who determines and blends the elements that produce the final sound. These engineers are usually men with musical as well as technical training, and many of them read scores and schematics with equal ease. They are rather a formidable group, and such men as K. E. Wilkinson at Decca and Gunter Hermanns at DGG have achieved well-deserved independent fame.

It was the efforts of Chief Engineer Arthur Haddy and K. E. Wilkinson that produced Decca's *ffrr* technique in the last days of the 78-RPM era, and "Wilkie" is still going strong today. It is through the efforts of such men that London records have a consistent, recognizable quality. There certainly is a London "sound," and it can be heard in their recordings made at any locale. Much the same can be said for the recordings of Deutsche Grammophon, Philips and, to a lesser extent, those of EMI (Angel and HMV).

In Europe the producer is responsible for the musical aspects of the recording. He collaborates with the engineer on the instrumental balances and works closely with the performers to insure that a technically correct and musically satisfying performance is achieved during the sessions. The musicians and producer work out the details of editing that result in the finished performance, and the producer usually supervises that editing. The final mix is again a collaboration between the engineer and producer.

This European approach to record-production responsibilities is based more on established procedure than on production-team personalities, and it has led to a technical consistency in the quality of recordings made by the major European labels. Theirs is a subtle, evolutionary approach with no sudden, drastic changes in general style. There is solid evidence over the years of a stable philosophy of musical sound which is not dependent on single corporate personalities. A DGG record from the 1960's bears a clear family resemblance to their latest recordings, and this is also true of English Decca and Philips.

This brings us to the shores of America,

where things are quite different. Here it is the producer who is in clear control, and the engineering department is generally expected to produce a recording to the specifications of the producer.

**Many American recording engineers, through no fault of their own, lack the solid technical and musical background possessed by their European counterparts. The European engineers are carefully trained for their clearly defined responsibilities and are supported by well-established engineering administrations. In America, engineering is considered a "service" organization whose chief function is the implementation of the producer's concept. The engineers and their administrative superiors have usually not had serious musical training.**

In the unionized structure of the engineering department of a large American record company, one becomes a studio mixing engineer by seniority. This means one begins as a technician testing lacquers, making tape-to-tape duplicates, running tape machines at recording sessions, etc. These are all necessary and worthwhile jobs, but they do not necessarily provide the background and knowledge needed by a first-class classical mixing engineer. A young American musician or electrical engineer who aspires to classical engineering has little chance of attaining his goal without spending years performing relatively unrelated tasks. This is not antiunion bias on my part but simply a statement that the present system is not really designed to produce mixing engineers. The fact that it has produced some excellent ones, like RCA's late great Lewis Layton (who engineered the great Reiner/Chicago Symphony records) is a tribute to the tenacity of talented people against large odds.

Why, since I am one of the people who use the authority given to American producers, do I seem to be complaining about the system? Would I really want it to change for my own productions? Well, that's a very good question. I've had the opportunity to record with some of the notable European engineers and, because of the different roles we fill in our own countries, these collaborations have sometimes produced a few conflicts. They have also produced some very good recordings and have been very educational for me.

To step away from the personal aspect, a good case can be made that American recordings tend to reflect the taste of each producer, and a major American company may issue quite different-sounding recordings supervised

by their individual producers. Sometimes this is good, and sometimes it's not so good. In any case, it makes the general technical level of American recordings vary a good deal more than those from Europe.

**The American system has also produced a power syndrome that I feel is not especially healthy for classical music. Too often multichannel recording techniques have taken the balance and sound of the performance out of the hands of the performer and left them up to the talent and taste of the producer. Many American producers make the decisions about what sounds good, what will attract the attention of the buying public, and what new recorded forms a piece of music can be given.**

An example is surround-sound quadraphonics, my objections to which were well documented by John Rockwell in an article on the subject in *The New York Times*. To me, surround-sound is a prime example of the medium manipulating the message, of producers deciding on how music should sound. Innovative, adventurous, provocative? Perhaps, but not to me. I find it an enormous challenge to properly and faithfully record anything from flute solos

to orchestral-choral combinations in a normal acoustic setting, and trombones playing from a rear channel in a Brahms symphony is not something I am anxious to capture.

I don't mean to characterize all American producers as manipulators of the art of music. Many are not, and certainly a welcome contrast is Lincoln Mayorga of Sheffield Labs. I had the pleasure of meeting Lincoln in New York a few days before writing this article, and he gave me his new Harry James record, *The King James Version*. It had been recorded with one AKG C-24 stereo microphone plus two helper microphones for the bass and piano. It sounds great. It may even inspire me to cut down the number of microphones on my sessions!

Of course, all American recordings are not gimmick-ridden any more than all European recordings are superlatively well-made. But the styles are different, and the difference between producer and engineer responsibilities is one of the major factors contributing to the varying results.

