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APRIL/MAY 1987  VOL. 10 NO. 3
The best Show we ever had

It may not be apparent from without, but life here at the magazine almost always feels filled with tumult and struggle. Manufacturers rarely agree when their products are harshly (or even mildly) criticized, and our policy of supplying preprints before publication gives those folks the mistaken idea they can influence, not just comment on, what we print.

Then there's the ongoing struggle with authors, printers, and production departments to meet our schedule even as well as we do—well, you get the idea, sometimes we feel like an embattled species here.

How pleasurable, then, for us to put on a hi-fi show ("The Best Reproduced Sound You've Ever Heard," was boldly claimed) in Santa Monica, and have it be a huge success! Of course, it was a lot of work, but, judging by the responses of both attendees and exhibitors, it was more than worth it. I won't comment on the best reproduced sound, but the sounds of hi-fi enthusiasts from all walks of life expressing their pleasure at the reality of Stereophile's show—these were some of the best sounds I've ever heard. Astonishingly, there were no complaints—but maybe some of you attendees will help out in this department so we'll know what to do better next time.

Speaking of next time, we're already committed to doing a show on the East Coast this coming October. We're shooting for the weekend of the 16-18th in Manhattan, but you'll have to watch these pages for confirmation of date and exact location.

Last but not least, a big and heartfelt THANK YOU to all exhibitors and attendees for making our High End Hi-Fi Show such a big success.
As the person who “invented” subjective testing, I have followed with great interest the many articles in the mainstream audio press which purport to prove that none of us can really hear all the differences we claim to hear, particularly those between amplifiers. My reaction has usually been: “Why didn't they invite me to participate? I would have heard the differences under their double-blind listening conditions.” I could make that assertion with supreme confidence because I had never been involved in any such test.

A few weeks ago, however, I was involved in such a test. It happened during Bob Carver’s visit to Santa Fe, in response to our report on his M1.0t amplifier, which he claimed to sound identical to a well-known perfectionist tube amplifier. Following our extended auditioning of both amplifiers, JA and I had declared that they didn’t sound the same, so Carver insisted that we prove we were hearing differences, a demand which JA and I felt to be completely unwarranted and unreasonable. (Doesn’t he trust us?)

Both JA and I report in full on the results of these further tests on the Carver on p. 117, but I was anticipating no problems whatsoever. After all, the differences I had heard at one
point during my preliminary listening were great enough for me to describe them as "dramatic." Certainly, any "dramatic" differences would be immediately audible under any conditions of comparison.

Before the blind tests began, I had been listening "informally" for about an hour to both amps, but attributed the fact that I had not been hearing "dramatic" differences to the additions to the system of the lightweight wiring and the switch which Bob had rigged up to allow instant comparisons. I assumed that, when we went back to hard-wired conditions, those "dramatic" differences would re-emerge. To my surprise and chagrin, they didn't.

I was, in fact, hard put to hear any differences between the amplifiers. That I was able to rack up four successful calls out of five was, believe, only because I was listening for the two most conspicuous sonic differences I had heard previously, on program material which I had personally chosen to reveal those differences as obviously as possible. The limited (by time) number of blind trials were too few to make an airtight case for my ability to distinguish one amp from the other, but they nonetheless indicated that I could. And, it must be noted, the objective differences between the Carver 1.0t and its reference amp were by no means unmeasurable. On Carver's own null tests, nulling between the two amps was 11dB or so less than the 50dB that he had claimed would result in an inaudible difference. Thus, there should have been an audible difference. But what bothered me was why differences which I had previously described as "dramatic" should suddenly become "very small" under the conditions of a blind listening test. Why, in fact, do all blind listening tests seem suddenly to deprive trained, normally perceptive, listeners of their powers of discrimination?

The skeptic's viewpoint, of course, is that the differences reviewers claim to hear are due to nothing more than autosuggestion. We expect a tube amplifier to sound a certain way, so that's what we hear. The hard evidence to support that skeptical view is scant but overwhelming. The evidence to refute it is abundant, but almost entirely "anecdotal"—that is, "a lot of people have reported it, but no one has proven it." It is appalling that, after more than 100 years of sound reproduction, during most of which time anecdotal evidence of audible differences was practically all we had to spur on technological advances, there should still be serious questions about the validity of observational data. So-called subjective testing, today, is still viewed by most of the "scientific community" as being in the same category as psychic phenomena; not proven, and thus the province of crackpots.

The ability to hear these small differences does seem uncomfortably akin to extrasensory perception. Both seem stubbornly resistant to scientific corroboration, although there have certainly been enough attempts to verify both. Some tests have almost conclusively proven that listeners cannot distinguish between objectively similar components—that, under carefully controlled tests, the ability to make such distinctions simply evaporates. A few tests have suggested that, perhaps, under some conditions, some people may be hearing inexplicable differences. But hard, incontrovertible evidence for the latter continues to elude researchers.1 On the other hand, to those of us who do hear these things, the findings of some of those controlled listening tests have been laughable. Witness the one reported recently in Stereo Review, wherein listeners were unable to prove their ability to reliably tell a $219 Pioneer receiver from a $12,000 NYAL OTL-1—surely two of the most different-sounding components one could find today. (NYAL's Harvey Rosenberg responds to that test in "Letters" on p.30)

Actually, these "controlled" tests have always had several obvious shortcomings. The listeners are always a "cross-sample" of audiophiles who claim to hear differences between products, rather than people who appear to have demonstrated an ability to hear such differences. The tests are invariably conducted in a room unfamiliar to most of

---

1 There have been blind tests performed indicating that differences between amplifiers have been audible, particularly when a large enough number of listeners has been involved to make statistical analysis more rigorous than in the Stereo Review tests referred to by JGH. (See HFN/JR, May/July 1986, and Stereophile, passim.) But the audiophile testing establishment has remained curiously quiet about such tests, leading to the situation where an apparently uninformed, but extremely influential, columnist such as Hans Panelt (Sunday New York Times, February 1987) can declare, with reference to the SR tests, that "Statistically, these hotly debated differences between amplifiers didn't exist."
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Since Ohm Walsh Loudspeakers sound so good in the reviewers lab why not find out how good they sound at home? Try them. Just come in and we'll match one of the Ohm Walsh Loudspeakers (from under $598 to over $4500 per pair) to your system and you'll be able to test them in your own home, without obligation for 30 days, free.
impossible discriminations at home, the panelists for these tests are being called on to make quick decisions under decidedly pressured conditions.

Time, of course, is one of their sources of pressure. Another, more important source is the desire to succeed—to prove that they actually hear, when it's important, what they claim to hear when it isn't. Most of us know all too well what pressure to perform can do to something as natural and mundane as sexual prowess; it is hardly surprising that pressure to perform might also adversely affect an acquired and definitely unnatural skill like assessing audio performance.

JA has suggested what strikes me as the most likely explanation for why "controlled testing" doesn't seem to work. His hypothesis is that the two conditions of listening—leisurely, unpressured experience of listening to music in the home, and controlled, high-pressure listening as part of a panel—call on different parts of our brain: the right cerebral lobe, which controls the motor functions for the left side of the body, for holistic impressions and emotional responses; and the left
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"brain," which controls the right side of the body, for serial processing of data and making logical comparisons and analyses.

It is well known that these functional divisions between the left and right brain exist: that the right deals with sensory input on an intuitive level, while the left specializes in the cognitive and analytical treatment of sensory information. We know that the ability to make fine sonic discriminations is learned, often over a period of many years. And all of us do 99.99% of our listening over time, under relaxed conditions, which allows time for us to form holistic impressions about the sound of a component. So it is the left brain which we train to detect and react to small sonic differences. The right brain functions as the information receptor; the left brain then analyzes these impressions in a logical manner to yield specifics about the sound that reviewers such as myself report on in Stereophile. But how much opportunity do we have to train the left brain as the primary information receptor? Very little, because that isn't the way we normally listen. So, naturally, when the left, logical, unemotional cerebral hemisphere is called upon to detect sonic differences using music as a test signal, all of us become untrained listeners, incapable of distinguishing anything less than the grossest differences.

Scientific evidence for the seemingly arcane talent of being able to hear differences continues to elude us, but much of the evidence for it is more than merely anecdotal. Why, for example, do reviewers' comments about products which they have auditioned independently so often coincide? Why, when a reviewer misjudges something, do so many readers agree about the thing(s) he miscalled? Why do subjective reviewers so often describe sonic flaws which are only later found to be the result of hitherto-unmeasurable objective flaws? Clearly, the issue is by no means a dead one. But equally clearly, we can no longer take seriously the traditional A/B comparison test as proof, one way or the other, of what we believe to be the truth. I propose an alternative approach: true double-blind, controlled testing, under leisurely, unpressured conditions. How could this be done? Here's how.

Obtain three (or more) power amplifiers widely acknowledged to be quite different in sound but similar in power output. These might be, for example, a Conrad-Johnson Premier 5, an Electron Kinetics Eagle 2, and a Sansui AU-G99X. Place each in a sealed black box with external input and output receptacles, and identical AC cords. Add mass to the two lighter boxes so that all three weigh the same. Provide adequate bottom ventilation holes (with external baffles to prevent peeking) for the amp which will run the hottest (the C-J, probably), duplicate these holes in the other two boxes, and add a (baffled) cooling fan at the top of each box. Add a heating element to the two cooler-running amps, so that all three will throw out the same amount of hot air from the top of the box. Finally, mark the boxes 1, 2, and 3.

Then send the three amplifiers, in turn, to each of a number of volunteer subjects. Each should then listen to his numbered box for as long as he wishes (up to a point), write a Stereophile-type review of it, and submit the report to whoever is organizing the test. He should then return the box, and another of the test amplifiers could, at the discretion of the test organizer, be substituted. This would scotch any attempt at collusion between participants.

I'm not volunteering to organize such a test, because it would be difficult to conduct and, I feel, even unnecessary. The results would prove nothing to those of us who already know what the outcome would be, nor would they sway those whose left brain has never been opened to the gestalt of reproduced sound. It would be like trying to prove the existence of green to a colorblind person who sees both green and red as shades of gray. They would believe it intellectually, but they could never accept it emotionally. Perhaps, ultimately, it isn't important that we prove our point to the deaf. Audio has continued to advance despite the protests of the selectively deaf, who claim that perfection was achieved with the advent of stereo. Many of them have since come over to our side, and their products have improved accordingly. As long as this continues to happen, there is no reason for us to continue trying to persuade non-believers that what we hear is more real than ESP.

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*130 watts per channel, min. RMS, both channels driven into 8 ohms from 20-20kHz with no more than 0.005% THD.
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Is Ken Kessler catholic?
Editor:
In Vol. 10 No. 1, your reviewer, Ken Kessler, the proud owner of 5000 LPs, admits to having catholic taste.

Is he trying to give catholicism a bad name? His admissions are tantamount to professing a catholic taste in literature by owning 5000 comic books which include Captain Marvel, Batman and Robin, Richie Rich, and Archie.

To mention some of his favorites—the Kinks, Bangles, Squeeze, Juice Newton, Mel & Tim—now there's a fine cross-section of 20th-Century music! And all stemming from his first-ever purchase "Da Doo Ron Ron" by the Crystals.

Excuse me while I throw up.

Jeff Burns
Johannesburg, South Africa
PS: Nice system, though; sort of like driving around in a Bentley picking up garbage.

JA gets it right
Editor:
Congratulations on the more incisive, cohesive, and relevant format of Stereophile under John Atkinson's influence. The December 1986 issue was superb.

John Tonkin
Victoria, Australia

JA gets it wrong
Editor:
Thank you for JA's flattering reference to our John Ogdon piano recital record in Stereophile Vol. 9 No. 8. If I may be permitted to correct him on a couple of details, we are "Altarus," not "Lazarus," Records. Also, the record is not only of music by Chopin, but of Liszt, Balakirev, Busoni, and Dohnanyi as well.

The psychology of name recognition must be nearly as ill-understood as the psychology of hi-fi discrimination. If I had ten quid (bucks to you) for every time I have spelt out "Al U Rats" (anagram) over the phone... our catalog would be a lot bigger than it is.

Happy listening.

Richard Black
Deputy Chief Name Advisor, Altarus Records Ltd, 17 Knole Road, Sevenoaks, Kent TN13 3XH, England

The magazine gets it right #1
Editor:
My felicitations to JGH, and to Stereophile for reaching 25 years of life as an outstanding audio publication. I've seen magazines around the world tackling sound recordings/reproduction and hi-fi topics come and go in more than 50 years of writing about audio.1

What inspires me about Stereophile, apart from seeing the contributions of British writers Alvin Gold, Christopher Breunig, and Martin Colloms, as well as John Atkinson (former Editor of HFN/RR), is its commitment to "Live Music." So many of today's audio scribblers ignore the important point made by friend and former colleague JA (Vol. 10 No. 1, p. 179): "... large-scale classical music does not work as well on record for me as it does live. Once you have heard something like Mahler's 8th in the concert hall, records just don't make it."

There's a man who understands what his ears and brain tell him!

Donald Aldous
Consultant Technical Editor, Hi-Fi News & Record Review, Croydon, England

The magazine gets it right #2
Editor:
First, I wish to express my continued praise for Christopher Breunig's record reviews. They are intelligent, detailed, specific, insightful, and musical.

1 Founder-Member No. 1 of The British Sound Recording Association in London, 1936.
In these days of extravagant claims and “hype” about audio components, it is difficult to have people believe that something revolutionary has occurred. Yet, all those who came to visit the Mondial suite at the January Consumer Electronics Show, knew an audio revolution had begun. The rumor had spread so widely that they came from around the world to see and hear for themselves. The only question that remained—“How soon can it be delivered?”

For what they saw was a radical design concept, a metal sculpture designed to be seen rather than hidden.

What they heard was a sound quality that ranks among the very top echelon of audio components. The sound quality is complimented by a construction quality utilizing parts and electronic components found only in amplifiers several times the cost.

As for construction—that takes place in Connecticut. Completely hand made, every limited production component undergoes computerized testing of the circuit boards and complete testing after 24-hour burn in. Yet the prices are lower than many mass produced audio components from Japan.

Mondial Designs new Aragon audio component line begins with 2004 and 4004 dual mono power amplifiers. Rated at 100 watts and 200 watts per channel respectively, they both have completely separate plus and minus power supplies for each channel. Their power supplies are so enormous that both Aragon amplifiers double their power rating continuously into 4 ohms and can drive any speaker load impedance down to 2 ohms or even 1 ohm.

The 2004 retails at $995. The 4004 retails at $1495. We urge you to compare the Aragon amplifiers with any made. You will discover what the world did in January—America has begun a revolution in audio.

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Second, I wish to thank JGH for his excellent, practical equipment reviews. I recently purchased a CD player based upon his recommendations of the Sony CD-P55 (Vol.9 No.6). I actually purchased the CD-P45 (identical to the 55 except that it lacks the remote control unit, and lists for $70 less at $330). If price is a factor, this must be one of the best bargains around. Indeed, as the review indicated, this player offers some welcome improvements to the sound of CD. With good recordings, there is very little of the high-end harshness I’ve come to associate with CDs; the midrange is exquisite, possessing a very realistic quality; bass is powerful and well-defined; soundstaging, especially centerfill, is quite good—definitely superior to my LP system (a Phase Linear 8000 turntable and Ortofon OM30 cartridge).

Thanks to AHC, too, for his excellent review comparing the Adcom GFP-555 and PS Audio 4.5 preamps (Vol.9 No.7). I intend to buy the PS Audio, based upon his practical, no-nonsense writing.

Charles B. Hammell
Moorestown, NJ

Music & A/B Testing
Editor:
In Vol.9 No.7, the three excellent letters that addressed the double-blind debate contained enough print that one might think nothing could have been left unaddressed. However, the correspondents overlooked one point that I have long suspected to be the integrating, harmonizing factor that will prove everybody right.

Music exists in the time domain. We cannot listen to a frozen snapshot of music as we can view a freeze-frame on a VCR. If music is any good at all, it engages our emotions, and our emotions evolve during the time we listen to the music because of the music. When I listen to an excellent performance of Mahler’s Third Symphony, I am left at the finale with a kind of exhausted serenity quite different from the tension of the opening movement’s strident, militant first few bars. The recording of Sviatoslav Richter’s musically electrifying, live performance of Mussorgsky’s Pictures at an Exhibition (apparently made during a tuberculosis outbreak in Eastern Europe) leaves me limp with excitement after the climax of the “Great Gate of Kiev,” and in quite a different emotional state than when I hear the light, contemplative opening bars of “Promenade.”

Now suppose that I have an ABX double-blind comparator and I play an entire performance of Mahler’s Third from beginning to end before pushing the button, and then play the entire performance through again for comparison. The juxtaposed passages of music are the climax and the beginning of the symphony—two emotionally disparate experiences. Under such circumstances, even if the comparator selects the identical components again, the subjective reaction will be different, reflecting the effect the music should have on the listener. If the listener attempts to remember the first performance of the same segment of music played much earlier while listening to the second performance in real time, he or she performs mental gymnastics which I know I am incapable of; I should doubt the veracity of others who claimed the ability to do the task well.

It may be argued—and I hope it will—that double-blind testers do not use ABX comparators that way. One does not listen to an entire symphony, much less a very long one, like Mahler’s Third, in one audition between button pushes. But does that not beg the most important question? One does listen to music that way. We do not listen to eight bars at a time. Whatever length musical phrase we typically listen to (even if it is those eight bars), the very fact that it is the customary length reflects that is enough for the composer and performer to grab hold of our emotions and take them for a ride, ending at a different point than that from which we started. If it weren’t, we should not find the experience of listening to music pleasurable.

Is it really possible to extract oneself from the emotion of the music, to interrupt the communication with the composer and performers, to push a button in mid-performance and analyze the differences between components of audio hardware, without destroying the musical experience? My own feeling is that it is not—music is a time-constrained medium. It simply is not possible to switch between components and hear the same piece of music on both. If the music continues on, the passage played after the switch
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is emotionally further evolved than the passage before. An analogy would be to compare the elapsed time to drive from Washington, DC, to New York with the elapsed time to subsequently drive from New York to Boston. The comparison would not be a valid measure of significance no matter how precisely made.

If, on the other hand, the ABX switch takes you back to the beginning of a passage just played (or is made at the beginning of a reprise), then you have the distance of the emotional journey the composer intended to take you separating the end of the play on the first component from the beginning of the play of the second movement. Though the listener’s emotional state may not be as fully altered as it may be between the climax of a symphony and its opening bars, it should be altered, nevertheless.

Therefore, I think that ABX comparisons could not only be done as well with complex test tones as with real music, but would be more valid if done in that manner. Better to eliminate the composer’s emotional ride and the temptation to climb aboard. The reason double-blind testers using ABX comparators may end up giving random responses as to the existence or nonexistence of subjective differences between components may have to do with the altered state of mind created by having to push buttons and listen to equipment under the scrutiny of the person who administers the test, as opposed to getting involved in a musical experience (normally a private matter).

If all of this sounds like a brief for purely subjective evaluation of audio components, it is not. True double-blind testing produces results that I am more inclined to trust than purely subjective testing techniques. The point is that if the specific procedure chosen to effect double-blind testing obscures the inevitably subjective experience of listening to music, then the test has thrown out an important baby with the bath water. The test conditions may eliminate the very factor for which we purchase the equipment being tested: the ability to forget the equipment and listen to the music.

What inspired me to write this letter was that, as I mused on the thoughts set out above, I came across Lewis Lipnick’s gem of self-deprecation, expressing some of the same differences between musical involvement and equipment evaluation from a different perspective (Vol.9 No.7). What a delightful article! He expressed himself in a manner that can come only from an audiophile who has devoted his life to the service of music.

Thomas G. P. Guilbert
Portland, Oregon

This deeply thought-out letter contains the beginning of an answer to the questions raised in JGH’s, JA’s, and LA’s evaluation of the Carver M1.0 amplifier elsewhere in this issue. Other readers with thoughts on the subject are urged to write in.

That Hafler test #1
Editor:

J. Gordon Holt seems to have misunderstand the operation of the Hafler null circuit in Vol.10 No.1. According to his fig.1 on p.89, the test amplifier is being driven not only by the driving amplifier, but also by a large part of its own output, in the form of positive feedback. If the test amplifier inverted polarity, the feedback would become negative and the tendency to oscillate would be reduced, contrary to JGH’s “Precautionary Notes.” (Such polarity inversion, however, would not produce the desired difference signal between the outputs of the driving and test amplifiers, but a sum signal.) This positive feedback was probably the cause of the oscillation that troubled JGH in his report on the XL-280.

His inability to correlate listening tests with the “null” test is, I suspect, due to the “null” test measuring positive-feedback behavior more than it does “null” behavior. The XL-280’s superiority over all other amplifiers tested on the null circuit is, I’d say, due to its more favorable phase shift. Since phase shift, if uniform with frequency, is of no significance in normal operation, it is no measure of good audio performance.

JGH also makes a questionable remark in his report on the XL-280. Regarding the fact that it can be nulled by up to 70dB at 10kHz, he says, “… assume we are listening at an average SPL of 90dB to an amplifier produc-

---

2 The output of the driving amplifier should be at earth potential, thus shunting any in-phase signal to ground. Depending on its output impedance, however, there will be some positive feedback.