---

## Classified Advertising

### For Sale

DUNLAP CLARKE 500 power amp, 9 months old, excellent condition, \$600. Pair of Infinity Monitors, 1½ years old, like new, transferable warranty, \$550 the pair. Call or write: David Barnes, 6500 Elmhurst Street, District Heights, Maryland 20028. (301) 736-9047 after 6 PM EST.

DAYTON WRIGHT XG-8 Mk 3 full-range electrostatic loudspeakers, Ampzilla power amplifier, Vestigal tone arm, Levinson JC-1 cartridge preamplifier, Supex SD-900/E moving-coil cartridge, Goldring S-800E cartridge. Contact: Larry Beiter, 719 Copeland, Pittsburgh, PA 15232. (412) 683-9550.

FOUR HARD-TO-FIND 8-ohm Bozak B-199A 12-inch woofers, mint condition. A pair make an outstanding bottom for electrostats! \$40 each, shipping and insurance included. Write: Granducci, Box 1473, Charlotte Amalie, U.S. Virgin Islands 00801. Or call (809) 775-2693 evenings.

DYNACO 400 amp (no meters), \$300. Dbx 119, \$115. SME 3009 non-detachable, damped, \$90. McIntosh MPI-4 indicator, \$425. Thorens TD-125 Mk II, custom base, \$175. Shure V-15 Type III cartridge, \$25 (perfect). Denon 103s cartridge, \$95 (perfect). Koss ESP-9 electrostatic headphones, \$90. Chuck Josephson, 515 Mt. Prospect Ave., Apt. 17-B, Newark, NJ 07104. Phone (201) 481-0375.

MARANTZ 8B, Stax SR-3 headphones, Braun PS-600 changer, Audiocraft AC-300 tone arm, Decca cartridge, SME tone arm. Donald Konicoff, 120 West Palmetto Park Road, Boca Raton, Florida 33432. (305) 395-7616.

MOTORCYCLE: 1974 Yamaha DT250A Enduro. Many extras on and off the bike. Bike is very fast. Excellent condition. Must see to appreciate. Must sell. Make offer, call: (914) 636-2784.

### Wanted

STEREOPHILE, Summer (2) and Autumn (3) 1971; McIntosh MR-65 owner's manual; McIntosh MPI-1, 2, 3 or 4; electronic crossover, reasonable. SWAP: Little-used McIntosh MR-78 tuner for SP-3A-2 in warranty. George, (301) 267-0852.

*Rates: For 25 cents per word, you reach everybody who is crazy enough (about accurate sound reproduction) to subscribe to The Audio Critic. Abbreviations, prices, phone numbers, etc. count as one word. Zip codes are free (just to make sure you won't omit yours to save a quarter). Only subscribers may advertise, and no ad for a commercially sold product or service will be accepted.*

*Closing Date: Ad copy must be in our hands by the 15th of the month preceding the publication month. That means by February 15th for the March/April issue, by April 15th for the May/June issue, and so forth. (Note that the publication months are the odd-numbered months.)*

*Free Ad: Anyone who subscribed to The Audio Critic before this first issue was off the press is entitled to a free insertion of no more than 50 words. If you've already sent in your ad and don't see it here, it will be in the second issue (March/April). If you're entitled to one but haven't sent it in yet, you have until February 15th.*

---

# Subscription Information and Rates

---

First of all, you don't need a subscription blank. If you wish to subscribe, simply write your name and address as legibly as possible on any piece of paper. Preferably print or type. Enclose with payment. That's all. (But, please, don't just send us a check with only your name on it, in an envelope without a return address. A few subscribers have done exactly that, leaving us no clue where to mail them **The Audio Critic**.)

Secondly, we will not send **The Audio Critic** any other way except by first-class mail in the U.S. or Canada and by airmail overseas. We simply refuse to be blamed and hated for the vagaries of postal delivery by cheaper methods. You're the one who pays for it this way, it's true, but you'll get much more reliable delivery.

That means we have only two subscription rates. If you live in the U.S. or Canada, you pay \$28 for one year's subscription (six issues) by first-class mail. If you live in any other country, you pay \$33 for one year's subscription by airmail. All payments from abroad must be in U.S. funds, collectable in the U.S. without a service charge.

We strongly suggest that you start your subscription with Volume 1, Number 1, no matter when you start. That way you'll have a better understanding of what **The Audio Critic** is all about and you'll own a complete set of our tests and recommendations. If you insist, however, we'll start your subscription with any issue you desire. You'll still get six issues for your money. Simply state which issue you wish to start with. If you don't specify which one, we'll assume it's Volume 1, Number 1 and send you all issues in print at the time you subscribe.

---

**Address all subscriptions to The Audio Critic, Box 392,  
Bronxville, New York 10708.**

---

# The Audio Critic

---

## In the next issue:

---

We fine-tune our preamplifier survey, adding some new units, zeroing in on pre-preamps and head amps, and exploring unconventional approaches to laboratory testing.

---

We go more deeply into our favorite subject: state-of-the-art speaker systems. Including subwoofers.

---

We begin our comparative survey of power amplifiers.

---

Plus all our regular features started in this first issue and then some.

---