—JA
EVEN THE FINEST LOUDSPEAKERS SIFT OUT SOME OF THE MID-RANGE DETAIL. WHY?

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that produces an expansive stereo image to give you pure uncolored sound. In fact, Altec Lansing loudspeakers are so uncompromising, so revealing, they prompted J. Gordon Holt of Stereophile magazine to write, "I have been hearing more going on in (the mid-range of) old, familiar recordings than I have ever heard before...instrumental sections are suddenly resolved into many individual instruments rather than a mass of instruments," and they compelled him to add that Altec Lansing's speakers have "high end sweetness and openness...with astounding inner detail."

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ing 0.03% spurious content at 10kHz. A level of 70dB below 90dB SPL is 20dB...which...is very clearly audible in the absence of other sounds..." That statement strikes me as nonsense. The 20dB spurious signal is only generated at 90dB SPL (damn loud) and hence is not obtained "in the absence of other sounds."

Daniel Waxler
Dover, NJ

That Hafler test #2
Editor:
After a lifetime of professional experience in the audio/telecommunications business, I have almost become inured to the weird behavior of the commercial world of hi-fi. This includes its peculiar propensity for reinventing the wheel, its unquestioning embrace of the Hafler SWDT being a case in point. Deriving a difference signal under dynamic conditions when testing the effect of a side-chain device in a bridge configuration is as old as the hills. It shares common ancestry with the test proposed by Roy Allison in the '50s, Collins in Audio, by Peter Walker of Quad, and more recently, the test for so-called "capacitor differences" by John Curl in The Audio Amateur and HFN/RR.

However, I am surprised that its obvious flaw has not been spotted: an essential prerequisite of any such test must be that the test device should, as far as practicable, be under its normal working conditions of source signal and load. It doesn't need more than a high-school level of electronics to see that the Hafler test fails to satisfy that condition. The Walker test, by comparison—and which everyone seems intent on ignoring—is a highly sophisticated version of the test, and really, to be fair, ought to be republished.

The inclusion of minor passive devices in Walker's simulated "straight wire" section was an acceptance of the laws of nature. A signal of any kind passing through any active device—even a Hafler XL-280—will be slightly modified in some way with respect to its Fourier components such that an absolute null would be quite impossible. With the passive components in the side chain, a complete null is possible with a well-designed amplifier. Without them, I would suggest that we then have a similar test to that attempted by the Hafler, except that the essential prerequisite I have already mentioned will be not satisfied. All the tweaking does to the test amplifier in the Hafler configuration is compensate for the differing parameters in the side chain with its load speaker. Hardly a straight wire!

Reg Williamson
Staffs, England

That Hafler test #3
Editor:
J. Gordon Holt's tests in Vol.10 No.1 revealed little correlation between the actual sound quality of different power amplifiers and their performance on the proposed Hafler/Gately amplifier test. This should not have been surprising, since the design of the test is based on several assumptions which, while seeming reasonable at first glance, are, in fact, wrong.

Let's make them specific: (1) The closer a power amplifier is to ideal, the closer will (Vo/a-Vi) approach zero, where a is the voltage gain, Vo is the amplifier's output voltage, and Vi the magnitude of the input signal. (2) A loudspeaker can be represented as a linear circuit consisting only of time-invariant resistances, inductances and capacitances. For (1), consider two amplifiers, one a Grundy-sounding amplifier, the other an "ideal" amplifier, but which has a 5s time-delay circuit at its input. Performing the Hafler/Gately test with the first amplifier would show some low-level Grundge; with the second, the result would be full-volume cacophony—clearly not the desired test result!

Even if we now restrict ourselves to ignoring the effect of signal delay, the hypothesis is still faulty. A voltage amplifier may be "better," the closer its output waveform is to its output. A power amplifier, however, cannot be analyzed without due regard to its load. Consider the simplest model of the output circuit and the load. The amplifier is considered as a voltage source Eo and a source impedance Zo. The load is represented as an impedance ZL. Let us simplify further and assume that Zo is purely resistive and equal to Ro. Now ZL will, in general, vary widely with frequency. Thus if we hook up a generator to the input, we will not see a constant Vo at the
output terminals. Is this, perforce, bad? Clearly, this frequency-dependence of the output terminal voltage will go away if we make Ro equal to 0 ohms. But should we? Authorities such as the Radiotron Designer's Handbook and Neville Thiele (A.N. Thiele, *JAES* Vol.19, pp382-392, 471-483, 1971) suggest that, far from it, the optimum Ro will depend on the specific load (loudspeaker and cables) and its characteristics, and that using feedback to force Ro to be zero is no cure-all.

To return to (2), a real loudspeaker cannot be represented as a passive, linear, time-invariant circuit. A moving-coil driver is, as is well-known, a motor. When the voice-coil is moving, it induces a voltage—the "back-EMF"—into the circuit. Thus the proper representation of the loudspeaker should include a voltage source, Vb, in series with an impedance, ZL'. In a linear analysis, (J. King, *JAES* Vol.18, pp34-43, 1970), the coil velocity is proportional to the supplied current; in turn, the induced voltage tracks the coil velocity. Thus, a unique relationship results between the applied and induced voltages. For such a linear—nonexistent!—loudspeaker, we simply eliminate the Vb source by replacing ZL' with a higher, fictitious ZL, which gives equivalent behavior at the speaker terminals.

But consider, now, a true, non-linear loudspeaker. The simplest model of our driver will be an ideal driver with one modification: a peg stop stops the voice-coil from travelling more than half its ideal forward travel, without restricting motion rearward. The back-EMF, Vb, will now track the supplied current exactly, except during that portion of the cone's travel where it hits the stop. Once it hits the stop, the cone's motion, and hence Vb, will go to zero. Vb, which for a sinusoidal input was a perfect sinusoid, will now have "teeth" missing. At the amplifier output terminals, meanwhile, we have:

\[ V_o = \left( V_o Z_L' + V_b R_o \right) / \left( Z_L' + R_o \right) \]

When the voice-coil hits the stop and Vb goes to zero, clearly V_o falls. The Hafler/Gately circuit produces a nasty sound; the blame is laid on the power amplifier, when, in fact, the lack of null is merely the expected interaction with a real, non-linear, load.

What does the designer who is using the Hafler/Gately test for development do? He most likely has a feedback loop also connected to the output terminal which senses this drop in V_o. Since V_o dropped, he concludes that he has too little negative feedback, so he adds more until the drop in V_o becomes much smaller.

The features of an amplifier which has been designed to do well on the Hafler/Gately test, then, are: (1) lowest average signal-propagation delay (in preference to minimum group-delay vs. frequency deviations); (2) low output impedance; and (3) a large amount of negative feedback. In actual fact, the optimum value for the output impedance will depend on the speaker and cables used.

Opting for a low value for the average propagation delay, instead as accepting as irrelevant a constant group delay and then minimizing its variations with frequency, flies in the face of recent listening-test evidence (reported by John Atkinson, *HFN/RR*, Vol.31, p.65, July '86). Most excitingly, however, in opting for a maximum-feedback design, we bring back memories of transistor amplifier design circa 1967!

-Vytenis Babrauskas
Bethesda, MD

That Hafler test #4

Editor:

After reading JGH's articles in Vol.10 No.1 on the Hafler SWDT, I would like to point out a major theoretical flaw in this test. Given the following fundamental properties of electronic circuits:

- 1: Every amplifier, be it phono, mike, or power, is a low-pass filter. Depending on whether or not it will pass DC, it may also be a high-pass filter.
- 2: Every low-pass filter, whether active or passive, has a frequency-independent time delay for frequencies well below the filter's -3dB point (about 0.2x in the case of a single pole).
- 3: The frequency, f, of a filter is given as the -3db point. The delay time of a single-pole low-pass filter is \( t = \frac{1}{2Pf_x} \), or \( t = RC \) for the passive version.

It follows that:

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• 1: The closest that we have to a perfect audio amplifier will have this delay because it must be a low-pass filter.

• 2: The delay would optimally be the same for all frequencies in the audio band, thus having no effect on the shape of the waveform. The signal will be phase-coherent because different frequencies, as in the case of a squarewave, will arrive at the output in the same time relationship to each other as they were at the input.

• 3: Any attempt to correct such a design into what has historically been called “flat phase,” from input to output, will yield a “phase-lead” resonant circuit. This will allow steady-state sinewaves to have apparently zero phase, but transients will be smeared in time.

Such a design would be like taking us back to the highly resonant MM cartridge. Even if the resonance were above 20kHz, it will still cause transient problems in the audio band. The graph shows the nulled residual of the SWDT test setup for a theoretical low-pass filter amplifier with a -3dB point at 100kHz, and with a 7Hz high-pass (DC-blocking capacitor) function. It is not flat with frequency, as implied by the test, which assumes that the perfect amplifier has an output capable of following the input instantly, a physical impossibility. It makes no more sense than trying to make the playback electronics of a tape recorder capable of moving the signal back in time in order to match the signal at the record head. Maybe when someone invents a time machine …

I want to emphasize that this test is dangerously misleading because it seems so innocent. The test appears intuitively obvious and simple enough for anyone to understand. Mr. Hafler’s logical explanation will be only too easily swallowed by those untrained in amplifier theory. I have to confess that it took me a couple of minutes to determine the catastrophic oversight, and I have been aware of this time-delay principle for many years.

Getting this test to work for a particular amplifier would mean using a network exactly matching the amplifier’s linear characteristics in place of the straight wire. Doing this in order to get more than 80dB of rejection broadband, and staying there, would be very, very, touchy. Problems would include enormous amounts of time, a temperature-controlled room, elaborate computer calculations, and the patience of Job.

Getting it to work as a generalized test for any amplifier would be impossible.
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We have yet to find a substitute for distortion analyzers and squarewaves, and I doubt we will.

Jeff Nelson
Boulder Amplifiers
Boulder, CO.

There's always the human ear, but we all know what a notoriously unreliable device that is. —LA

David Hafler responds

Editor:
Mr. Nelson's objection to the SWDT (straight wire differential test) is based on the fact that all amplifiers have time delay, and that the concomitant phase shift causes a residual signal when the output of the amplifier is subtracted from its input. Yes, I agree. It is not only conventional non-linear distortions that show up on the SWDT, but all aberrations, including those not necessarily objectionable.

Whether phase shift is audible or not is a controversial subject. Phase shift is one of the few parameters which varies widely from amplifier to amplifier, and I will not arbitrarily assume its inaudibility. I prefer to take the viewpoint that all errors be reduced to a minimum rather than theorizing that some are not audible and can be neglected. Therefore we have tried to reduce all distortions in our XL-280 amplifier and have compensated for phase errors so as to have very low phase shift in the audio band.

Mr. Nelson objects to this compensation as he states that this leads to resonant circuits which, he claims, "smear" transients. His hypothesis does not prove out in practice. Our well-damped minor resonance, which falls above 400kHz in our production XL-280s, introduces no detectable flaw in the audio range. The SWDT would show a "smear" as part of the audible residual signal if this problem existed, and we cannot hear such distortion with music or other transient signals.

Mr. Nelson suggests that the differential test would be workable if a linear network, which exactly matched the amplifier, would be used for the straight wire. If that were the case, the amplifier and compensated wire would match; there would be no residual due to such factors as phase or amplitude response errors. Mr. Nelson's suggestion "bends" the straight wire, and assumes that phase and amplitude errors are inaudible. This is too great an assumption. To take an extreme example: an amplifier with very limited frequency response, -3dB at 100Hz and 10kHz, could be tested against the not-so-straight "wire" which includes passive components giving the same frequency response as the amplifier. The amplitude error would be subtracted out, and the "bent" amplifier would exhibit no amplitude error in this comparison with the "bent" wire.

The SWDT puts a premium on bandwidth. This is necessary to obtain low phase shift in the audio range. This wide range, plus phase compensation, permits a null which remains deep over a wide range. Since the sensitivity of the ear decreases at low and high frequencies, the residual which increases at the frequency extremes because of phase shift has very low audibility. This test is primarily a listening test, so an inaudible null indicates there is no audible distortion.

Mr. Nelson bases his objections to the SWDT on the short description given by J. Gordon Holt when he wrote of his experiments with the technique. I suggest that Mr. Nelson refer to my article in Audio, February 1987, which covers the rationale of the SWDT and mentions some of its limitations. I would like to point out particularly that my discussion of evaluating amplifier distortion by listening tests includes comparison on an A/B basis between the amplifier and a straight wire. I have observed that for an amplifier to be indistinguishable from a straight wire on the A/B comparison, using music or noise as a source, it must perform well on the SWDT. This means that, in addition to low distortion, the amplifier must have wide bandpass and relatively low phase shift. Of course, we will never see the perfect amplifier with infinite null on the SWDT. However, when our null exceeds 60dB over a wide spectrum, I contend that the aberrations are essentially inaudible; an amplifier with different sonic qualities is less accurate. Mr. Nelson's argument does not refute my contention: a null level deep enough to be inaudible means an accurate amplifier, and any which sounds different is not as accurate.

We are all seeking accurate sound. Computerized models of "perfect" amplifiers (or imperfect ones for that matter) are fine for the
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*Vol. 9 No. 7 (November 1986)
theoretician—but the sound is what is important for the user of audio equipment. Comparison with a straight wire—or differentially—uses the perfect reference standard, and the tests can readily be done with one's ears. If accuracy is our goal, then the SWDT is a simple way to evaluate it.

David Hafler
Pennsauken, NJ

Why amplifiers sound the same

Editor:
In a recent conversation with my astrologist, I asked her why I have gotten so involved in the controversy over amplifier testing and design. She suggested that in a previous lifetime I was an evil radio repairman (which explains my use of tube circuits) who has come back in this lifetime to repent for my past sins. Judging by the number of phone calls I have received in the last two months from crazed audiophiles, I must have been very, very evil. The only way to pay my dues is to comment on recent Stereo Review and Stereophile amplifier tests.

Why all Stereo Review’s Reviews Sound the Same Test: There are so many flaws in this test I could fill this magazine with them, but I should start by comment on an emotional issue. I believe David Clark has compromised his integrity by being dishonest with me. When he requested NYAL OTL-1 amplifiers for the Stereophile test (SR, January 1987), I specifically told him not to use the 4-ohm Magnepan speakers for critical listening tests as it was an improper load for this design. I suggested the Martin-Logan CLS speaker instead. When I asked him what kind of testing he was conducting, he inferred that they were very casual. He did not describe the test or the procedure to me. Does this behavior taint the results of the test? Does Stereo Review’s previous record of critical testing taint this test? Would you speak a little louder because I am hard of hearing?

Ironically, not long ago, I suggested to Bob Carver that he use his amplifier null techniques to demonstrate to Stereo Review’s editors that different amplifiers (with different transfer functions) will produce a measurable difference when driving a given speaker. This difference will vary with each speaker. Of course, the real question is: does the listening panel have sufficient listening acuity to detect the electrical differences that we already know exist?

In his test procedure, David failed in four ways. (1) He failed to use the null test technique and thereby a priori establish the electrical differences in the amplifier’s performance with the given speaker. (2) He didn’t measure or control the panel’s listening acuity. (If David won’t trust my claims about my amplifier, why should I trust his claims about his panel’s listening skills?) (3) He failed to describe the acoustical character of the room—because a room is one of the best filters known to man. Why wasn’t a good old fashioned reliable FFT analysis of the room done to make sure it wouldn’t mask important sound characteristics? (4) Last but not least, he failed to use an appropriate speaker for the test.

David says that he is a serious student of audio engineering. Why didn’t he mention the research by Martin Colloms and a series of articles that appeared recently in the Audio Engineering Society Journal that refute his position and question his methodology? Dearest Dave: Half a test is no test. Was David in control of the article? Is David Julian’s heir apparent?

Stereo Review Shooting Themselves in the Foot Test: Ladies and gentlemen, lend me your ears—I bet you a zillion dollars that I can prove that David Clark’s test procedure also proves that all amplifiers over time sound the same. Yes Sir—youir 1959 Fisher sounds exactly the same as your 1987 Fisher. Your 1960 Sony will sound exactly the same as your 1987 Sony. So trust me—do not buy any new audio equipment. You are wasting your money. All of those ads that claim that everyone’s new products are better—don’t believe them. In fact, all those engineers who are supposed to be working in laboratories in America, Europe, and Japan developing new and better equipment: (1) don’t know what they are doing; (2) are telling you lies; (3) don’t really exist. The implication of the David Clark test is quite simple: everyone who has been involved in advancing amplifier design over the last 25 years—including designers, the press, retailers, and sensitive music lovers—is a bunch of charlatans.
It's no secret that the Audio Research SP11 hybrid preamplifier has secured its reputation in esoteric music systems around the world. Now, Audio Research introduces some of the SP11's acclaimed hybrid technology in a simpler, less costly format.

The new SP9 hybrid preamplifier combines the essential controls and pure musicality listeners want most, with the robust construction Audio Research is noted for. Using just two 6DJ8 vacuum tubes and proprietary FET-based circuitry, the SP9 provides more than enough gain (66 dB) for popular moderate-to-high output moving coil phono cartridges (loading may be set internally). High-level circuits have been optimized for overload-proof reproduction from compact discs. Two tape inputs / outputs, plus automatic / manual muting, add convenience and protection.

With phono noise (IHF weighted) measuring 72 dB below a 1 mV input, the SP9 allows music to bloom dynamically from a near-silent background. Staging is broad and deep, with focus of individual voices both palpable and rock-steady. In the end, the new SP9 is true to its heritage: it sets surprising new standards of musical accuracy at its price — and invites comparison with the most expensive competitors. Audition the SP9 soon at your nearest Audio Research dealer.

**Abbreviated Specifications**

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- 26 lbs. shipping weight.
At least there are two honest men in the audio business: Julian and David.

David Clark has also assured me that differences in the perceived sound of amplifiers are due not to differences in circuit design but to the different emotional appeal of brands: cosmetics, brandname, construction techniques. You might say that David believes that knobs make the big difference. I am convinced, so, in order to justify the cost of a Futterman OTL-1 amplifier, we have instituted a policy that will once again reestablish our reputation as faithful servants of our customer's needs: Included in the purchase price of an OTL-1 ($12,000) is a custom installation by one of our VTNTs (Voluptuous Teenage Nymphomaniacal Technicians), who will live with you for 90 days to make sure you are happy with your music system (or whatever else needs servicing).

We are also prepared to send to David, for double-blind testing, one of our VTNTs and an affectionate German Shepherd to see if he can detect any differences in their performance, under controlled conditions.

"And what you do not know is the only thing that you know." — TS Eliot
East Coker, 1943

We do not yet have a mathematical or electrical modeling technique of an amplifier circuit that will give predictably good results, though many have been suggested. Oddly, over the last 25 years, those designs proven to be the most electrically perfect usually sounded very mediocre. Does anyone remember TIM-perfect amps? The Hafler test is another variation on a test which has been used for the last 25 years to demonstrate that those amplifiers that test best under condition "X" are more perfect. Why, then, do amplifiers less perfect under test condition "X" sound better?

I would also like to suggest that, while our intellectual understanding of how we make judgments about "sound and music" quality is still very primitive, our hearing isn't. This implies that we still do not know which combination of distortions is acceptable and which a turnoff. The gestalt of listening to music is far more complex than that of controlled listening tests. Recent research on the physiology of listening to music indicates that, when deeply involved with music, we go into a trance-like state because our brain secretes a "natural narcotic." How does this altered state affect our sensitivity to a given type of distortion, which may have been acceptable before we reached this state?

As Richard Heyser has pointed out, the only way to describe an amplifier is relative to a specific speaker. Question: Why don't we design more speakers with dedicated amplifiers, which is the better way to do things? Answer: Boys get cranky if they don't own lots of toys.

Audiophiles already know that one man's Twinkies is another man's cat food. Girls, let's be honest, while we would like you all to think that we are serious scientists in total command of our art form, designing audio gear is still a hodgepodge of primitive disciplines. Never take our technical claims too seriously because the smarter we get, the less we know. On the other hand, we are doing pretty good for a bunch of dummies because our inventive impulse and passions compensate for the lack of megabuck laboratories. Isn't that what high-end audio is all about? And besides, everyone knows that my Black Hole Amplifier is the only more-than-perfect amp.

Some Question Dostoevsky Might Ask if He Were an Audiophile: What if you could buy a perfect amplifier—the last one you would ever have to own? Would you be happy? What if the perfect amplifier existed and made all your records, FM, and CDs sound terrible? Would you be happy? Why are audiophiles in such pain? What are they searching for?

I suggest that audiophiles are music lovers who seek to explore an altered state of musical consciousness, a state that can only be entered with a precarious commingling of emotional commitment, artistic courage, and a musical stimulus of a high order. The intensity of feelings, knowledge, and decisions we make in this state are quite different from "normal" listening experiences.

The only perfect musical amplifier is you! For those who understand what I said, no further explanation is necessary. For those who do not understand, no further explanation is possible.

In closing, I once again thank the editors.
for permitting me the opportunity to respond, and further request that John Atkinson not request a VTNT for an extended review. It interferes with listening to music. Trust me, I know.

I remain, bound to the Karmic wheel of audio,
Harvey Rosenberg
NYAL

Beware the bionic arm

Editor:
I enjoyed Vol.10 No.1 very much, except for one thing: in "The Audio Cheapskate," Sam Tellig recommends the JVC QL-Y5F turntable. I owned one of these and discovered a major problem that Stereophile's readers should know about if they are considering using one. The owner must consider the suspension capabilities of their cartridge very carefully. The Y5F tonearm is servo-controlled, working on a feedback principle, and responds to pressure an instant after it occurs. This means that on the rise, when playing an album with a warp, the tonearm will drive the stylus into the rise before it recognizes that the surface is rising and changes commands. I had installed an almost new Ortofon MC20 II moving-coil cartridge in the Y5F. Within 3 months of use, the suspension of the stylus had been destroyed by the servo control of the tonearm. I quickly sold the turntable after that experience. In summary, I would recommend that anyone who uses a JVC QL-Y5F turntable choose a cartridge with an exceptionally robust suspension.

Rick Siegert
Denver CO
Peter Walker, founder of Quad, has often echoed the sentiment of Julian Hirsch: all competently designed amps, when not overloaded, sound alike. Accordingly, I expected the new 50W/channel (into 8 ohms) Quad 306 to sound exactly like the Quad 405-2. It doesn’t.

It sounds better.

Not that apologies need be made for the Quad 405-2. I found that amp very neutral, somewhat lacking in dynamics, with just a trace of transistory edge in the upper mid-range. Good, but not great.

The new 306 is similarly lacking in dynamics, and, as you might guess with a 50W/channel amplifier, the bass is not overpowering. The improvement over the 405-2 comes in the upper registers: they are sweeter, more delicate, and more euphonic—close, in fact, to the typical sound of the class-A amplifiers that Quads, with their current-dumping circuitry, are supposed to sound like. (In a Quad current-dumping design, a small class-A voltage amp is said to determine sound quality, while a larger amp kicks in, as necessary, to satisfy the speaker’s demands for more current.)

Admittedly, the 306 is not an audiophile’s amp. But then Quad electronics aren’t designed for audiophiles; they are made for people who listen to music rather than hi-fi. If you want to impress your friends with how loud your system can play, the Quad 306 is not for you. Neither is the Quad 405-2. Both amps lack cojones, although the beefier Quad 606 (150W/channel for $995) may be macho enough to please US audiophiles.

True, at $595 the Quad 306 is no bargain. It costs $59.50/lb vs. $17.50/lb for the B&K ST-140 and $13.63/lb for the Adcom GFA-555 (review forthcoming). Even a Krell KSA-50 is cheaper, weighing in at $34.85/lb. Similarly, the superb Jadis JA-30 tube monoblocks weigh in at $37.11/lb. I cannot recommend the Quad 306, therefore, on a cost/lb or watts/dollar basis. I can recommend it on the basis of its civilized sound, excellent styling, and compatibility with the Quad 34 preamp.

The 306 is beautifully designed, outside and in. The standard gray finish is, well, gorgeous. The amp is very compact, measuring approximately 12.5" wide by 8" deep by 2.75" high—the same dimensions as the matching 34 preamp. Inside, the construction is rather ingenious. The whole works slides out like a drawer when you loosen two screws; servicing should be a breeze. Workmanship is impeccable, although no one would claim that Quad has gone all out to compete with the likes of Krell, Klyne, Threshold, Rowland,
In the trendy world of high tech electronics-of-the-month, Peter Perreaux makes each unit as if it were his last... and yours.

Perreaux audiophile components are distributed exclusively in the U.S. by Signet, 4701 Hudson Drive, Stow, Ohio 44224
et al. It is simply a neat little amplifier, designed for efficient production.

Yes, the asking price is a little steep, in the US—especially when you can buy the equally excellent Adcom GFA-535 (60Wpc) for only $295. The Adcom plays louder, goes lower, and sounds less sweet but a wee bit crisper. Close call. But the Adcom is half the price.

There are a few more things to be said in favor of the Quad. It took the company 16 years to replace the old 303 amp with the 306. At that rate, the 306 should be in production until the year 2002. If you buy one this year, you won’t be trading it next year for a new Quad model (unless it’s a Quad model further up in the series).

Is the 50W Quad 306 up to driving a pair of ESL-63s?

Yes (as are many other low-powered amps, including the Jadis JA-30s, the Radford STA-25, the Conrad-Johnson MV50, and my modified Marantz 8B). The Quad speakers can get by quite nicely on 50 watts. But a 100W amp with lots of current, like the Harman/Kardon HK 870 (now up to $650), will make the speakers sound more dynamic, more gutsy. And the amp will produce deeper, tighter bass. (The ESL-63’s bass response is surprisingly amplifier-sensitive. Surprising because a lot of people think the ESL-63s have no bass at all.)

As long as you don’t try to push the Quad 306, the sound is quite satisfactory—open, spacious, delicate. On the other hand, if you must play your Tefarcs at loud volumes, well, the 306 isn’t quite up to it. Neither was the 405-2, which I would imagine is headed for oblivion. (Will there soon be a Quad 406?)

In conclusion, then, I like the Quad 306 very much. But I would like it even more if I lived in England, where the price is more comparable to the Adcom GFA-535. In America, the Adcom is half the price and at least as good. For a Cheapskate, the choice is clear. And there’s another reason to choose the Adcom amp over the Quad: the matching Adcom GFP-555 preamp, which I find clearly superior to the Quad 34 preamp.

The Quad 34 Preamp
The Quad 34 preamp ($595) has been on the market for about four years. By and large, audiophiles have not taken it seriously. (The ESL-63 speakers they do take seriously.) The preamp has... TONE CONTROLS!

The usual audiophile stance is that tone controls degrade the sound. If the source material doesn’t sound good without tone controls, you should seek source material that does. Unfortunately, many of the best performances are not particularly well-recorded, following Holt’s law: “The better the performance, the worse the sound.”

It’s a question of what comes first: the sound or the music (performance). If you put performance first, you may find the Quad 34’s tone controls a Godsend. They can make older recordings, which sound shrill with most of today’s audiophile preamps (tube or solid-state), sound listenable. Are the highs too strident? Roll them off with the high-frequency filters—which cut in at either 7kHz or 11kHz, with a steeper slope available at either setting.

There’s also a bass control and something called “Tilt.” No, this is not a pinball machine. You twist the tilt lever up to add warmth and reduce brightness, down to achieve the opposite. The tilt lever acts around a center point of around 1kHz.

The advantage of these unusual tone controls is that they are easy to use and they
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make musical sense. It's not at all like using a standard graphic equalizer, where there is a constant temptation to twiddle. With a little practice, you instinctively know where to turn the tilt and set the high-frequency filters. You can then forget about the controls and listen to the music—something very hard to do with an equalizer.

The 34 preamp sounds better than I last remembered. Perhaps improvements have been made over the last few years. Or maybe it's that the preamp now comes equipped with RCA plugs rather than DIN connectors—thus allowing you to use the interconnects of your choice.

The phono section of the 34 produces a wide, deep soundstage—no peculiar effects, but also no extension of the soundstage beyond the edges of the speakers. Imaging is very good, with instruments precisely located (this is one area where I think I hear an improvement over my original sample, no longer on hand). Detail, however, is another story. This is not one of the most transparent preamps I've encountered. In his original review of the 34, JGH talked of a euphonic "velvet fog;" it's still there, but less noticeable than before.

What's more troublesome, though, is a certain heaviness or muddiness of sound—an overripeness in the midbass that comes through even when playing CDs, and with amps other than the Quad 306. (Yes, the tilt control was set flat and the high-frequency filters switched off.) Cable changes did little or nothing to change the situation. I would have to wonder—conclude is too decisive a word—whether the Quad 34 is the most neutral of preamps. It is certainly not one of the most transparent, as a comparison with the Adcom GFP-555 preamp shows.

(I'll be discussing the Adcom preamp in an upcoming issue, but for now I can tell you that it is every bit as good as AHC says it is. In fact, I may like it even more than he does, because with the tone controls and high-frequency filter I can tame CDs and moving-coils.)

Back to the Quad 34. Like the 306 amp, the Quad preamp excels in listenability. The sound does not put you on edge. It is smooth, creamy textured, and unfatiguing. Audiophiles looking for crisper, more crystalline and leaner sound had best look elsewhere, though—for instance to the Adcom GFP-555. (The Adcom preamp and power amps are going to cause a lot of manufacturers a great deal of grief; Quad is just one of them. The Adcom preamp and small Adcom amp, by the way, sound just great with Quad ESL-63s. Imagine! A $295 amp driving a pair of $2950 speakers! Only in the Audio Skate! To tell you the truth, though, the amps I most like with the ESL-63s are the Jadis JA-30s. Sorry.)

The Quad 34/306 combination, then, is highly recommended for certain people. Maybe you're one of them. The 34/306 combination sounds so nice that I'm tempted to give up all this audiophile nonsense, settle in with the Quad electronics, and just listen to music. And the combination looks so nice that you might forget that the Adcom GFP-555/GFA-535 combination costs a third less. If you're like many Quad aficionados and keep your equipment for 10 to 20 years, why worry about paying an extra $400 over the Adcom combo?

More than any other preamp/power amp combination, these products force you to decide who you are: audiophile or music lover. If you like big sound and lots of balls, you'll hate the Quad electronics. If you like delicate sound at moderate volume levels—especially if you listen to imperfect source material which can benefit from the Quad 34 preamp's tone control treatment—then you'll love the Quad stuff. Your move.

**Discrete Technology Power Bridge Cords**

When Sal D'Emicco of Discrete Technology Laboratories, Inc., called to offer me a pair of his "Power Bridge" power cords for my Quad ESL-63 speakers, I could scarcely contain my skepticism. Power cords that plug into the wall and energize the Quads—could these possibly have a sonic signature of their own? I remembered my initial skepticism over speaker cables and interconnects, though, and resolved to keep an open mind.

The Power Bridge cords sell for $200 a pair; they look like heavy-duty extension cords you might assemble yourself for about $12! (The connectors are sealed and the wire is unmarked, so it's difficult to tell what kind
dual channel STASIS/class A amplification

parallel/cascoded FET preamplification

magnificent music

illustrated:
model SA/3 dual channel STASIS/class A power amplifier
model FET nine unffled cartridge/high level FET preamplifier with external supply

Threshold Corporation
1945 industrial drive
of wire D'Emicco uses; whatever it is, it appears to be 12 gauge.)

Do the Power Bridge cords make a difference?

Yes—compared with what looks to be the 18-gauge cords that Quad supplies with the speakers. The Power Bridge cords appear to deliver, well, more power. The speakers sound louder, more dynamic, and there's more bass.

Not wishing to jump to conclusions, I went to my local hardware store and assembled some homemade cords, using 14-gauge wire. These, too, were superior to the thinner wire supplied by Quad. Did these $12 cords sound better than the $200 Power Bridge cords? There you have me. They sounded different—not quite as powerful, perhaps less detailed (you can see I'm falling off into the deep end). But in some respects I preferred my newly assembled $12 cords—the sound was more laid-back, and the midrange seemed smoother.

What should you do if you own Quads? Experiment! By all means, upgrade your cords with thicker wire—pretty easy, since you can simply disassemble the Quad-supplied cords and reuse the connectors. If your dealer stocks the Discrete Technology cords, see if you can borrow a pair. And don't rush to part with your $200 until you also try upgrading your present cords with 14-gauge wire. The 18-gauge wire seems to starve the speakers for power.

Power Bridge cords are also said to be "performance-enhanced" for Levinson, Krell, and Rowland Research power amps and preamps—these are obviously for high-end high-rollers. Undoubtedly you will be hearing from AHC on these. He's the man for this assignment—after all, his name is CORDesMAN.
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The Impossible Dream?

Barry Fox looks at the Compusonics Affair

There is one big advantage in recording data on a disc instead of on tape: It takes only a fraction of a second to "rewind" the recording, the record/play head just skipping and skating across the disc surface. In professional circles this can mean a big financial saving.

Rewinding a reel of tape is very time-consuming, and studio time is expensive. It can cost thousands an hour to pay for a studio full of musicians. Up to 25% of the time spent on overdubbing is wasted on shuttling tape. This is true, regardless of whether the tape is storing an analog or digital recording.

When the recording on disc is in digital code, the way is clear to doctor and edit the sound with far more flexibility than would ever be possible in an analog system. For professionals, digital disc recording is a very valuable tool, second only to recording in a solid-state memory.

In a recent issue of Stereophile ("Into the
Optic (Vol.9 No.8), I examined the reasons why solid-state storage is a long way off, even for professionals. To record two channels of 16-bit digital stereo, sampled at 44.1kHz (that’s compact disc standard, and less than most studio standards), you need to “freeze” a digital data stream of over 1.4 megabits per second. That’s 85 megabits a minute, 5080 megabits an hour. And that is without any of the extra coding needed for track identification.

Chips exist which can store 1 megabit of data, but they are still at the early stage of production. Assuming that the IC-market saying that “Whatever it is, it will end up costing a dollar” holds true, that’s still over $5000 for a solid-state memory equivalent to a single CD. And 5000 chips in sockets take up a lot of space—and give off a lot of heat.

The British telephone service’s speaking clock, nicknamed TIM and called by dialing 123, has always been a leader in audio technology. The first clock, introduced in 1936, used optical discs to store the sound. In 1963, the Post Office junked the discs and switched to magnetic drums. In 1984, British Telecom, which took over from the Post Office, junked the drums and gave TIM a solid-state store. All the phrases Britons now hear when they dial 123 are pieced together from a 256 kilobit memory bank, built up from four 64k chips. The bandwidth is, of course, limited because telephone lines have a high-frequency limit of around 3kHz. Dynamic range is limited, too, because telephone lines are noisy. To record the equivalent of one CD with TIM technology would require the memory capacity of 20,000 speaking clocks.

Firms promising that solid-state storage is “just around the corner” talk of data compression as a way of getting more sound into less chips. The recording skips redundant information, for instance when a sound remains constant. But all data compression involves compromise, and this can color the sound. Few producers will jeopardize the quality of a recording before it even leaves the studio. People who listen to music on home hi-fi systems are also highly unlikely to tolerate the compromise of data compression, when they have grown accustomed to hearing uncompressed “linear” 16-bit recordings on CD.

Recently the same British Sunday newspaper which started the DAT-will-kill-CD scare (see Vol.9 No.6, p.53) ran another story in a similar vein. It told of the small British firm Lyricdata and its plans for a solid-state recorder. A prototype can record 16 seconds on a bundle of chips. This, the report claimed, can be extended to an hour. Why not a day or a month or a year?

As a little background to this story, I can tell you that I first spoke with Lyricdata last January and made clear to the company that I wanted to hear and see the system working before I gave it publicity by writing anything. In January I was promised a demonstration “in a week or ten days.” As I write, it is November ’86, and despite reminders I am still waiting.

If you really want to record in a solid-state memory, you can already do so. Atari’s ST range of home computers can now record short sequences of CD quality sound or still color pictures in their onboard memory for instant access. The ST range is ideal for this because it offers very large memory capacity at low cost: a 1 megabyte (8 megabit) ST costs under $1000. Hybrid Arts of California charges $2000 for a processor which converts mono or stereo sound into digital code, dumps it into the ST’s memory, and then reads it out again at the same or different speed. In addition, by discarding data the tempo of the recorded sound can be changed without altering the pitch. The ST memory can freeze around 10 seconds of 16-bit, 44.1kHz sound, and Atari is soon to launch a twice-the-price, 4Mb version of the ST which will quadruple solid-state recording time.

West Germany’s Steinberg Research uses the Atari ST in a different way to record sound. For around $250, Steinberg sells a program and interface box which allows a 1 megabyte ST to store instruction codes equivalent to 0.2 million strokes on a musical keyboard. These key strokes are then to be used to trigger the reproduction of any synthesized or prerecorded sound. The recorded “events” can simultaneously control up to 24 different electronic musical instruments or memorized sounds. So, with the ST and Steinberg system, an ambitious amateur musician can build up the equivalent of a 24-track electronic music recording at home, step by step. Even with 24 tracks controlling 24 different electronic devices.
The promise of delicate tube-like performance is part of the allure of MOSFET amplifiers. But the promise remained largely unfulfilled until now, because of transconductance error. In Polaris, Sumo employs proprietary active bias output circuitry to correct the problem. Dedicated servo circuitry also reduces crossover notch distortion to levels found in the very best Class A amplifiers. And the elimination of protection circuitry ensures the purest possible reproduction of music.

The power is 100 watts RMS per channel into 8 ohms at 0.05% THD. There is no current limiting. Polaris is a conservatively rated amplifier capable of driving 4 ohm, even 2 ohm, loads comfortably.

Audiophile analog pressings reveal new nuances of sound. Compact Digital discs display dynamic range without high end pain. There is finesse for the subtler shading and power for the most explosive rock and roll.

Sumo products are manufactured in the USA. Among the select group of dealers stocking them are:

SOUNDINGS
4697 East Evans
Denver, CO 80222
Tel 303/759-8505

CALIFORNIA SOUND WORKS
737 W. Lancaster Blvd.
Lancaster, CA 93534
Tel: 805/945-0971

SUMO PRODUCTS GROUP
21300 Superior St., Chatsworth, CA 91311
Tel: 818/407-2427

SUMO CORP. CANADA
1305 Odium Dr., Vancouver, B.C. V6S 3M5
Tel: 604/256-5848
sound sources, the 0.2 million events locked into the ST’s 1 megabyte memory are enough for a 3 or 4 minute pop single.

Another West German company, Print Technik of Munich, has developed similarly priced technology which lets the ST record digitized color pictures. Any video camera, or video recorder, is plugged into the Print Technik digitizer which breaks the video image down into individual picture points, or pixels. The digitizer then codes the color and brightness level at each individual point. A full color image, of definition to match the quality of the ST computer screen, needs 32 kilobytes or 256 kilobits of memory. The 1 megabyte ST can thus temporarily freeze 32 images temporarily in its memory, and subsequently record them permanently by dumping to floppy disk.

Several firms are now selling professional disk recording systems which musicians, and TV and film studios, are using as a working tool. These systems use computer magnetic disks of the "hard" or "Winchester" type. These are rigid metal disks, coated with a layer of magnetic oxide and tracked by a record/playback head which flies very low over the surface on a cushion of air. Hard disks can store large quantities of data (many tens of millions of bits) and are relatively cheap (tens or hundreds of dollars depending on capacity). The read/write head can skip very rapidly from one part of the recording to another, and the short time it takes (measured in hundredths or thousandths of a second) can be buffered by a small solid-state store.

Although hard disks were designed to store text and computer data, which flow in chunks, they can be made to cope with a continuous flow of music or speech by building in more solid-state buffering memory to bridge the gaps between the spurts of data flowing on and off the disk. When several hard disks are ganged together, with buffering and a computer programmed to manipulate the data under the control of a studio producer, the result is as near as makes no difference a solid-state recorder.1

The first two hard-disk machines on the market were the British AMS Audiofile and the Synclavier from America. A British TV station, TVS, has used the Audiofile to store and generate sound effects for a game show, and Synclavier is winning the hearts and minds of the music recording industry. A string of other manufacturers is readying hard-disk technology. Because this new field is bitterly competitive, they are often cagey about releasing technical details. Some firms, too, claim more than they can deliver. I found Synclavier usefully forthcoming.

The Synclavier tapeless recording system is made by the US firm New England Digital, and it is a spinoff from work done at Dartmouth College in New Hampshire. This is where the BASIC (Beginners All-Purpose Symbolic Instruction Code) computer language originated. The story began ten years ago when Sydney Alonso and Cameron Jones were working at Dartmouth College on computer-controlled sound synthesis. They quit, joined NED in nearby Vermont, and took the project further. John Kemeny, who designed BASIC, invested the first $17,000. NED told all investors not to expect any returns for ten years. His caution was justified. But NED has now sold systems to Sting, Frank Zappa, Grace Jones, and Stevie Wonder. Synclavier technology is also selling to the film and TV industry, and was first used in feature films Back to the Future and Romancing the Stone.

Apart from the fact that there is no tape to rewind, hard-disk recording has a hidden benefit. When pop musicians overdub by playing the same rhythm tracks over and over again, the tape physically degrades. Analog recordings lose high frequencies, so cymbals start to sound dull. Digital tapes accumulate errors. If the rhythm tracks are copied from tape onto magnetic disk before over-dubbing begins, there is no degradation.

A hard-disk digital system also lets producers reshape and mould the tempo and pitch of music, speech, and special-effects recordings to fit the pictures on screen. Editing which would take hours on tape can be done in minutes off disk.

The sound can be stored on disk in either of two ways:

Live sound—a singing voice, for instance—is captured as an exact digital replica of the original, like a compact disc recording.

The other way of storing sound on the disc

---

1 Uniquely among recording companies—I believe—Denon masters CDs from a hard-disk recorder, others working directly from the U-matic tape master. —JA
The reference standard—experience it at CSA Audio

CSA Audio, 193 Bellevue Avenue, Upper Montclair, NJ 07043
Telephone 201-744-0600
is for a musician to play on the keyboard of an electric piano, and so generate a series of control codes which tabulate the sequence of keystrokes. These keystrokes can then be used to trigger the synthesis of other, quite different, sounds. In this way a tune played on the keyboard, and recorded on the computer disk as a sequence of control codes, can be played on any electronic synthesizer. The keystroke codes can also control prerecorded music, voices, or sound effects—even animal noises. It’s the easy way to create a talking piano or singing dog.

Once the music or sequence of keystroke code words has been recorded on disk, the replay tempo can be changed without altering the pitch, or the pitch altered without changing the tempo. The pitch-change facility lets a music editor change the key of an accompaniment to suit a vocalist. Tempo change lets a TV producer use one piece of theme music to suit several action themes, from slow-moving and pensive to a fast-moving chase sequence.

The same sound can be cloned ie, recorded on top of itself. If this is done with a very slight change of tone or timing, the result is a sound which gets larger and larger, not just louder and louder. After repeated cloning, one helicopter and jet fighter sound like a squadron.

When sound is recorded in full studio quality with 20kHz bandwidth and dynamic range (in 16-bit code sampled at 50kHz), 1 Mb of Winchester storage is needed for every 10 seconds of sound. NED’s current disk drives (made by Control Data) offer up to 32 separate channels of sound simultaneously. The channels are recorded either on separate disks or interleaved in the data stream for a single disk. Eventually there will be a 32-track Synclavier system for recording up to 30 minutes.

But this will be cost-effective only for the largest TV studios, who need to handle up to half an hour of unbroken recording time.

In theory, there is no reason why studios should not record direct onto disk. In practice, most record on tape first, then transfer short passages to disk for editing and overdubbing. This cuts the cost of the hardware. An 8-track system, equivalent to an 8-track studio tape recorder and capable of storing 15 minutes of sound, will usually cost over $100,000. Also, although the computer industry glosses over the fact, a hard disk can “crash.” The magnetic head flying on the air cushion can momentarily touch the fragile surface coating and scratch it. This can spoil the whole disk and lose a recording.

So far, it is impractical for a disk system to use a microphone recording of a musical instrument as the trigger for controlling synthesized sounds. The trigger technique only works when keyboard strokes are recorded as a sequence of control codes. “One day the computer will be able to follow the pitch of the notes of a live music recording and work from there,” Brad Naples, President of NED told me last year. “But it will probably not be until the year 2000, because that will need artificial intelligence and fifth-generation computers.”

Inevitably the question is asked, why not use a home computer and floppy disks to record sound—not like the Atari, where the disk is simply an archive store of the sound-snapchot stored in memory, but as a “real time” store, like a small-capacity hard disk? When you stop to think, the exercise seems pretty pointless. Home recordists don’t need rapid access, with zero rewind time; they don’t need the facility to doctor the pitch or tempo of recorded sound; and they don’t need to clone, edit, and process like professionals. These may sound like nice options, but not if they raise the price or compromise the quality. Most home users want to record and playback with long playing time and best possible quality at the least possible cost. No more, no less—which is why I feel DAT will one day be big.

From across the pond in England, I have watched with a mixture of amusement and amazement, at the publicity generated for a high-cost system which records for a short time in compromised quality on a computer floppy.

“The age of true digital audio began today,” pronounced US company Compusonics at a New York press conference in May, 1984. A month later, at the Chicago Consumer Electronic Show, Compusonics showed the DSP-1000 and said it heralded “the arrival of a new age in the industry’s history.”

The DSP-1000, said Compusonics, allowed
The Pre-Eminent Tonearm

A pre-eminent arm needs a formidable combination of strengths. It must combine almost zero friction with near-absolute rigidity. In following the groove, it must keep side forces to a minimum—in fact drastically improving on all pivoted arms in this regard. Its design should ensure that resonances are reduced to insignificant levels. It must be easily adjustable in every way that affects performance, including VTA, azimuth, and dynamic balance.

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—Thomas O. Miiller, The Absolute Sound, Issue 39

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—Hi-Fi News & Record Review, July 1986

"It may have no sonic equal at any price."
—Anthony H. Cordesman, Stereophile, Vol. 8, No. 7

The Eminent Technology Tonearm 2. Priced at $850, it is an air-bearing, straight-line tracking arm in a class by itself. The pre-eminent tonearm. Call or write for more information.

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TEL 904 575-5655

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"consumers to make home digital recordings from any digital or analog source... storing it in a digital format on a high-capacity floppy disk."

At the Chicago 1984 show, Compusonics talked of 45 minutes of stereo from a single home computer floppy disk, with 16-bit digital conversion, prerecorded software, and an eventual price to the consumer of $400. But sheepishly they admitted that their prototype could actually manage only 10 minutes of mono. And whenever I called at the stand it was always just the wrong time to hear it working!

With astounding naiveté, the press, both in the US and abroad, responded with over-the-top reports. Journalists puffed the system without even hearing the machine demonstrated. At Britain's International Broadcasting Convention in Brighton, in September 1984, the demonstrators didn't even have a working model on display!

Compusonics people would not explain how they intended to achieve the miracle of 45 minutes of 16-bit stereo from a floppy disk. So I read their patents. One claimed that the recorder takes acoustic snapshots of the audio signal, at a rate of a hundred a second, compares them and records just enough information to describe the differences. This was what would give 45 minutes of digital stereo on a single computer floppy.

A later patent explained the technology used to increase the storage density of a floppy computer disk. Conventional disks, normally called disks or diskettes, record digital data in narrow concentric circular tracks. Each circular track is divided into smaller areas called sectors. The tracks are numbered (eg, 0-39, or 0-79) and so are the sectors (eg, 1-8 or 1-9). This pattern is laid out on a blank disk when it is formatted. A stepper motor moves the recording and playback head across the disk to find selected track sectors. Compusonics argues that a large proportion of the disk capacity is wasted because it is used to record guiding information. Also, the relatively coarse servo cannot cope with very narrow track spacing. The new idea was to record locational information on the disk at the time of manufacture, using a more robust technique than that used to record the data.

Extra concentric tracks called "magnetic walls" are recorded between concentric data tracks. (Alternatively, the magnetic walls and data can be recorded as a double spiral, like a gramophone record with two grooves.) The magnetic-wall tracks are prerecorded at the manufacturing stage, permanently charged to the highest level which the special high-coercivity magnetic medium can sustain—a coercivity of 1200 oersted is suggested—so that the locational information will not be erased by the data heads. Also, the location tracks are recorded vertically and the data tracks horizontally, or vice-versa, so that their fields do not interact. This, of course, requires a completely new kind of floppy disk, with a coating which can handle both vertical and horizontal magnetization.

The very strongly magnetized locational guide tracks provide servo information for the read-write head. But in addition they provide a reaction force. The servo system generates a magnetic field which interacts with the magnetic-wall field so that the head moves across the disk surface. Hence the term "magnetic wall." This interaction provides precise alignment, after coarse movement is controlled by a conventional stepper motor. Compusonics claims that this technique can increase the storage density from conventional levels of around 100 tracks/inch up to anything between 500 and 25,000 tracks/inch. Obviously, this in turn increases the amount of data which the disk can store and thus the audio playing time. But all this seems to be very much in the future.

Several companies have announced magnetic computer disks which can be recorded vertically as well as horizontally. The patent says disks of this type "have been disclosed by Kodak in an article." There are, however, no disks or hardware on the open market which can work in this fashion.

However impressive Compusonics' technology may sound on paper, the grant of a patent is no guarantee that something actually works. The proof of the patent is in the demonstration of a product which does what is claimed.

Compusonics has explained that the DSP-1000 "is being held back while we test higher-density disk drive/diskette sub-systems." But clearly the American company still has an eye for press publicity. In July 1985 a US news-
letter announced that Compusonics had begun pilot production of versions for radio stations, and promised deliveries of a consumer version in the fourth quarter of the year. Compusonics said it would sell through 75 high-end audio dealers, and was striking a deal with Siemens for Germany and Austria, and AVM Ferrograph for Britain. Soon afterwards the US press announced a deal with Japanese company NIAC. (It is also rumored that US high-end company McIntosh are interested.)

I asked AVM Ferrograph in Britain what was happening. "We shall be manufacturing a Ferrograph product using Compusonics' information compression system," said Ferrograph. "We hope to get into production early in 1986. An initial sample of the Compusonics version will be sent to us."

"Five minutes of stereo or ten minutes of mono is achievable," said Ferrograph. "It is hoped that the prototype 45 minute recorder will be tested and proved by the end of 1985." Wisely, Ferrograph is now talking about selling the machine as an alternative to NAB cartridge players, as used by radio stations for IDs and jingles. Meanwhile, articles continue to appear in the US press which sing the praises of Compusonics—all, apparently, on the strength of what Compusonics claims.

Emphasis has now switched from the incredible nonappearing DSP-1000 domestic machine, which won all those original publicity puffs, to the DSP-1500 broadcast disk recorder. Recording capacity, per 5.25" floppy disk, is 6.6 megabytes, from which Compusonics gets four minutes of stereo at 32kHz sampling and 16-bit linear coding. This is an interesting proposal, but broadcasters will only switch from standard cartridges to computer floppies if the price is right and the quality good.

I finally got to hear a Compusonics system working at the National Association of Broadcasters (NAB) Convention in Dallas in April, 1986. A DSP-1500 unit, looking rather like a video recorder, replayed four minutes of stereo, or eight minutes of mono, from a 5.25" floppy disk. Visitors to NAB could listen on headphones. "It sounds just like CD did in the '70s," said one engineer who tried listening. I reckoned it sounded far worse. The sound was rough, there were digital glitches, and the music skipped.

David Schwartz, president of Compusonics, was demonstrating it. Every time the machine stopped, it sat in limbo for half a minute before starting again. Schwartz explained that this was because the machine was a prototype with a prototype EPROM which was checking half a megabyte of memory before starting again. A prototype that primitive almost exactly two years after the system had first been launched?

Just a few yards away, another Compusonics person, Hamilton Brosius, was ready and willing to talk frankly. Brosius previously worked with a New York dealer, Audiotechniques. He was recruited as an outlet for Compusonics equipment, but he couldn't get anything to sell. Finally, the investors, who were growing tired of giving Compusonics money, asked him to go in and try to sort things out. Brosius joined for the period November 1985 to July 1986. "I am trying to bring them back down to reality." he told me. "When they first advertised the multi-track mixing system, the picture showed rotary controls that were actually just billiard balls. When people asked to buy one they were told, Yes, if you give us half a million dollars in development fees."

Compusonics turned up again at the 1986 APRS—a professional studio exhibition held in London in June—where the DSP-1500 was being demonstrated on the AVM Ferrograph stand. The Compusonics machine had a Ferrograph sticker on the front. So did the Compusonics publicity leaflets. Compusonics people with Ferrograph badges were doing the demonstrating. "What do you think of the sound?" they asked when I listened.

"Nasty" was the only word I could think of. "It just doesn't sound like 32kHz sampling and 16-bit linear coding."

"That is because the data is being very heavily compressed," the Compusonics demonstrator explained. "The data rate off disk is only 156 kilobits/second."

So why does the leaflet refer to 32kHz sampling and 16-bit linear coding? "It samples in 16-bit code but then compresses," explained Compusonics.

They also revealed that although the leaflet rates disk-storage capacity at 6.6 megabytes, the disks on demonstration hold only 3.3
The conrad-johnson PV7 vacuum-tube pre-amplifier offers musical accuracy, elegant styling, careful workmanship, and reliable circuitry. Suggested retail price is $695.

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April, 1987

Dear Stereophile Reader:

As the president of AERO Speaker Systems (Acoustic Engineering & Research Organization, Inc.), I am proud to introduce our line of Holosonic loudspeakers - a culmination of five years of research and development and a three million dollar investment.

The patented AERO Holosonic Speaker System is not based on the primary "tuned speaker technology" used in loudspeakers today, but represents a new threshold in primary speaker technology.

AERO Holosonic Speakers are the first forward-firing loudspeakers to deliver three-dimensional acoustical image forming the "live sound stage" with total accuracy using no added electronic circuitry. Simply put, some of the most new and amazing sound qualities you've ever heard.

If by now you have not seen or heard about our products, please write for a brochure or ask your local dealer for a demonstration.

Dealers are cordially invited to come and see us at the June Chicago Consumer Electronics Show.

In closing, I want you to know you have my personal commitment to a standard of excellence, quality and value worthy of your recognition.

Sincerely,

Sanford L. Awner
President
megabytes. The only music for demonstration was punchy rock and roll. I asked about something more subtle, like piano music. None was available.

Ferrograph promised delivery of the unit in the fall of 1986 at between £3500 and £4000. US price for the DSP-1500 is around $3000. *Stereophile* would be interested to hear from any British or American radio stations which have paid hard cash for these units. What do you think of them? This would give a useful insight into what, if anything, the system has to offer domestic users.

When I spoke to them in London, the Compusonics people seemed to know very little about DAT, which will offer hours of CD quality for a price similar to that of the DSP-1500. They argued that it would take minutes to wind a tape end to end. Not so. DAT tape will fast-wind at several hundred times the normal running speed of around 1cm/s; Sony claims that a three-hour cassette can be spooled in as little as 15 seconds. Shorter tapes will give almost instant access, because the machine has a memory buffer built in to bridge gaps. DAT will search for digital cues at 200 times normal speed, stopping and starting with delay comparable to compact disc.

A firm of investment bankers, Blinder, Robinson and Co., of Colorado, will provide potential investors with a pack of literature on Compusonics. I asked for one, explaining that I wanted to quote it in print. BR kindly obliged.

A background sheet of "corporate highlights" explains how David Schwartz began his search in 1981 for a low-cost way of making digital recordings in the home. He raised $100,000 from private sources and formed Compound, which later changed its name to Compusonics (to avoid conflict with another company). In November 1983, Compusonics sold 32,500,000 shares to the public at 20c per share. In April 1985, Compusonics sold another 9,275,000 shares at 16c per unit, to raise well over a million dollars needed "to complete the development and initiate the marketing of what it (Compusonics) believes to be viable products."

When Blinder Robinson sent me the corporate highlights, they also sent me a package of some 40 press clips from US publications with headlines like "Digital sound now on computer disks," "New digital system plays and records," and "Watch out digital discs: here comes floppy audio." Clips of critical or questioning items, like my own, were not included.

Blinder Robinson clarified the confusing situation over what, exactly, Compusonics is promising to sell: the DSP-2000 Series is a professional system for studio recording and mixing; the DSP-1000 Series is the consumer system. The DSP-1500, as demonstrated at NAB in Dallas and the APRS in London, is intended for professional broadcasters as a replacement for continuous-loop cartridges. It was conceived "because of the ability to obtain a floppy disk for use with the DSP-1000 series with sufficient record and playback capacity."

The Colorado bankers also sent me a wadge of financial information (much of it labeled "unaudited") which explains that "the company continues to incur expenses in connection with the development of its products and has not received significant revenues. . . the company is continuing to experience delays in the development of its DSP-1000 Series product line. . . development and marketing of the DSP-1000 Series could be expected to significantly reduce expenses associated with research and development. . . delays in development of the DSP-1000 Series occurred as a result of the inability to obtain a floppy disk with sufficient storage capacity for widespread consumer use. . . past projections for the availability of the DSP-1000 series for marketing have proved premature." The October 1985 financial results for Compusonics said it in figures. "The recorded net loss for the quarter was $2,309,227 on total revenue of $41,430."

But, said Compusonics, David Schwartz still believed that the company will reach a "cash flow break-even position during early to mid-1986." I look forward to receiving the next set of figures from Blinder Robinson.

You can't help but admire Compusonics' flare for publicity. When I got back to Britain after being less than impressed by my first audition of Compusonics at the NAB show in Dallas, I picked up *Billboard* magazine: "Flop-py disk Video Corp. says it plans to demonstrate a prototype removable disk-based digital video recording/playback system.
Featuring the revolutionary new HYBRI-DOME High-Frequency Driver ①, Siefert Research’s new Magnum III 3-way Loudspeaker System ushers in a new era in loudspeaker performance.

Key to Magnum III’s natural sound is its exclusive HYBRI-DOME high-frequency driver with its hybrid mating of metal and polyamide. This two-piece construction uses an optimally-stiff aluminum dome supported by a highly-compliant polyamide suspension. Aluminum’s stiffness extends response to over 24 kHz whereas the compliant polyamide suspension permits operation down to 1500 Hz. Also, this provides transverse-wave absorption and edge termination that can’t be achieved by one-piece metal assemblies. (Frequently-used one-piece soft plastic or fabric domes experience mid-spectrum breakup difficulties highlighted in widely-published laser interferometry photos.)

Thus, the HYBRI-DOME provides unmatched sound smoothness, transparency and an effortless, uncolored reproduction of complex tonalities.

At the heart of the Magnum III is a new, unique Six-Octave Midrange Driver ②. The exceptionally-smooth response (100 Hz to 8 kHz, ± 2 dB) of this four-inch, polypropylene-cone driver extends with minimum group delay one octave on either side of the 250/3000-Hz crossover frequencies.

Magnum III uses an expensive Third-Order 250-Hz Crossover Network ③ that is just below middle C (262 Hz). This locates any crossover phase changes well below the extra-sensitive 400- to 1500-Hz sound region.

The final element providing a robust low end to below 36 Hz (-3 dB), is the Integrated Tuned Port ④ that shares the enclosure’s ¾-inch wood material. Others use a lower-cost cardboard tube that causes audible air turbulence.

The synergism afforded by Magnum III’s features gives it extraordinarily-low-group delay, exceptional imaging and 36-Hz to 24-kHz response within ± 2 dB.

The compact enclosure (only 22H x 13.5W x 14D) is available in walnut, oak, or black-lacquered natural hardwood.

We invite you to audition the Magnum III at home for 30 days. If it does not meet your requirements, the purchase price will be refunded with no hassle.

For the complete story on the Magnum III, or its highly-regarded predecessor, the Maxim III (2-way system), call or write. VISA and MASTERCARD are accepted. PRICE: $699/pair, plus $36 UPS.
within the next three months.”

Compusonics demonstrated the audio system at the Chicago Consumer Electronics show in June 1986, along with the new video system. One engineer reckoned that the system sounded quite good, especially after the Compusonics demonstrator had explained to him that the 16-bit code was being reduced to 4-bit code by data compression. This would normally give a dynamic range of just 24dB (each bit gives 6dB dynamic range), but the system uses ranging techniques which let the limited dynamic range “float.” This 4-bit coding technique seems at odds with the description of the technology given in the Compusonics patents. So who knows what is actually going on inside the player?

The video player produced a couple of pictures a second (like a slow-scan TV or video conferencing system). A system like this cannot reproduce motion, without drastic smearing. It remains to be seen whether someone finds a use for a video system that displays a couple of still pictures every second.

Compusonics argues that it makes sense to go for floppy disk because the drives can now be bought for a few tens of dollars from Japan. If so, why does the player cost several thousand dollars? Also, although it is clever technology to get digital stereo off floppy disk at a rate of 156 kilobits/s compared with the data rate of over 4 megabits/s for compact disc, this won’t interest broadcasters, who are being asked to pay thousands of dollars for four minutes of compromised quality.

If Compusonics ever succeeds in achieving what it promised the press in June 1984, then I will welcome the chance to write about it. The company has my address. Meanwhile, the story has a moral: Don’t believe everything you read—unless the writer can put hand on heart and say he or she has seen and heard the publicity claims proved.

Editor’s Postscript

While Compusonics may not seem to be doing anything in the consumer field, their professional DSP-2002 digital editing system is selling to film and TV post-production houses, which use them primarily for automated soundtrack mixdowns.

Priced at $35,000, the basic 2002 recording and programmable editing/sequencing system comes with 1Mb of onboard RAM, a 3.3Mb floppy-disk recorder/player, and one 143Mb (!) hard-disk drive. Up to 31 additional 143Mb hard discs can be daisy-chained; five, for example, are said to give 100 minutes of recording time. A review of the 2002 appeared in the December 1986 issue of Recording Engineer/Producer; because there was no mention of sound quality, I phoned two of the production houses referred to in that report: International Recording, of North Hollywood, CA, and Transcom Media, of New York, NY, for their opinions.

At International, I spoke to Peter Roos, former software developer for Compusonics, who confirmed that International was using, not one, but two of the 2002 systems. One of International’s systems has five hard discs on line for a total of 715Mb, while the other has nine such drives for a total of 1287Mb, or 1.3 gigabytes! (This is approximately the amount of data stored on a music CD; because of its increased need for incorruptibility and tracking information, a CD ROM, by comparison, holds 312Mb of digital data).

Asked about the 2002’s sound, Roos said “It’s very good; pretty much right up there with Sony’s 24-track 3324 (PCM) system.” “What about the data reduction?”, I asked. “It’s a lossless algorithm, performed in the digital domain,” was the reply—another way of saying it’s “perfect.” Roos went on to say that International had just finished using their 2002s for audio postproduction on a 65-installment 30-minute cartoon series called Adventures of the Galaxy Rangers, currently being aired on Saturday morning TV.

At Transcom, which has a 2002 with “only” a modest 715Mb of online hard disk, George Nemzer agreed with Roos about the sound of the 2002. “It’s really beautiful,” he said. “Analog is really the best sound to the ear, but when we’re talking mixes and copies, digital just has it all over the best analog. And the Compusonics has as good sound as any digital system I know of.”

It would appear, then, that Compusonics is delivering product, and apparently good product at that—at least to professionals who can pay strictly professional bucks. But as for that $400 consumer system that will record for 45 minutes on a “conventional” floppy disk? Don’t hold your breath.

—JGH
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Anthony H. Cordesman explains why he doesn’t like small loudspeakers

Editor’s Introduction

Stereophile’s Recommended Components feature (see p. 92) is, as I am sure you will have guessed, produced by a committee. The reviews are studied, the reviewers polled to verify the continued validity, the merits and demerits of specific pieces of equipment are discussed or, rather, argued over at length by JGH, JA, and LA, and out of the whole business emerges the “truth.” But, as with the findings of any committee, what is presented as a consensus will have significant undertows and countercurrents of opinion; if these are very strong, a “Minority Report” is often also produced. Such has been the case this time, concerning loudspeakers.

When compiling the recommended listing, performance parameters are weighted equally: midrange verisimilitude has to be counted as equally important as the ability to produce well-focused stereo imaging; a clean, uncolored high end is no more or no less important than the ability to provide thunderous levels of low bass. If all loudspeaker designers aim at providing a complete performance package, then there should be very little disagreement about what models to recommend. But when a designer has chosen, instead, to sacrifice one area of performance in order either to push the others as far as possible with the technology at hand, or, with a low-priced model, to allow more of the limited resources to be concentrated where he thinks appropriate, this brings taste into the equation. To some listeners, on some
kinds of music, the deficiency will be unimportant; others will argue that such a sacrifice denies the loudspeaker any chance of producing a high-end sound, no matter how good it is in other areas.

We present, therefore, a Minority Report on loudspeakers from AHC to accompany "Recommended Components." —JA

A reviewer is supposed to be reasonably catholic in his or her taste. The point of a good review is not to impose one's personal taste on the reader, but rather to judge in terms of a range of accepted value, and to communicate enough information to the reader that the review can act as a guide in letting the reader make his or her own decision. Accordingly, I tend to be more tolerant in reviewing audio equipment than I am in choosing what I like to listen to—although I make no claims for excessive tolerance, even as a reviewer.

I also fully accept the fact that no loudspeaker is perfect. Let's face it—no loudspeaker does more than approximate the sound of live music, and all loudspeakers involve audible compromises with reality. Regardless of whether a speaker costs $50 or $50,000, the loudspeaker designer is always forced to make tradeoffs, and these tradeoffs are all too audible.

For example, there is no right pattern of dispersion. Limited side- and rear-wall reflection means more accurate imaging, but only in a comparatively narrow listening area. Most speakers have only a comparatively flat response within a relatively limited dynamic range. Many speakers only perform best at relatively moderate listening levels and have trouble with both soft and loud passages.

Drivers have to be chosen with careful compromises in terms of dynamic range and loudness limits, distortion, and bandwidth. Crossovers involve complex tradeoffs between phase accuracy and amplitude accuracy, and so on. No matter how good the illusion of music, any experienced audiophile will always be aware that something is missing or unnatural.

As a result, I tend to be only moderately critical when reviewing loudspeakers with restricted dynamic range and bass. Given all the tradeoffs that speaker designers must make, it is still possible to make a loudspeaker with a midrange good enough to partially compensate for the fact that it will not play loud or low. At a given price point, such a speaker may even be the speaker of choice, many listening rooms either being too small for a speaker with deep bass, or having other limitations.

That said, however, I would like to express my growing personal distaste for small monitor speakers and for the dishonesty with which they are advertised and reviewed. I can see a limited need for such units in the field and in very unusual listening conditions. I do not, however, see a need for such speakers in most listening rooms. I see no valid design reason for producing them, and feel they deserve far more criticism than they now get.
The best of both worlds . . .

The Accuphase DP-80 CD transport combines with the DC-81 digital processor to constitute the first CD player designed without any compromises in the effort to reproduce music. While other audiophile companies sell modified machines manufactured by others, Accuphase has spent several years developing their own machine, combining the best available components and technologies from around the world. Weighing over sixty pounds and utilizing discrete components for the most precise digital to analog conversion yet achieved, the DP-80/DC-81 will stand as a musical reference.

Some of the most sophisticated expressions of CD playback technology have been designed for recording studio or radio station use. The complex control facilities required only for professional audio applications have been omitted in the DP-80/DC-81 playback system because they would be a barrier between a music lover and his goal of enjoying reproduced music. Unlike any machine in this price range, the Accuphase CD player has been designed with the single goal of sonic excellence.

It is no surprise that Accuphase is the company that built this superb component. As a company that combines the purist vision of small American and European companies with the technical facilities for research and development, parts selection, and quality control of much larger corporations, Accuphase is uniquely capable of taking the newest technology to the very limits of its capabilities.
Let me begin by summarizing my reasoning in nontechnical terms:

- Whether a speaker is large or small, unless designed to be used adjacent to a wall, it still has to be the same distance from the rear and side walls for best performance. In addition, small speakers require fairly high stands. The illusion that small monitor speakers are easier to place than conventional speakers ignores the real-world laws of speaker placement.

- The laws of physics simply do not permit a speaker with a usable sensitivity to generate accurate bass below 120Hz from a small cabinet. Whether or not the speaker is equalized, something has to give, usually at the expense of accuracy from the lower midrange down. The issue is not deep bass or performance in a limited range of music, but mediocre performance in the area where most music has most of its energy.

- These speakers do not produce a better midrange at the expense of bass—they simply produce more midrange energy relative to the bass. A small enclosure demands far more compromises on getting flat and dynamic lower midrange than a larger one, and virtually forces the designer to play some sort of design trick to get the illusion of acceptable bass. At a given price, a talented designer is going to do better with a larger enclosure.

- If a small speaker with a restricted bass range or low-frequency dynamics has flat upper octaves, it will never sound musically natural. No live performance ever has such a balance in timbre; the imaging will be artificially exaggerated, and the soundstage will tend to be too wide and diffuse. There will be too much transient detail because the upper octaves will not be masked or balanced by adequate lower-midrange and upper-bass information.

- If a small speaker with restricted bass range or dynamics has rolled upper octaves, so that the highs seem natural in proportion to the lows, we get "polite" music with a sweet, comfortable sound, but no real bite and power. The result is fine for background music, but it is about as satisfying as a polite painting, a polite wine, or any other polite pleasure.

- In both cases, the listener eventually tends to restrict their listening to the music that suits the speaker rather than explore the full range of musical experience. The speaker is not supposed to help you select your music.

- There is no reason for the existence of such speakers. Virtually all of the better mini-monitors are British. Though generally reasonably priced in the UK, they are grossly overpriced in the US relative to full-range US speakers, such as models from Thiel, Vandersteen, VMPS, etc.

- While subwoofers or external woofers can help, only a bass unit specifically designed to work with a small monitor can really perform well. Most small monitors have to alter their low bass to provide some kind of boost so they sound reasonably good when used alone. This makes blending with a bass unit far more difficult.

- A single, separate bass unit will degrade imaging and the presentation of depth with a stereo system unless it crosses over well below 80Hz. Even a single bass unit, however, tends to raise the cost of a small monitor system above that of a full-range speaker system. Further, most combinations of small monitors and bass units are far uglier than a pair of full-range speakers, and harder to place in a listening room. They also involve very complex hookups, and often mean extra amplifiers and interconnects—all of which cost money and degrade sound quality.

These generalizations have a sound technical base, but many of these problems are not fully apparent to the audiophile because there are no universally accepted standards in the audio industry for measuring low-frequency response and dynamic range in loudspeakers.

Anyone, for example, can claim response down to 40-50Hz if they ignore the need for realistic maximum loudness levels, low levels of distortion, and/or the rate of rolloff in bass response. In practice, however, the real-world rolloff point for bass response in a domestic loudspeaker is going to occur at very high frequencies.

The Fletcher-Munson curves show that both low frequencies and overall listening levels must be relatively loud to hear natural

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1 All things being equal, however, a large enclosure will introduce higher levels of midrange coloration than a small one, due to the lower frequency at which the resonances of large panels occur and, price for price, the less opportunity there will be for damping the resonant behavior with braces, etc.
THE INCREDIBLY PERFECT SOUND STAGE

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bass; anyone who has conducted practical speaker tests becomes aware of the fact that the ear is very sensitive to changes of even a few dB at low frequencies.

This means that when a speaker is placed in a home listening room, and you are discussing bass below about 150Hz, the "roll-off" point should be measured at an SPL of at least 95dB, and at 100dB for a really good high-end system. The tendency to measure bass response at lower signal levels is simply absurd, given the insensitivity of the human ear to bass frequencies and the measured SPL of bass notes in live music.3

Similarly, a small loudspeaker, or any loudspeaker in which the bass response falls off at a very sharp rate, would have its frequency response limited set at the point where an anechoic or average room test shows a drop of around 1dB. A speaker with a slow falloff curve can have its frequency response set at the -3dB point, but this simply doesn't work with most small loudspeakers. It adds 5-15Hz of bass response they really don't have under real-world conditions, and disguises the point where they begin to run into trouble.

It is interesting to see what happens when these criteria are applied to real-world loudspeakers. Let's be generous: we'll use a 3dB drop, and, to be neutral, use the anechoic tests run in Britain by British reviewer Martin Colloms (as presented in Hi-Fi Choice).

Let's also be generous and accept the fact that some of these tests are run at 86dB because, as Colloms states, "miniature speakers are generally in gross overload at low frequencies"—although I would strongly argue that such testing is fundamentally unrealistic because it disguises the true nature of speaker bass performance at real-world listening levels.

We end up with the following -3dB response points for some well-reviewed small speakers and mini-monitors:

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Bass Cutoff (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-18</td>
<td>70</td>
</tr>
<tr>
<td>Celestion SL6S</td>
<td>70</td>
</tr>
<tr>
<td>Goodmans Maxim</td>
<td>120</td>
</tr>
<tr>
<td>KEF C10</td>
<td>110</td>
</tr>
<tr>
<td>Mordaunt-Short MS100</td>
<td>95</td>
</tr>
<tr>
<td>LS3/5A</td>
<td>95</td>
</tr>
<tr>
<td>ProAc Tablette EBT Super</td>
<td>95</td>
</tr>
</tbody>
</table>

This kind of performance simply is not compatible with the demands of real music, and has not had any justification in design terms for years. Whether or not one likes the acoustic-suspension principle, it has been possible to design decent woofers and enclosures at reasonable prices for more than two decades.

This kind of performance also gets much worse when we start talking about performance at 96-100dB and the resulting impact on distortion. While speaker size is scarcely an indication of low distortion, the fact is that most mini-monitors effectively clip with bass peaks at what are normal listening levels with other designs. This, of course, is a damn good reason to publish measurements for second- and third-order distortion in loudspeakers at every frequency, and for publishing the clipping level, or point at which the drivers really begin to distort. But, then, publishing such measurements would probably put two-thirds of today's speaker manufacturers out of business.

I don't mean to say that deep bass is vital to good home listening—in fact, in most homes it is difficult or impractical. However, I find damn little excuse for speakers costing over $150 that can't go down to at least 60-70Hz at 95dB SPL with reasonably low distortion.

Speaker measurements of bass performance should also examine real-world dynamic ranges, and be measured at levels no lower than 90dB, and normally at 100dB. I am saying that virtually all of today's small "monitor" speakers are measurably incapable of high-fidelity reproduction, and have no place in a decent audio system.

2 Most rooms do reinforce the bass of a loudspeaker, but a given speaker may have very different bass-response characteristics in different rooms. Speaker manufacturers generally specify anechoic response because there is no standard listening room. Even so, an anechoic chamber runs into increasing measurement problems below 100Hz, due to its finite size.

3 Reviews which refer to the fact that bass power exists in speakers with sharp bass rollofs below the -3dB point are largely absurd. Most small loudspeakers virtually hit a brick wall at this point and will only have audible bass response below the -3dB point if their midrange and treble are played at painful SPLs. This is one of many reasons why audiophiles play their speakers far too loud, often to the level where the woofer can no longer respond effectively. This kind of bass often has well over ten times more distortion than the midrange, and is generally blurred, with gross overhang. In most cases where level is used to extend apparent bass, the entire speaker system will be driven to the point where distortion extends well into the lower midrange. In addition, room-interaction problems will be sharply increased.
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Phono Cartridges

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<tr>
<th>Cartridge</th>
<th>Price</th>
<th>Replacement</th>
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<tbody>
<tr>
<td>AO M-1, Ind. Magnet Cartridge</td>
<td>95.00</td>
<td>40.00 stylus only</td>
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<tr>
<td>AO MC-4, High Output (2.5mV) Moving Coil</td>
<td>195.00</td>
<td>125.00 with trade</td>
</tr>
<tr>
<td>AO MC-5, High Output (2.5mV) Moving Coil</td>
<td>250.00</td>
<td>160.00 with trade</td>
</tr>
<tr>
<td>AO 404B, Boron Cantilever, 2 piece brass support system</td>
<td>295.00</td>
<td>195.00 with trade</td>
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<tr>
<td>Choice of: AO 404B-MH (1.6mV), AO 404B-L (5mV)</td>
<td>595.00</td>
<td>395.00 with trade</td>
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<tr>
<td>AO B-100, Hollow Boron Cantilever, machined body</td>
<td>695.00</td>
<td></td>
</tr>
<tr>
<td>Choice of: AO B-100MH (1.6mV), AO B-100L (5mV)</td>
<td>1895.00</td>
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You may trade up by using the credit earned by your old cartridge toward any higher model.

Compact Disc Players

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>AO CD-1, 16 bit 4x oversampling, includes 4 AO Sorbothane feet.</td>
<td>695.00</td>
</tr>
<tr>
<td>AO CD-1R, 16 bit 4x, remote, fully programmable, 4 Sorbo feet.</td>
<td>795.00</td>
</tr>
<tr>
<td>AO CD-100, tubed, 2 chassis, remote, fully programmable, 4 Sorbo feet.</td>
<td>1895.00</td>
</tr>
<tr>
<td>AO CD Disc Stabilizers, set of 35 rotation stabilizers with Locator.</td>
<td>45.00</td>
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<tr>
<td>AO CD Disc Stabilizers, refil set of 60 self adhesive stabilizers.</td>
<td>60.00</td>
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Speaker Cable

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<thead>
<tr>
<th>Type</th>
<th>Price</th>
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<tbody>
<tr>
<td>LiveWire BC-2, twisted pair, OFHC.</td>
<td>.50/ft</td>
</tr>
<tr>
<td>LiveWire BC-3, twisted 4 conductor.</td>
<td>.75/ft</td>
</tr>
<tr>
<td>LiveWire BC-4, spiraled 4 conductor, FMS geometry, OFHC.</td>
<td>.95/ft</td>
</tr>
<tr>
<td>LiveWire Type 6, spiraled 4, FMS geometry, polypropylene insulation.</td>
<td>1.50/ft + $20/pr. prep</td>
</tr>
<tr>
<td>LiveWire Type 8, spiraled 8, FMS geometry, polypropylene insulation.</td>
<td>3.00/ft + $30/pr. prep</td>
</tr>
<tr>
<td>FMS Grey 3, tubular teflon core construction.</td>
<td>10.00/ft + $30/pr. prep</td>
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Interconnecting Cable

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
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<tbody>
<tr>
<td>LiveWire Reference, foam polypropylene dielectric, 100% shield.</td>
<td>45.00 per 3 ft. pair</td>
</tr>
<tr>
<td>FMS Gold, 4 conductor FMS magnetic field balancing geometry.</td>
<td>96.00 per 20 ft. pair</td>
</tr>
<tr>
<td>FMS Blue 3, spiralled 4, tubular teflon core construction.</td>
<td>135.00 per 3 ft. pair</td>
</tr>
<tr>
<td>FMS 404B, 165 ft.</td>
<td>543.00 per 20 ft. pair</td>
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Tonearm sets with teflon plug, 4 feet : Reference 58.00  FMS Gold 88.00  FMS Blue 169.00

McLaren Audio Electronics

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<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>McLaren 602 Straight line preamp, 60 or 80 dB gain.</td>
<td>1195.00</td>
</tr>
<tr>
<td>McLaren 402 Full feature preamp, 6 inputs, tone controls, phase switch.</td>
<td>1495.00</td>
</tr>
<tr>
<td>McLaren 702 Stereo power amp., 100/100 watts, stable into any load.</td>
<td>1195.00</td>
</tr>
<tr>
<td>McLaren 902 Mono power amp., 250 watts, dedicated mono block design.</td>
<td>2395.00/pr</td>
</tr>
<tr>
<td>McLaren 1002 Analog FM stereo tuner with digital readout, 10 presets.</td>
<td>995.00</td>
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Sorbothane Accessories

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<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>AO Sorbothane Record Mat, 3/8&quot; thick, dampens record and platter.</td>
<td>35.00</td>
</tr>
<tr>
<td>AO Sorbothane Record Damper, dampens record and spindle</td>
<td>12.00</td>
</tr>
<tr>
<td>AO Sorbothane Isolation Foot, for CD's, turntables, tube electronics, etc. (set of 4)</td>
<td>40.00</td>
</tr>
<tr>
<td>AO Sorbothane Vacuum Tube Dampers, reduced hysteresis distortion (set of 4)</td>
<td>12.00</td>
</tr>
<tr>
<td>AO Sorbothane Self-Slick Sheet, self adhesive backing lets you damp anything.</td>
<td>15.00</td>
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Accessories

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<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>AO Superclump, solid Delrin, holds down grooved area of record, not just label.</td>
<td>45.00</td>
</tr>
<tr>
<td>AO Superclump Plus, solid Delrin reflex clamp/damper.</td>
<td>75.00</td>
</tr>
<tr>
<td>AO Record Brush, over 1000000 carbon fibers clean and control static.</td>
<td>15.00</td>
</tr>
<tr>
<td>AO Electro Stylus Cleaner, vibrating stylus cleaner.</td>
<td>35.00</td>
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<tr>
<td>TRT's Wonder Solder, this solder really does sound better (15 ft).</td>
<td>15.00</td>
</tr>
<tr>
<td>AO-10 Headshell, 10 gram anti-resonance headshell, LiveWire headshell leads.</td>
<td>45.00</td>
</tr>
<tr>
<td>AO-16 Headshell, 16 grams, adjustable azimuth, LiveWire headshell leads.</td>
<td>45.00</td>
</tr>
<tr>
<td>Profile Pro Lift, puts end-of-record/lift-off on any turntable.</td>
<td>45.00</td>
</tr>
<tr>
<td>LiveWire Headshell Leads, pure copper litz, no other insulation.</td>
<td>7.95</td>
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</tbody>
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February 1, 1987
In August of 1986, Sheffield Lab completed an historic series of recordings—not direct-to-disc, but on analog and digital tape—in the Soviet Union. For the first time an American conducted Russian works with a Russian orchestra, and a Russian conducted American works with a Russian orchestra. Laurence Leighton Smith conducted Glinka's Russian and Ludmilla overture, Tchaikovsky's Symphony 5, Mussorgsky's prelude Khovantschina, Shostakovich's Symphony 1 and Festive Overture, and Glazunov's Concert Waltz in D, Op. 47. Dmitri Kitayenko conducted Piston's The Incredible Flutist, Barber’s First Essay for Orchestra, Copland's Appalachian Spring, Gershwin's Lullaby for String Quartet, Griffes's The White Peacock, and Ives's The Unanswered Question. The orchestra was the Moscow Philharmonic and initial releases are scheduled for early summer of '87. J. Gordon Holt talked with the three principal participants in this venture: Doug Sax and Lincoln Mayorga, co-owners and chief recording engineer and music
director, respectively, of Sheffield Lab, and Keith Johnson of Reference Recordings.

JGH: Whose idea was this series of recordings?
DS: Well, Lincoln and I had been talking for some time about wanting to do more classical recordings. Classical is really our background, you know. I was a symphonic trumpet player, and Lincoln, of course, is a classically trained pianist. But looking at the very high cost of recording in the US, it was suggested that we check out the costs in Europe. And the difference turned out to be pretty dramatic.

JGH: The United States is the most expensive place in the world to record an orchestra, is it not?
DS: Astronomically high. If you want the London Philharmonic, I would say it would cost you one quarter as much as it would to record an American orchestra.

JGH: Any American orchestra?
DS: Yes, any American orchestra, because regardless of its prominence, the recording scale is the same. Savannah costs as much to record as Chicago. Needless to say, you’re going to go to Chicago.

JGH: Are the English musicians’ union rules as rigorous as ours?
DS: No. They’re much more flexible, and the pay scale is much lower. You can see why the London orchestras are recorded so much. But we thought we might as well price some Eastern European orchestras too, while we were at it. And then Lincoln ran into this lady...

LM: She worked at the Russian Consulate in Washington, DC. She said, if you’re looking for an East European orchestra to record, why don’t you make an inquiry to the Russian consul? We had never thought of that. So I did, and it started negotiations that went on for about a year.

They weren’t all that enthused about the idea unless they could see some PR potential in it. They said they had thousands of recordings of Russian orchestras with Russian conductors, but they would be interested in recording a Russian orchestra with an American conductor. So we went out and found an American
conductor. We wanted someone of unquestionable ability, and came up with Laurence Leighton Smith. The Russians approved him, the dates were set, and everything was on.

DS: Then I started having second thoughts. I pointed out that this was not the best time for our company to do a project of this size, that it's a difficult project, we'll be over there working with 220V and 50Hz, we'll have to bring all our equipment, and maybe the Russian conductor is not going to have a very good feel for American music. It's not his idiom, he doesn't know it—he hasn't heard it!

I played devil's advocate, mentioning everything that could possibly go wrong. But Lincoln was adamant.

LM: I just thought it was something that couldn't be passed up. I said "We're doing this project, it's destined. The door is open, and that door hasn't been opened since . . ." What was it, 25 years ago, when Mercury took American technology over there, when they recorded Byron Janis with the Moscow Philharmonic?

DS: So, here, twenty-some years later, the door had opened again, and Lincoln said "We're going in!"

LM: Doug and I went to Russia in March '86 to finish the negotiations—cost, licensing, everything. We came back with the realization that someone else other than Doug would have to do the engineering.

DS: I couldn't take off the time from here. You have to remember, Sheffield Lab is only part of our operation. The Mastering Lab is an important part of our business too, and when we began to figure the cost of this venture, even at East European prices, we saw there was no way we could afford to shut down Mastering Lab for a month. Our first choice was Keith, who turned out to be available.

KJ: Actually it was no surprise. Doug came at me very obliquely. He played me a tape of an orchestra, and said "Here's what this hall sounds like, what do you think of it?" He showed me some pictures of the place. He came on like he was asking for my advice; what would I do in this situation? Sort of feeling me out.

I told him, "This would be a tough place to record in," but I was intrigued by the sound of the orchestra. I was amazed at the string sound. And the hall, with all of its problems, had a very strange charisma that made things sound very exciting. So I thought it would be possible to get the hall to work.

Anyway, we had just talked casually about it for a while when Doug said, "How would you like to go to the Soviet Union?" Of course, I was very excited. But I was also in sheer panic, because there was so little time to prepare, although that did change. Our original choice of a conductor was changed, and the sessions had to be rescheduled. But I had been to the Soviet Union before as a tourist, so I knew what to expect. I liked the people a great deal. They're an interesting people—very warm and outgoing.

JGH: Did you get a chance to scout out the recording venue prior to the sessions?

KJ: No, but Doug's tape and photos were very useful to me. I was particularly glad the tape had been miked in M-S, because by suppressing the mono center, I was able to hear what was coming at the microphone from the side walls. I had a pretty good idea of what the hall sounded like before I ever set foot in it.

JGH: Doug, what did you use to make that test recording?

DS: I used their equipment. That was one of the things that really surprised me. I expected the recording sites and their equipment to be very primitive. But they had a Telefunken tape deck, and I was stunned to see copious quantities of any microphone you could name: Neumann U-47s, M-49s, M-50s, U-64s, U-67s and 87s. SM2 stereo Neumanns, SM69 Neumanns, AKG C24s, AKG 414s, Schoeps—you name it, they had it. A multichannel Neve console, multi-track analog recorders, even Sony 1610 PCM units. My God!

JGH: They're mastering digitally?

DS: I don't think so, because they don't master to two-track. Everything is multi-miked. But they had 1610s if they needed them.

So they set up an SM-69 for me where I could get, not a flattering view, but an accurate view of the hall acoustics, and I ran off the test tape.

On that same March trip, we took with us printed scores of American music for Dmitri Kitayenko, the Russian who would be doing the American works. I don't think he had had any prior familiarity with American music, because there are no recordings of it there.

JGH: That amazes me.

DS: It's not like in the United States. There's only one label in the USSR: Melodiya. And
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there's no American music on that label. None.
So we brought over a variety of tapes and
records and scores, which we left with him so
he could decide what he wanted to do.
JGH: Who was involved in the recording
sessions?
LM: Just Keith and myself, and Stan Ricker.
And, of course, Laurence.
JGH: Where was the recording made?
DS: It was in their large recording hall in the
radio/television complex. It was very spa-
cious, and had an extremely high ceiling, maybe
three stories high. We had the equipment on
the third floor; you look down on the orches-
tra.
KJ: The room was very high but it wasn't all
that big. I'd guess it was about 70 feet in each
dimension; almost a cube. But the orchestra
was gigantic, because of all the strings—
probably more than 110 pieces—and the orches-
tra members were right up against the
rear and side walls! So the first reflections were
a real problem. It was moderately live, but had
a fast decay, once it started to decay. It holds
for a while, and suddenly cuts off. And the
place was riddled with standing waves! It's a
hard space to work in.
DS: This television complex had five record-
ing studios, four of them relatively small, and
then this very large one. And this, mind you,
wasn't even Melodiya's recording facility, this
was for TV! And, Gordon, in every studio
there was a nine-foot Hamburg Steinway. The
best piano built!
You know, they do things in a funny way
over there. If the State figures something is
unimportant, it just isn't available. But if they
feel something is important—and music is
very important to them—they will spare no
expense on it. Only the very best will do.
JGH: Did you use any of the Russian equip-
ment for the recordings?
DS: Only for the test tape. We brought all our
own for the sessions.
In addition to our own highly modified JVC
digital machine, we brought some filtered
power packages we had made up to go from
220V to 110. And we brought Keith's mikes
and mixer, and Dave Wilson's modified half-
inch Studer—the 30ips John Curl UltraMaster
analog deck. It's still my feeling, and Lincoln's,
that we absolutely wanted to record in analog
as well as digital, so as to have more than one
view of this event.
JGH: Keith, why didn't you bring your own
tape machine?
KJ: Because I couldn't convert it to the Rus-
sian 50Hz line-frequency within the time I
had.
JGH: The power pack Sheffield put together
wouldn't have worked?
KJ: No, because it didn't do a frequency con-
version. See, Sheffield's digital recorder and
Dave's UltraMaster have their own servo drives
for the motors, but my machine uses hystere-
sis motors driven right off the AC line.
I had considered taking a hefty amplifier like
a Crown DC-300 and putting an oscil-
lator on it to provide 60Hz for the recorder,
but there wasn't even time to make that
lashup. As soon as I knew things were really
happening, I spent most of my time listening
to Doug's tapes and trying to figure out what
was going on in that hall.
LM: Also, the people at Reference Recordings
were not happy about Keith using his pro-
prietary machine for a Sheffield Lab record.
I prefer the 30ips half-inch medium any-
way—the smoothness of its high-frequency
response and the lower noise. Although I do
feel the low end is definitely better on Keith's
machine.
KJ: Before I left for Moscow, I put together a
set of parametric equalizers—very subtle,
very restricted range—with just the right
amount of equalization to remove some of the
colorations the hall had. This would al-
low the mikes to reach into the orchestra but
still be placed somewhat distant, and the im-
mediacy of the performance could be caught.
That was a major project, to build four sets of
equalizers: eight channels of them.
JGH: What did you use for monitor speakers?
KJ: They're 8" two-ways, my own design, in
which the woofer cone is treated paper
laminate—very light moving structure, very
efficient driver. But the enclosures are quite
large for 8" two-ways. They have their
amplifiers built-in—blamped. And I've done
a lot of work to minimize standing waves and
reflections on the cones. I use them for all my
recordings, and before these sessions, I listened
to recordings of the pieces that were going to
be taped, and learned what the speakers
would do.
JGH: Did you have trouble adjusting to the
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unfamiliar acoustics of the control room?

KJ: Virtually none. The control room was very neutral. It was large and easy to work with. I've worked in awful control rooms in the past—places that are so reverberant you can't tell which is the hall and which is the room. This one was a Godsend!

DS: When we arrived, the Russians thought we would be using their equipment, and they had, maybe, 50 or 60 mikes out for us to select from. When Keith came up with his handful of mikes, they were hurt. They thought they were doing the recording; that, somehow, hadn't been explained to them.

KJ: Then I walk in with my two little packing cases and pull out eight microphones and stands. Everything I use except the monitor speakers goes into two little containers.

JGH: Was the orchestra layout conventional, or were the instrumental sections separated and isolated?

KJ: It was a performance layout, except that it had a much, much bigger string section than most American orchestras, so I did a bit of doubling up on the strings. Instead of leaving them spread out horizontally, I narrowed the string section and made it deeper from front to back.

JGH: What sort of mike setup did you use?

KJ: Well, first I tried a pair of omnis out in front of the orchestra, about 15 feet in the air and probably about 25 feet apart. That seems pretty far apart, but then the size of everything was such that, if the omnis had been brought closer together, the outer edges of the orchestra would have been lost. But when they were that far apart, I couldn't get any decent center fill. And the first-chair string players were getting lost.

So I added a pair of cardioids between the omnis—widely spaced and behind the conductor—to pull out the middle of the orchestra. The woodwinds were still weak, so I had to add another pair of cardioids—closely spaced—between the conductor and the middle of the orchestra.

LM: The only way we could get the woodwinds in proper balance, and without a feeling of too much distance, was with that extra pair that we had in their section.

JGH: Did you hear the same balance problems when you were standing on stage?

LM: It's completely different somehow when you're listening to it live. And it would depend on where we were standing. When we stood where the conductor was, we heard a pretty respectable balance, but we certainly couldn't just place a pair of microphones there and expect to come up with anything remotely similar. It seems that our ears have the ability to sort things out much more satisfactorily than microphones can.

KJ: What we ended up with was a setup that I would not normally use, but it definitely worked there. Actually, it was quite similar to what Decca/London used during the '50s and '60s.

JGH: What were your general pickup mikes?

LM: I would say that there were no general pickups, per se. We had a pretty even balance between the omnis at the sides and the cardioids towards the middle.

JGH: Keith, you said you used eight mikes. Where were the other two?

KJ: They were at the back of the hall, spaced omnis, picking up ambience.

JGH: How come you didn't get double arrival times?

KJ: If you listen carefully to the recordings, you'll hear that there are in fact double arrival times, but the hall itself creates a slight double-arrival effect, and I had set up the timing so that the ambience mikes, which were set at a very low level, would tend to be out of synchronism with the inherent hall return; the microphones acted to break up the apparent suddenness of the slap-back. They actually reduced the double-arrival sounds—just the opposite of what you would think they would do.

JGH: Doug, eight mikes is more than you've ever used for an orchestra. How do you think you would have set up in Moscow?

DS: It's hard to say. I didn't have to cope with the problems Keith encountered.

JGH: Aren't Keith's recording philosophies rather different from yours?

DS: Only in perspective, not in philosophy. We both strive for a wide dynamic range, we go for natural balance, and neither of us, when we're recording an orchestra, use any more microphones than we absolutely have to.

The other thing unique to Sheffield and Reference Recordings is that we use microphones and electronics of our own design. I don't know any other company into that.

JGH: But you usually record with directional
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microphones, while Keith seems to prefer omnis as a first choice.

**DS:** Yes, but he also uses cardioids. And his microphones are all FM microphones that deliver line-level outputs. Mine also are line-level mikes. And he has no transformers in his and I have no transformers in mine.

**JGH:** You said the Russians multi-mike everything. What was the reaction of their engineers to your unorthodox recording techniques?

**LM:** They were at first a little bit amused. They didn’t know quite what to make of it.

**KJ:** Amused! They stood there looking on in horror, clearly not comprehending how anything was going to work at all with so few microphones.

**DS:** By their standards, it is absolutely unheard of that you can record a full orchestra with only eight microphones.

**KJ:** And sure enough, when I did the first trial recording, the conductor, Kitayenko, just about walked out, he was so disgusted. He heard the playback and he said “This sounds like I’m in a fishbowl.” He was used to hearing a much closer pickup. We still had quite a bit of fine-tuning to do, but what he heard at first just confirmed what they all knew; that it wasn’t going to work my way. The hall was a much worse problem than I had anticipated. It took lots of moving things around.

We ended up moving major parts of the orchestra. I found the places where the microphones liked to be, relative to the standing-wave patterns in the room, and then we had to move the orchestra relative to the microphones because we couldn’t move the microphones.

**LM:** We had to place some absorbing materials behind the percussion, and we had to put a reflective baffle behind the horns. The room was very live, and it tended to sound exciting but somewhat muddled. As a result, we used more microphones than I normally would have used either, but we still retained a natural stereophonic perspective.

**KJ:** Then the ceiling had all these acoustic “clouds,” supposed to randomize the reverberation patterns, but all they did was throw standing waves back at you. They don’t show up in the usual acoustics measurement, but they sure cause havoc when you listen to them.

**LM:** Stan (Ricker) and Keith struggled through much of the night and most of the next day or two, moving microphones around, putting up reflective baffles, trying to tame the reflections.

**KJ:** Basically, we were breaking up standing waves, and as we did this, all of a sudden, everything started to come together. We started getting the sound we were looking for, and from then on everyone’s concern was with their playing. There was this tremendous feeling of excitement, of total commitment to what they were doing. It was amazing!

**JGH:** Well, what did they think of the sound after you started to get things to work?

**DS:** They were amazed that Keith could go in there with a handful of mikes and get the results he got. They were pretty stunned!

**LM:** Well, I’m not so sure. Actually, they didn’t have much to say one way or the other. If they were stunned, they kept it pretty much to themselves.

**KJ:** As the sessions progressed, a number of the musicians came up to the control room and listened. And I’m sure that what they heard was very new to them—that they never heard a recording before where the sounds are diffusing and intermingling the way they do in a live performance, rather than the spoonfed type of recordings they are used to.

**LM:** Once we got things to work, and they had become accustomed to what was, for them, an unfamiliar sound, they just ignored it. They began to work for musical results.

They were also noncommittal in their opinions about the American music. But we got the impression they felt it was music of a “lighter” nature, not very substantial.

**KJ:** Once we got the hall tamed, the sessions were fun all the way through, except for the aggravation of not having the Dave’s 30ips analog machine until after the American music had been recorded.

**JGH:** What happened?

**KJ:** Leave it to the French! They wouldn’t ship the thing when they were supposed to. They didn’t have room in the luggage compartment, or people were too lazy, or something, but it didn’t get to the session until we were halfway through. So we had to start the session with an old Telefunken prototype they had in the TV studio. I don’t think it ever went into production. It had been brought in originally to an audio fair in the Soviet Union.
JGH: What? An audio fair? Like CES?

KJ: Oh, no. It was for professionals—more like our AES or IEEE conventions. The Russians bought the thing from Telefunken. It really was a prototype. It looked like a hand-built machine. There were circuit boards, but there were lots of fixes on them. And it was only half a recorder; it had no monitoring provisions. There were no line amplifiers for metering or control or anything. I mean you literally fed a line signal in and you got a line signal out. No VU indicators! We ended up having to use their mixing board for level-setting.

JGH: Which works were recorded on the Telefunken?

KJ: All of the American ones. On 15ips quarter-inch! And that's what the records of those pieces were mastered from, because those were the only analog tapes we got of them. The Russian pieces were done on Dave Wilson's 30ips half-inch machine. And of course all the sessions were also done digitally on Doug's modified JVC.

DS: You know, it probably cost us over $30,000 additional to take Dave's machine over for those sessions, and then we only got to use it for half of them. It cost $8000 to ship, round trip, and in order to cover the 30 hours of recording at 30ips, the half-inch tape ran us $4800! Then there was a substantial rental fee for the recorder.

It would have been easy for us just to say, "Look, most of these records are going to sell on Compact Disc, and we've invested a fortune in digital technology, so why not just go digital and forget about the analog recording?" But that's just not our philosophy.

JGH: How did the sessions go? Were there any problems working with the people?

LM: Oh, no. They were so sweet, good natured, enthusiastic, and totally committed! Every take was an all-out effort. This was not a routine endeavor for them.

KJ: They were a young group of people, not tied up with officialdom, and they just bent over backwards to help us. They were magnificent.

LM: None of the apathy, none of the ho-hum attitude that we often encounter in the cynical orchestras of this country.

DS: Lincoln told me about when they were rehearsing cello solo in the Shostakovich First. Laurence said to the first cellist, "Could you give me a little more vibrato here?" And the cellist said, "I would do anything for you." In English! Many Russians speak English fluently; it's taught in the schools, and it's almost a second language there.

LM: I want to tell you one other thing that was rather touching. One afternoon we had been working all day long at the studio—it had been kind of a frustrating day, and a hot one. We didn't always use the air conditioning. All of a sudden I was tapped on the shoulder by the chief engineer of the State Radio—he'd brought me a dish of chocolate ice cream. It was such a sweet gesture . . .

Little things like that kept happening. On the last day, I gave the concertmaster, who was a very sweet man named Valentin Zhuk, a Sheffield Lab T-shirt. He accepted it rather shyly, and tears were just streaming down his face. God, they were all so moved by what was going on.

DS: There was a lot of that kind of feeling. I met Laurence at the airport when he returned, and we went out to dinner. He told me of when he and the rest of them went to look over the recording site the evening before the first scheduled session.

You know, the moment you're there, you know you're in Russia and that things are different. They were very much aware that America was a long way away. They went to the radio/television facility, up the elevator to the third floor where the monitor rooms were, and opened the door that goes downstairs, two flights of stairs, to the base of the recording studio. And while he's telling me this, Larry has tears in his eyes. They open the door—they didn't even know the orchestra was there—and what do they hear but Appalachian Spring. There were the musicians, on their own, rehearsing American music. He was really touched.

KJ: But then they had to be told how to play for the recordings.

LM: Oh, yeah. When they first started playing, they played at, like, one dynamic level . . .

KJ: What I call the standard, chronic mezzo forte, which you hear in studios all the time.

LM: When they go into the studio to make a record, they're instructed not to play loud and not to play really soft. That way, they get their dynamic-range compression right from the or-
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orchestra. We had to persuade them to do it the way they do it for a live performance: from double piano to triple forte.

JGH: When they finally got the point that they could play the way they would for an audience—that they didn’t have to hold back, and could play the way they wanted—that’s when the playing really got inspired.

JGH: Do the Soviet orchestras have the kind of work restrictions that our AF of M¹ imposes?

LM: Oh, no. The sessions were three hours in length, with some kind of break every hour, but they hadn’t demanded that schedule. It was arrived at by negotiations with the State Radio and Television. They were quite flexible. In fact, they were so very flexible that, at first, they’d tell you something was impossible, and then after thinking it over they would somehow make it happen for you.

I’ll give you an example. We suggested getting an audience in and broadcasting one of the sessions on TV. The first thing we were told by Leonard Zezulin, who was our liaison with the State Radio and Television, was, “Oh, you can’t expect us to move that quickly on something. You know, this is not the West; this is the Soviet Union.”

Then, later, I was kidding around and said, “Leonard, what are you telling me? This is a wonderful city, this is one of the greatest cities in the world. Anything is possible here. And if we can’t get it through normal channels, certainly you can get it for us.”

He knew I was pulling his leg—slightly. But then, by the afternoon, he said, “Well, I spoke to my boss, and here’s the paperwork for the live performance.”

DS: And they made quite an event of it. The Minister of Culture spoke, and it was beamed all over the Soviet Union and the satellite countries. We have a full one-hour tape of the entire broadcast, and we’re hoping to make a video of it, maybe for PBS.

JGH: Was it aired in the US?

DS: Not much of it. CBS’s Good Morning America and the ABC Evening News gave it a few minutes. Maybe, now that we’ve finished the package, we’ll get some better coverage.

JGH: How many hours of recording did you come back with?

DS: We have 30 hours. You know what three hours would have cost in the US? $30,000, that’s how much!

LM: You see why we went to Europe for this?

JGH: I’ll say!

I noticed applause at the end of my preview lacquer of the Piston. Was that recording from the broadcast concert?

LM: Yes. We felt it was the best performance of the Piston.

JGH: The applause wasn’t all that rousing, though, was it?

LM: Well, it must be said that it was not a very large audience—only about 200 people. And it wasn’t the most musically sophisticated audience either. There were a lot of diplomats there, families of the people from State Radio and Television—some music students, but only a handful.

JGH: Were you generally pleased with the performances you got during the sessions?

LM: Oh, yes. I think they’re red hot. I’m just very much enamored of them, and the more I listen the more I like them—even though the orchestra had some rough edges.

DS: Larry’s Tchaikovsky Fifth is positively stunning. This is the most impassioned, moving performance of this work you’ve ever heard! His affinity for the Russian music, and his emotional involvement with it, is amazing. In fact some of the Russian musicians couldn’t believe it. They said, “You must be Russian, because you have such an understanding of our music” But can you imagine a less Russian name than Larry Smith?

LM: Even though the performances were marvellous, we still had to do a lot of editing. And the editing involved some very hard decisions.

At the sessions, I would ask for another take to achieve better ensemble or better balance here and there, and then I’d go back and I’d listen to all the takes, and the one that had the inspiration was often the one that had a problem.

In most cases, the choice was clear—you go for the inspired take in spite of the rough edges.

JGH: These performances have a real fire to them—much more than I hear on most recent symphonic recordings.

LM: Well, it’s an awesome responsibility for the record producer. People don’t realize that, when they’re listening to this flawless performance by this prominent conductor,
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they're not listening to his performance at all, but to something that was pieced together by some totally unknown record producer. After the recording sessions, the conductor usually washes his hands of the whole affair, leaving it in the hands of the producer. We have very little documentation of our great musical artists today. Very few of their performances have been preserved for posterity.

JGH: Except for live-performance broadcast tapes.

LM: Yes. If we could just get the AF of M to allow archival taping of all symphonic concerts. Then, if there's a performance that's worthy of release as a record, you could pay the musicians retroactively for recording.

I'm a union member. I like to see employment for musicians, and I like to record under union contracts legitimately, but I have to say that their attitude is unrealistic. The way the rules are set up now, they are putting musicians out of work. Because it makes more economic sense for a record company to record in Europe.

JGH: I assume the Moscow recordings will be released in the Soviet Union.

DS: Yes, by Melodiya. We are going to send them tapes. That was part of the arrangement.

LM: I think if we offered to send them mothers, they might be delighted. But I don't know that for a fact. They simply asked us for a tape, which we will give them if that's what they prefer.

JGH: I'd like to ask all of you what sort of feelings you got about Moscow?

DS: It was difficult for me. I sort of checked out, mentally. I realized that if, for any political reason, they had asked me to stay, I would have stayed. I kept thinking of the American reporter who was detained because Washington accused a Soviet Embassy person of spying.

LM: It's a very strange place, not a comfortable place at all. I would not want to spend a very long period of time there, and I was delighted to leave. There's no question that the lid is on pretty tight. Everyone is very careful about how he behaves, what he says.

KJ: I was aware I was in a police state, but it didn't bother me. I've travelled quite a bit, and I can accept a culture the way it is—not try to judge it by the standards of the country I was brought up in. But I wasn't breaking any laws, and I never felt in any danger there. In fact, I felt as if the State thoroughly approved of what I was doing there. Nonetheless, the hotel really bothered me. I had the feeling the whole staff was KGB, and that I was being spied on all the time.

JGH: Did you feel your room was bugged?

KJ: I almost did. I don't know whether it was true or not, but that's the way I felt. But I figured, if that's the way it is, that's the way it is.

LM: Everyone there seemed a little paranoid. We found the musicians extremely friendly and ready to talk in the studio, but if we asked someone to go to lunch with us they would politely decline. The authorities discourage any unauthorized contact with outsiders.

I met a young Soviet composer, a very gifted young man, who wanted to talk to me about something, but when I invited him into my hotel, he declined. So we went to a little juice bar and sat and talked. He had a Walkman, and he played me some very interesting music he'd written—jazz settings of scenes from some English plays. The words were sung in English by Russian jazz singers. It blew me away! It was interesting music, and it was very well sung. It had a very nice jazz feeling. There was a good rhythm section, and the instrumentalists were members of one of the Moscow orchestras.

JGH: I thought the State frowned on jazz.

LM: They hold it in scorn, but they tolerate it. This musician just does this with his friends; there's kind of an underground in "un-approved" music there.

I told him I would be happy to see if there might be some interest in a performance back in California, and he said, "You'd better not, because if it were known that I approached you privately, I could be in trouble. I'm supposed to go through proper channels. But when the time is right, you could approach the international booking organization."

It's the first time I've ever seen a situation where a young composer would not jump at the chance to have his piece performed in America.

DS: I really had the feeling that the Soviet people are in jail. Because they can't leave.

JGH: But did they seem unhappy to you?

DS: Well, no... But there was a grayness to them—something you have when your vistas are defined and limited. And they seemed to have to be so careful about their every move. One incident in particular brought this home to me.

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leaves Russia must be arranged through an international licensing bureau consisting of three men, whom we met. I think the youngest one would be in his mid-60s and the oldest was definitely in his 70s.

Now, these are sophisticated gentlemen. When the Bolshoi Ballet comes to the US, these men deal with Sol Hurok. When RCA was to record Sviatoslav Richter, it negotiates with these men. They have been dealing for the last 30 years with the upper crust of musical culture.

I knew we would be meeting with them in March, so I had brought with me three bottles of exquisite California wine and three bottles of Jack Daniels. We met for dinner at this nice place, with Leonard Zezulin, who was really in charge of the project. He was with the government television and radio. I opened up my briefcase and presented the wine and bourbon to them, and there was an awkward silence, as if something was wrong. Finally, one of the gentlemen said, “You know, in Russia, we have had a drinking problem. And as of the first of the year,” and he had a twinkle in his eye, “we no longer have a drinking problem.” It seems the government was actively discouraging the consumption of alcohol.

Zezulin said to me afterwards, “If you had wanted them to accept your gift, you would have had to present it to them individually, where no one could see them accept it.”

I was stunned! These men have worked together for 30 years, yet they were afraid, or ashamed, to have the others see them accept my gift because of the State’s campaign against drunkenness!

KJ: It was very hard even to find beer there. But after things had settled down and we were into the recordings, there appeared one morning a refrigerator completely stocked with beer—both of them things that are very hard to get there. The musicians had gotten them somehow or other; they did it on their own. I doubt if it was anything official.

DS: In the whole of Moscow, I didn’t see a single café! It’s bizarre! You go to Europe, you go to Vienna, there are cafés everywhere. But in Moscow, there was no place to sit down and chat—to be sociable. This is not deemed important, so they don’t have it. But they have a subway system—marble walls, magni-
ficient chandeliers—unbelievably opulent. That’s important to them. And they have a 105-piece orchestra for the Bolshoi Ballet. But a Russian citizen can’t sit down and have a cup of coffee and be comfortable.

JGH: One final question: If you had the chance to do it again, would you?
LM: Oh, yes. It was a great experience. It was a very warm experience, and everybody involved seemed to feel that we were doing more than just making records—that in some small way we were helping to ease international tensions.

KJ: Oh, I would certainly do it again, absolutely. For many reasons. One is that talent, that orchestra—that whole area of Soviet artistry is something that needs to be tapped and brought to the rest of the world. Their dedication to music was so apparent. It’s just not right that their inspired music-making shouldn’t be heard outside their country, and in better sound than Melodiya gives it. Besides, I had a lot of fun working very hard with everyone.

JGH: Lincoln, Doug, are there any plans for future projects like this?
LM: Well, Dmitri Kitayenko is going to come over and visit Laurence Smith in Louisville. I believe he may be conducting Larry’s orchestra, and I hope to make some records there. And I’d love to go back. In fact, I would love to go to Leningrad if possible. Working with the State Radio and Television was a pleasure. They have a facility in Leningrad too, and they said they’d be able to help us out. It’s just a question of finances.

JGH: In other words, it’s a matter of how well these records go over.
LM: Quite simply, yes. And we are still looking for people who would like to be involved in the investor pool that shares the royalties on these recordings.

JGH: Who funded the first sessions?
LM: I raised most of the money myself, independent of Sheffield’s resources. And I took out a loan myself. I’d love to replace it.

Oh, and one other thing . . .

JGH: Yes?
LM: Finn Air gave us a good deal on our air transportation, and asked if I’d give them a free plug.

JGH: You just did.
LM: Yes, I know.

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Some of the listed items are discontinued models (‡), retained in this list because their durability and performance distinguish them as "classics," and because they sometimes may be obtained for substantially less than their original cost. (Upgrade modifications are available for many.) In general, however, discontinuation of a model will preclude its appearance here. In addition, though professional components—recorders, amplifiers, monitor speaker systems—can be obtained secondhand and sometimes offer performance which would otherwise guarantee their inclusion, Stereophile's "Recommended Components" listing is exclusively concerned with products offered through the usual hi-fi retail outlets.

**How to read the listings**

"Recommended Components" in Stereophile is a noble tradition which has evolved drastically from the time when JGH published two lists: a list of components, with a series of obscure numbers after them; and a list of numbers, with a definition of what each number meant. Definitions such as "very gutsy," authoritarian sound (think how Zarathustra must have spoken)," and "we don't really like this, but a lot of people whose judgment we respect do" were not uncommon. The listing in those days had two advantages: non-members of Mensa couldn't read it at all, so we didn't get too many letters in response; and it succinctly expressed the preferences of one man, J. Gordon Holt.

Nowadays, "Recommended Components" is a very different beast; we try to include any product which is truly excellent or which we feel represents good value for money. Many different tastes are represented. There are eight amplifiers in Class A alone, while in the days when JGH alone composed this feature there were seven recommended in all four Classes together. The nearest analogy to our Class A amplifier ratings is a good wine store's recommendations on California Chardonnays at less than $20 a bottle: there are at least 12 or 15 you shouldn't miss, and who's to say which will be the best with the particular meal you have that night?

Of course, Class A amplifiers (which are only a case in point—the problem exists throughout the list) don't cost $20 each—$4000-plus is more like it. And, in spite of AHC's oft-repeated advice to try them at home, most dealers won't lend you $12,000-$20,000 worth of merchandise to play around with. You'll have to read carefully both our descriptions here and the original reviews, to try to determine which group of amplifiers to choose from. Carefully evaluate your room, your tastes, your source material and front end(s), and your speakers, and you: with luck, you may be able to come up with an intelligent selection. "Recommended Components" will not tell you just what to buy!

Nor are we terribly sympathetic to letters complaining that the Symphonic Bombast A-123, which we recommended heartily two years ago, no longer makes it into Recommended Components at all. Where deletions are made, we strive mightily to give reasons (there always are reasons). But remember, deletion of a component from this list does not invalidate a buying decision you have made. In every case, you, the audiophile in charge, are expected to independently evaluate the performance and suitability of the product for your situation. Caveat emptor.
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At Audio Studio we're scrupulous in our pursuit of the best values in high-end hi-fi. Audiophiles ourselves, we carefully analyze components before adding them to our select inventory. Which means that we can help you choose with confidence from among the best there is. And back that choice with solid service.

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Turntables

Editor's note: Any of the four Class A turntables and their variants will provide a musically satisfying basis for a top system. It is not usually worth changing one for another unless the listener is confident that the rest of his system will be thereby improved. If contemplating purchase of one of these Class A units, audition it in depth as part of a preferred turntable/arm/cartridge combination is mandatory. A possible sixth contender is almost certainly one of the Goldmounds, but these have not been auditioned for some time. If an inexpensive turntable has not made its way into Class C, D or K, assume that it is not recommended under any circumstances. Underachievers are more common in the world of turntables than in any other area of hi-fi.

A

Linn Sondek LP12

The standard against which newer turntable designs have been measured for 13 years now, the Linn is more colored than the other Class A 'tables (particularly in the upper bass), harder to set up, and more likely to go out of adjustment, though much better now in this respect than it used to be (low bass extension suffers when the LP12 is not set up correctly). In JA's opinion, the Linn is a Class A 'table on musical grounds—it also measures well—but AHC feels strongly that the LP12 doesn't belong even in Class B, let alone A. (Vol.7 No.2)

RATA Torlyte-modified Linn Sondek

Russ Andrews' drastic modification for the Linn alleviates the lack of transparency in the upper-bass, rendering it more compatible with such tonearms as the SME V. Full review in this issue.

Oracle Delphi II

Setting the standard for elegant appearance, the Oracle also works superbly, giving up some bass extension to the VPI and SOTAs. If appearance matters at all to you, give the Oracle a listen. (Vol.9 No.4)

SOTA Star Sapphire Series III

The Series III, complete with the acrylic Supermat, is significantly better than earlier versions, due to its use of an aluminum armboard, new suspension springs, ribbed platter construction, motor drive pulley, and is just a whisker better than the other Class A turntables. Compared with the standard SOTA Sapphire, the vacuum heldown significantly improves bass range and detail, as well as resolution across the audio range. The SOTA 'Electronic Flywheel' line conditioner improves performance very slightly further. (Vol.9 Nos.2 & 4)

SOTA Sapphire Series III

The standard SOTA (now also in Series III guise) lacks vacuum disc clamping but is easy to set up and use, attractive, ingenious in design, and sonically excellent. With the new Supermat it comes close to its much more expensive brother, the Star Sapphire, in sonic neutrality, midrange naturalness, and high end sweetness. Vacuum clamping is available as a $695 upgrade. (Vol.7 No.2, Vol.8 No.3)

VPI HW-19 II

The latest VPI has achieved a standard of sonic neutrality that puts it very close to the latest SOTA Star Sapphire, and at a much lower price. It is cosmetically less elegant, and a bit more cumbersome to adjust, but it readily accommodates a wide range of tonearms and is very stable. The $300 Power Line Conditioner is a worthwhile accessory. (Vol.9 Nos.4 & 5)

B

Acoustic Research Connoisseur ES-1

This is one low-cost turntable we can heartily recommend. Compared with the original AR, it has much better cosmetics, comes with its own arm or can be fitted with yours—the Cheapskate just loves the AR with the Rega RB300—but it seems to have a less effective suspension than the original. Intrinsinc character is a bit fat in the upper bass, but musical, nevertheless. Can produce hum problems with unshielded cartridges like the Grados. (Vol.8 No.7)

Linn Axis

Versatile, competitively priced, "turnkey operation," two-speed belt-drive deck with electronic speed control and ingenious suspension. "Smaller" sound than the Sondek, perhaps limited by the good, but not outstanding, performance of fitted LVX Plus tonearm. (Vol.10 No.1)

Sonographic SG3

Better-sounding than the AR and a bit more expensive, the Sonographic may be hard to find, but is worth seeking out. Good value in the unarmred version. (Vol.9 No.7)

C

Acoustic Research EB-101

Almost as good as the Connoisseur, but comes fitted with what can be described as a no-more-than-adequate tonearm. (Vol.8 No.7, Vol.9 No.4)

Dual CS-5000

Sophisticated budget 'table with electronic speed control. Has an OK arm and a basically good sound (apart from a lightweight bass) for a moderate $350. The 5000 also has automatic armlift at end of record, the only such 'table we recommend. A Cheapskate favorite. (Vol.9 No.4)

Harman/Kardon T-65

Good basic performance, marred by tonearm problems. Perhaps not quite as good as the other "C" rated decks, but a clear notch above the Dual 505-2. The lack of an interchangeable tonearm and so-so suspension are drawbacks. On the plus side, the T-65 is easy to set-up and use, and doesn't tend to go out of adjustment with time or if moved. This deck offers about the minimum level of performance which can legitimately be described as audiophile quality. Recommended only if bought at discountd price. (Vol.9 No.2)

Rega Planar 3

Synergistic mix of no-nonsense deck with superb arm. Lack of environmental isolation may be problematic; some recent reports of variable wow & flutter; limited cartridge compatibility; but a safe recommendation, nevertheless. (Vol.7 No.1, Vol.8 No.6)
Tempest Tribe Compact Disc Player—$1895
Meridian 207 Professional Compact Disc Player taking orders—$1595
Cello Etude Passive Preamplifier—$1000

Accuphase • Bryston • Cello • Dual
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D

Dual CS505-2 phono unit

Getting down to the least you can expect to pay for a record player that works at all well, the Dual 505-2 has been forced (by demanding British audiophiles) to perform—for $200. It has its problems — read the review for details—but you can’t do better without spending more than $300. (Vol.8 No.3)

K


Deletions

Ariston RD-40, due to lack of US distribution.

Tonearms

A

SME Series V

Extraordinarily neutral pivoted tonearm, with the lowest resonant signature of any. Easy to set up, VTA and overhang are adjustable during play, but no azimuth adjustment. The best bass performance on the market. Very pricey, but ergonomically and aesthetically a work of art. A finish worthy of Tiffany, according to AHC. Some compatibility problems with cartridges having low height, but otherwise the new reference. Probably the best arm available today. A new, less versatile, version, the IV, should offer much of the V’s sonic virtues at a lower cost. (Vol.9 No.6)

Eminient Technology Two

The ET Two corrects its predecessor’s cueing difficulties and comes up with a host of ingenious extras, but more important, it has “an extraordinarily live and open soundstage” and gets the best results from a wide range of cartridges. Needs a very stable subchassis turntable to give of its best. A bit fussy to use—some low-patience types won’t want to bother. Only really rivalled by the SME V, which has better bass definition, but, at less than half that fixed-pivot arm’s price, the ET Two is the best value in a high-end tonearm. (Vol.8 No.7)

B

Alphason HR-100S

Neutral, very low friction. An advantage is the availability of different tonearm tube and counterweight inserts to vary the effective mass, and thus enable matching of virtually all medium to low-compliance cartridges (even some moderately high compliance ones). (Vol.7 No.3, Vol.8 No.7)

Grado Signature

A detachable-headshell arm with performance that virtually equals the best fixed-headshell arms listed above. Very convenient to use, a top performer sonically, and only $485. The Grado provides very near to the best sound, with user convenience that is simply not available in many high-end arms. (Vol.8 Nos.5 & 7)

Linn Ittok LVII

Slight resonant colorations in the upper midrange compared with the best arms, which can add both hardness and a false sense of “excitement.” Bass and lower midrange still amongst the best, however, and superior to the similarly-priced competition in these areas. (Vol.8 No.7)

Souther Triquartz

The latest version of the Souther SLA-3 shows obvious signs of refinement. The whole arm is less resonant, the sound is more solid. AHC feels it to be a close call rating the Eminent Technology a class higher—the Souther is very close to Class A. Possesses a more “live” sound than the ET, and works better with high-compliance, low-mass moving-magnet cartridges, and, of course, very well with the Clearaudio Veritas (imported by Souther). Only significant drawback as far as JA is concerned is the fact that the use of the turntable spindle as support for the gantry will introduce an arbitrary degree of rumble. (Vol.8 Nos.5 & 7)

Sumiko FTIII

Solid sonic value for money, audibly superior to the MMT, though finish is a bit rough compared with the best. VTA adjustable during play. (Vol.9 No.4)

The Well Tempered Arm

One of the most neutral arms available, this odd-looking arm is hard to fault on any count. Superb highs, stereo soundstaging and midrange, excellent compatibility with MC cartridges that put a lot of energy back into the arm. Some deficiency/softness in the low bass, but above that there are virtually no problems. Good value for money. (Vol.8 Nos.4 & 7, Vol.9 Nos.3 & 5)

C

Alphason Xenon

Very similar to the HR-100S, but cheaper bearings and internal wiring downgrade the sound by 5% and knock $300 off the price. (Vol.8 No.7)

Rega RB300

At $195, the Rega offers very good detail, depth, midrange neutrality, ambience, and precision of imaging, almost creeping into Class B. Works well with the Rega ’table, but also recommended by Audio Cheapskate as an ideal substitute for the arms that come with the AR and Sonographe ’tables. Lacks any form of height adjustment, however: VTA can only be adjusted by adding spacers under the base. Even-cheaper RB250 dispenses with the spring downforce adjustment and the sintered tungsten counterweight, but sacrifices little in sound quality. (Vol.7 No.7, Vol.10 No.1)

Sumiko MMT Revised

A simple, removable-headshell arm that is less than the best but not by that much. Well-suited to either MM or MC cartridges. (Vol.8 No.5)

K

Air Tangent, SME IV, Dynavector DV 507 (modified), Wheaton Triplanar

Deletions

Sumiko “The Arm” used to be the pivoting arm against which others were measured, but is no longer manufactured. Should be a worthwhile secondhand buy from owners who are upgrading to the SME V.
Concert Grand

Accuphase • Acoustat
Athena Audio • Audio Research
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B&W • Cabasse • California
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Cartridges

A

Koetsu Red & Red Signature
If the Ortofon and van den Huls appeal to the brain, then the Koetsus appeal to the heart. Romantic sound despite neutral tonal balance. The Red’s soundstage is superbly delineated, the Signature is the champion in this area. (Vol.8 No.7)

Ortofon MC-2000
Possibly the most literally accurate cartridge available, the MC-2000 can make most good discs sound very much like their CD counterparts. It has superb trackability, very good soundstaging and imaging, excellent bass, and extremely smooth highs. The only problem: such low output (0.05mV!) that hum and noise may be a problem in many systems. In any case, a very low noise step-up is necessary. (Vol.8 Nos.2, 4 & 7)

Sumiko Virtuoso DT1
The first high-output coil to make Class A. Warmer balance than the Talisman, with first-rate imaging, excellent harmonic contrast and detail, a top end that is free from the problems that plague most MCs, and, according to SWW, the “uncanny ability to reproduce the natural weight and authority of live music.” vdf stylus requires careful setup; output a little on the low side for some MM inputs. Lacks the ultimate “speed” of the Koetsus, but up with the best in terms of transparency. The music emerges from a near-silent background that is akin to CD. (Vol.9 No.4)

van den Hul MC-10
The first van den Hul to provide midrange and bass extension to match the typically excellent vdfH high-frequency extension and detail. Tonal balance more like CD than the Koetsus. Superb decoding of recorded detail but requires careful setup. Available from Transparent Audio Marketing. (Vol.9 No.6)

van den Hul MC One
Not particularly cable fuzzy, but does require attention to arm damping. Works very well in the WTA and the SME. Carries the MC-10’s resolution of soundstaging, tonal neutrality and naturalness of timbre a stage further. (Vol.9 No.8)

Veritas/ClearAudio
The Veritas has amazing resolution and definition, superb dynamics, excellent bass, exceptional imaging and depth, very sweet highs. A remarkable cartridge. A special version is available for the Souther arm. (Vol.8 Nos.4, 5 & 7)

B

Adcom XC/MR-II
Very smooth and neutral, much like master tape, with excellent trackability. (Vol.7 No.8)

Argent Diamond
Somewhat lean upper midrange, very neutral midrange, gorgeous soundstage. Makes excellent records come almost eerily alive.” (Vol.8 No.1)

Audioquest B-100L
Remarkably accurate balance and timbre, good soundstaging, subtly forward and elevated highs and upper midrange. (Vol.8 No.4)

The Decca cartridges
Several entrepreneurs are modifying Decca’s stock cartridges to perfectionist standards. Many perfectionists have a love-hate relationship with these cartridges, which combine superb sound—low-frequency dynamics are perhaps the best around—with shoddy construction, somewhat “frazzled” highs in standard trim, and a propensity for causing incurable hum. (Based on a sum-and-difference sensing circuit, the channels share a ground.) The van den Hul Decca has very good trackability, sweet (tapelike) highs, excellent speed and detail, and very dynamic and lifelike sound: “One of the most seductive cartridges on the market” (Vol.7 Nos.4, 5 & 8). The Garrett Decca (Vol.7 No.8, Vol.8 Nos.1 & 3) is slightly superior in every way to the van den Hul. The Super Gold, which is actually marketed by Decca and promises greater reliability and a better warranty, is similar to the Garrett but a little more forward-sounding. (Vol.8 No.4)

Dynavector 17D2 MR
Lovely high end, very detailed sound, a superb performer. One of the best cartridges tested by AHC; the best that BS has heard. The short cantilever implies a need for good disc clamping to reduce warp-induced wow. (Vol.7 No.8, Vol.8 No.1)

High-Phonic MC-R5
“One of the best MCs I’ve tested” said JGH about this $400 cartridge, referring in particular both to tracking ability and to the breadth and depth of its soundstage. Its euphonic balance would suit speakers with an uptilted HF balance, such as the Martin-Logan Monolith. (Vol.9 No.8)

Monster Cable Alpha 2
Smooth, musical, detailed, very good soundstaging, very quick and detailed, but lifted high end can make choice of ancillary equipment important. “More agreeable than accurate,” said JGH, due to the Alpha 2’s recessed midrange, but he did feel that the soundstaging, imaging, separation and trackability were all superb. Not at its best with Conrad-Johnson or Krell preamps, or Martin-Logan loudspeakers. Samples may vary; ours did (though one of them had become magnetized). (Vol.7 No.8, Vol.8 Nos.1 & 3, Vol.9 No.4)

Ortofon MC30 Super
Much less expensive derivative of the MC2000 features almost Class A performance in some areas, particularly regarding bass performance and tracking, but less good soundstaging. Slightly less neutral tonal balance then the ’2000 will render it incompatible with systems optimized for CD playback. (Vol.10 No.1)

Shinon Red Boron
Fast, smooth, excellent bass, superb imaging and depth, sweet but very detailed highs. Highly sensitive to tonearm set-up, may require a tilted-to-the-back tonearm to achieve correct VTA. (Vol.8 No.4, Vol.9 No.1)

Talisman Alchemist III5
Excellent soundstaging, slightly forward, excellent midrange, smooth highs, very detailed. Dynamic and exciting rather than cool and analytical. (Vol.7 No.8)
GREAT MUSICIANS, PAINTERS, WRITERS, CABINETMAKERS, SCULPTORS ALL HAVE THE SAME IDEAS ABOUT EXCELLENCE: IMPOSING THE HIGHEST CRITICAL STANDARDS UPON THEMSELVES, THEY REJECT MUCH OF THEIR OWN WORK AND OFFER TO OTHERS ONLY THEIR VERY BEST.

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AudioVisions was incorporated in 1981. Over the past six years we have painstakingly evaluated hundreds of audio component models; the evaluation of one model may continue for months. The two AudioVisions owners share over forty-five years of combined audio and musical experience. We are not “copycats” who make decisions on the basis of the publication of a rave review. AudioVisions has been the sponsor of the national debuts of several outstanding new components; those debuts took place many months before glowing reviews of the components were published. Meanwhile, in general our approach to new products is very cautious. Though the AudioVisions store is larger (and more comfortable) than most, we feature only a relatively small number of products. All the products featured at AudioVisions reflect our beliefs: We make real choices, real decisions, and we stand by them. Perhaps that's why so many of our customers tell us that they trust us, and believe in us.

In addition to really enjoying music, we also really enjoy people. Perhaps that's why we feel that everyone deserves excellence, whatever their audio budget. That old adage, "Take the time to do it right," means a great deal to us. We will gladly take that time, if you will: please call in advance for an appointment.

The View is Best from the Summit . . . . . Close Your Eyes and Listen.
Competition coil, Adcom (Vol.7 No.8)


Difference. MAS production. Has imaging, Shure.

First call. "state-of-the-art" car. When your friends need to change the cartridge on their old Dual or Garrard, this is the one to recommend. Will hum if used with AR decks; lack of suspension damping can lead to woofer pumping, even flutter, with high-mass arms. Dealers aren't in love with it; at $20, how much profit can there be? (Vol.7 No.8; actual review was of an earlier version, the GTE +1)

Nagaoka MP11 Boron

A clear, precise midrange and treble is allied to a rather veiled bass, but the mixture will work well in beer-budet systems where the need for unfatiguing highs outweighs the lack of low frequency clarity. (Vol.10 No.2)

Kiseki Purple Heart, Carnegie, Goldbug Clement, Koetsu Black, K, Monster Gemini 1000

Garrard MC60 Super

"Uncolored, detailed, and composed," said KK of this conventional-output MC, with a performance evenly balanced across the board. Sins of omission rather than commission lead to a recommendation. (Vol.10 No.2)

Ortofon X3-MC

First in a new range of reasonably high-output MCs from Ortofon, the X3 features excellent tracking and portrayal of recorded space, with fine retrieval of groove information. In many ways, the opposite in character to the Denon DL-160, the X3 will shine in systems that lack a little sparkle. (Vol.9 No.8, Vol.10 No.1)

Ortofon MC10 Super

Unfatiguing, well developed, superbly laid-back. With the or-tofon MC10 Super, you have it all. (Vol.10 No.1)

Shure V15-VMR

Exceedingly neutral midrange and bass, slightly soft high end, high compliance. Excellent value at typical discounted price of $139. You sacrifice a bit of detail both compared with MCs and the more expensive ($400) Shure Ultra 500 for unsurpassed tracking ability, excellent reliability, and listenability. (Vol.7 Nos.5 & 8)

D

Goldring Epic (US version)

At last a challenger—albeit, at $60, a more expensive one—for the budget crown of the cheap Grados. Good tracking ability, and more extended HF response than the Epic sold in the UK (but less-good soundstaging), make it suitable for use in relatively expensive LP players until the budget can be stretched for a Class B or C cartridge. (Vol.10 No.1)

Grado XTE +1

The best buy in a really cheap cartridge, this $20 MM has excellent trackability and sounds rather like a good MC. When your friends need to change the cartridge on their old Dual or Garrard, this is the one to recommend. Will hum if used with AR decks; lack of suspension damping can lead to woofer pumping, even flutter, with high-mass arms. Dealers aren't in love with it; at $20, how much profit can there be? (Vol.7 No.8; actual review was of an earlier version, the GTE +1)

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Moffat

Almost unobtainable, this extensively reworked Toshiba features tube analog stages and increased levels of rejection of ultrasonic hash in the digital circuitry. Indulgently included in the listing because the sound is the best that JA and DO have heard from CD. (NR)

Sonargraph SD1

Perhaps a slight loss of transient detail and resolution compared with the best, but scores in other areas, resulting in a consistently musical performance, bettered only by the best analog front ends. A "clear best buy," according to AHC. (Vol.10 No.1)

Sony CD-P650ESD/DAS-703ES

Less warm- and liquid-sounding than the Tempest, with a less deep soundstage, but with better low-bass control and extension. Very, very expensive, but JGH's reference player as of early '87. Without the '703 DAC, sound drops to Class B where it becomes too expensive to recommend. (Vol.9 No.6)

B

Denon DCD-1500

Almost as good as the two-box Sony at one-third the price. A best buy. (Vol.10 No.2)

Discrete Technology LSi Mk.II

Roughly comparable with the PS Audio CD1A in overall attainment, this modified Magnavox is warmer-balanced, but less good at retrieving recorded detail. (Vol.10 No.1)

Mission PCM7000

Fully-loaded with features, the Mission is the best of the machines featuring Philips new 16-bit chip set. A tight, extended bass is coupled with very clean treble, rendering listenable CDs with a hitherto fatiguing balance. JA and GG consider resolution of low-level detail to be amongst the best in this class; AHC demurs (based on audition of an early-production version). (Vol.10 No.2)

PS Audio CD-1A

AHC liked the sound of this much-modified Magnavox 2041 on massed strings and voice, and felt the bass to be better than the Mod Squad Meridian Pro; JGH felt that its soundstage presentation was also excellent, but that its middles were a bit recessed. An overall dryness, however, not dissimilar to that of, for example, the PS IV preamp, prevents the CD-1A's inclusion in Class A. (Vol.9 Nos.1 & 6, Vol.10 No.1)

C

Magnavox 560 etc.

Preliminary auditioning of these 16-bit plus oversampling machines suggests a Class C rating, as the performance shortfall of Philips' new chip set is not a serious failing in view of the competitive pricing. Audition before purchase is strongly recommended. (NR)

NEC CD-705

Two-times oversampling player with generally low levels of HF grunde. (Vol.9 No.2)

Sony CD-P55

JGH was impressed by the facilities offered by this inexpensive, much-discounted player, and felt the sound to be surprisingly good, at least on a par with Sony's now obsolete '520. Reported problems in tracking discs that Magnavox-system players handle without problems. Considering the sound quality and excellent feel, a cheap buy. (Vol.9 No.6)

D

Magnavox FD. 1040, 2041 (or Marantz and other Philips 14-bit/oversampling players)

Very user-friendly, often heavily discounted. Soft highs, somewhat harsh midrange, lack of ambience, somewhat loose bass—but mucho cheap. Worth modifying with better output capacitors. (NR)

K

Accuphase, Audioquest, CAL Aria, Meridian 207, Melos, Nakamichi OMS-5 Mk.II, PS Audio CD2, Cambridge CD-1, Kinegeretics, Tandberg TCP 3015A (16-bit version)

Deletions

Meridian Pro MCD obsolete, replaced by new generation of Meridian machines yet to be auditioned. Sony CDP-520ES replaced by '650. Adcom GCD-300, due to uncertain availability and highish price for Class D.

Preamplifiers

A

Audio Research SP-11

A tube/FET hybrid that JGH finds both musical and accurate. His new reference. Inputs and controls for every possible need—except bass and treble—and sound improves even further if most of the switching and controls are bypassed via provisions on the preamp. Requires significant warmup for the best sound—even to the point of leaving it on all the time. (Vol.9 Nos.4 & 7)

B

Audio Research SP-10 II

This versatile all-tube preamp is virtually free of coloration, doing everything almost perfectly—"almost" being the word distinguishing it from the SP-11, whose low-bass is less fat and which has better detail. Only practical limitation is its inability to use very-low-output cartridges such as the Ortofon MC2000, without additional gain devices. JAH's reference, but AHC finds its virtues to be too good to be true, feeling the SP-11, in being more transparent to the details of the recording, offers a more accurate, if not always more musical sound. (Vol.7 No.7, Vol.9 No.7)

Conrad-Johnson Premier Three

Another state-of-the-art tube preamp, the Premier Three is similar in overall quality to the SP-10 II but more "tubey": a little warmer, more luscious midrange, less analytically detailed, less frequency extension at either extreme. JGH's reference until the SP-11 came along. Can be improved by bypassing switching and balance control. Latest version reputed to be better than this description, but as yet unauditioned. (Vol.7 No.3, Vol.8 Nos.2 & 4)

Convergent Audio Technology SL-1

Borderline Class A according to AHC, this tube design closely approaches the SP-11 in some areas,
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in particular the bass and midrange, and even surpasses it in the high treble. It loses out in terms of dynamics, however, hence an overall Class B rating. (Vol.9 No.7)

**Klyne SK-5**
Incredibly clean, quick, detailed, smooth, open and solid, with superb imaging and soundstaging. Possibly the most accurate preamplifier until the appearance of the SP-11; may or may not be the most listenable, depending on your system. Particularly suitable for moving-coils (includes a variable-gain head amp and HF roll-off switching). Latest '5A version has revised line-level stages; has reached Santa Fe at time of writing but has yet to be auditioned. (Vol.8 Nos.2 & 5)

**Motif MC-7**
The Motif is a transistor preamp designed by Conrad-Johnson, and sounds it. In fact, it has the same virtues as the Premier Three, but is better at them: the high-frequency sweetness is there, but highs have more extension; the imaging is as three-dimensional, but more specific. Highly recommended; the only thing missing is the warm glow of the tubes. (Vol.9 Nos.1 & 7)

**Adcom GFP-55**
A slight loss of transparency and a restricted soundstage keep this otherwise excellent $500 preamp from competing with the Class B contenders. Unique for an "audiophile" product in that it features tone controls. Like the PS 4.5, a best buy. (Vol.9 No.7)

**Conrad-Johnson PV5**
Not really competitive in price with the other Class C units ($1485), the PV5 sounds wonderful. Quite euphonic, but it seems to get in the way of the music so little. An ideal preamp for CD player owners. (Vol.7 No.3)

**Lazarus**
Lively and clean sound, superbly transparent, easily surpassing, for example, the Berning TF-10. A slight glare in the upper mids and grain in the treble bar it from the Class B collection, and DO was worried about the fact that it cannot be turned off, which could lead to excessive tube replacement costs. The Cheapskate loved it, however, feeling that it was the ideal preamp to render silver disc reproduction fatter to that of black. (Vol.9 No.2)

**PS Audio 4.5**
Beautifully built with superb sound, especially considering the price. Class B sound with line stage switched out and using CD as source, when AHC found little to criticize, but system matching then becomes tricky in terms of gain and frequency-extreme rolloffs. Phono stage is near-Class B, but with line stage in, drops to Class C overall, the sound becoming leaner and less transparent. (Vol.9 No.7)

**Conrad-Johnson PV-3**
At $300 in kit form, this used to be the lowest-cost way of acquiring a full-function tube preamplifier. Switching is limited, volume control doesn't track very well, and it has a notably fat mid-bass and rolled-off highs, but the sound is nonetheless quite attractive. (Vol.5 No.10, Vol.6 No.3)

**Dynaco PAS-3X**
Owners of this venerable classic should not yet throw it out; if you come across one at a garage sale, snap it up. Replacement of capacitors, upgrading of the rectifier and power supply, and replacing resistors can turn an old PAS-3X into a respectable preamp. You can buy a Van Alstine update kit ($100) and turn your old PAS-3X into a very nice-sounding product. (NR)

**NYL Moscode SuperIt**
Bargain phono-only preamplifier, with volume and balance controls. Smooth and sweet top end; firm, articulate bass; good sense of dynamics. Well-defined, wide soundstage, but inferior to Class B preamplifiers at localizing instruments in space. Add a QED or Old Colony line-level switch box and you have a remarkably inexpensive, full-function, high-end preamplifier. (Vol.9 Nos.6 & 8)

**Phoenix Systems P-100**
This offers truly high quality phono preamp quality at an astonishingly low price ($99 kit, $149 assembled). A "black box" with only an AC switch and a stereo/mono switch, it accepts a MM cartridge and delivers line-level RIAA- equalized outputs to your main control preamp. The sound is clean and dynamic, a little thin at the bottom (there's a good chance this was corrected in later versions), with a wide, deep soundstage, remarkable midrange clarity and sweet highs. (Vol.8 No.2)

**Superphon Revelation Dual Mono**
Once the only solid-state preamp that could be recommended at under $500, the 460 Dual Mono now has serious competition from the PS and Adcom Class C preamps. A pain to use (separate volume controls) but the sound quality hints at the best available, particularly with MM cartridges. Limited input switching. (Vol.8 No.4)

**K**
Audio Research SP-9, Krell KRS-1A, Krell KRS-2, Klyne SK-6, Cello Audio Suite, PS Audio 5.0, Meitner PA-6, Conrad-Johnson Premier Seven.

**Moving-Coil Stepup Devices**

**A**
Audio Research MCP-33
Much the same open, three-dimensional sound as the SP-10 preamp (with which it's not intended for use), the MCP-33 will benefit many preamps. Front-panel switchable cartridge loading (a big plus). Not for use with really low-output cartridges such as the Ortofon MC-2000. (Vol.8 No.5)

**Audio Research MCP-2**
A transistor step-up that provides almost the open sound quality of the Klyne SK-2A (see below), for the same price as the tube MCP-353 ($1395), with greater ease of use and slightly less flexibility. Rolls Royce construction. (Vol.8 No.5)

**Conrad Johnson Premier Six**
Possessing similar colorations and transparency to the Premier Three, the Six can be an ideal for use with transistor preamps, but requires careful matching. Quite expensive ($985). (Vol.8 No.5)
Counterpoint SA-2
Superb preservation of detail, low distortion, lovely midrange. The noise is noticeably higher than with the Klyne (see below), but the problem with fat bass on early units has been corrected. Comes with an interesting tube bias adjustment for tailoring the sound to your tastes; the SA-2 can be made to sound rich and euphonic or somewhat lean—as long as you don’t go crazy wondering what’s right. (Vol.6 Nos.2 & 3)

Klyne SK-2a
A close rival to the Counterpoint SA-2, the basic difference here being solid-state versus tube. Superb bass, very deep and tight, excellent high frequency extension, excellent imaging. It still lacks the 3-dimensionality of tubes, but only slightly. Adjustable high-frequency rolloff and cartridge loading is a boon for those with several MC cartridges. A bargain at $695. (Vol.7 No.3, Vol.8 No.5)

Fidelity Research XG-5
The least coloration of any transformer AHC has heard; less expensive, more convenient, and lower information loss than “The Head,” which we used to recommend. (Vol.8 No.5)

Princeton Design Group Active Cartridge Stabilizer
Shorts the output of any pickup (MM as well as MC) and amplifies resulting current; seems to improve the sound of most pickups; not suitable for higher-impedance MMs. Class B ranking is a guess—audition in home system and decide whether it’s worth the price. (Vol.9 Nos.1 & 3)

SOTA Headamp II
Somewhat warm and sweet, superb inner detail, good HF detail, excellent soundstage presentation. Tube solid-state step-up to use if you like the sound of tubes, but can’t afford to buy them. (Vol.7 No.8)

Music Reference RM-4B
Not as good as the best tube step-ups, but similar in character and less expensive. The RM-4B is flexible and a good deal. (Vol.8 No.5)

Power Amplifiers
A
Editor’s Note: LA feels that a more critical discrimination should be made between these admittedly excellent amplifiers, whereas JGH and AHC feel that all are of Class A quality but different enough in character that each will shine in an appropriate system. Look to the next Recommended Components for this impasse to be resolved.

Audio Research D-250-II “Servo”
In the super-amplifier sweepstakes, the D-250-II is analytical and revealing, yet musically natural and unfatiguing. Not the typical tube sound: extended highs, very good bass control (though still short of the best solid-state), close-up and intimate midrange with tremendous detail. According to LA, the 250-II may be outdone in the bass by some, but the sense of aliveness from the midrange on up is unequalled. (Vol.9 No.5)

Audio Research M-100
Felt by some to surpass the D-250, this tube monoblock is the least “tube-sounding” amplifier JA has heard. And that’s a compliment. Sounds best with its input level control bypassed. (NR)

Counterpoint SA-4
An OTL and OCL mono tube design which is the “perfect amplifier for the 17th and 18th centuries,” according to AHC. Sweet, airy, and close to the D-250 Servo in its ability to deliver recorded detail. Works well with electrostats, despite limited current delivery into low impedances. (Vol.9 No.4)

Jadis JA-30
Auditioned by DO with old Quads, this modest (but not inexpensive) mono tube amplifier produced Class A sound quality, striking the right balance between tube “liquidity” and tube midrange glare. Imaging, timbral accuracy and transparency are exceptional. Audition carefully with your chosen loudspeakers; they may require rather more drive than the Jadis can provide, even though the latter overloads very gracefully. (Vol.10 No.2)

Krell KMA-100 Mk.II
By all accounts, the latest version of this 100W mono amplifier is the best Krell has yet produced, eliminating virtually every trace of upper-midrange glare. Exceptionally transparent, it gets close to getting the best from any loudspeaker with which it is used. Forget the apparently modest power rating, this amplifier is almost a true voltage source and can dump current into very low loads. (Vol.10 No.2)
Krell KSA-100 Mk.II
For a while more popular in Japan and Europe than in the US, this elegant pure-class-A dual-monaural amplifier, now in Mk.II form, is becoming recognized here as totally unflappable when it comes to driving real-life loudspeaker loads. Bass is the tightest you will hear, apart from the KMA-100; soundstaging is excellent, with depth aplenty on recordings involving it; but choose ancillaries with care as the Krell’s transparency will let you hear exactly what’s wrong farther upstream. (NR)
NYAL Futterman OTL-1
With circuit design dating back to the ’50s, should this OTL, capacitor-coupled four-box, stereo amplifier be a contender? The answer is yes, as the tightest regulated supply around kicks the tubes into order. Can produce magic with the Quad ESL-63, but not recommended for use with ultra-low impedance speakers. (Vol.9 No.6.) Those with less deep pockets could investigate the NYAL Futterman OTL-3, which is superb in the upper registers (sweet and musical). Deep and rich but not very tight bass, realistic soundstaging, superbly natural midrange. Again, a great amp for the Quad ESL-63. (Vol.7 No.8)
Threshold SA/1
Relatively moderate power for the price, but the “sweetest, smoothest high end this side of Audio Research” according to JGH. 160W “Stasis” mono design. Add low-frequency authority and a slightly laidback midrange, and you have a solid-state amplifier only bettered by the best tubes when it comes to the presentation of soundstage. (Vol.9 Nos.1 & 3)
Boulder 500
This class-AB unit, based on Deane Jensen’s 990 discrete op-amp design, extends the traditional bass strengths of solid-state amps throughout the audio frequency spectrum. Very neutral in character, but with just a trace of hardness in the mids and treble. Transparency and resolution of detail rival that of the best cost-no-object designs. (Vol.9 No.5)
Classe DR-3
Low 25W output per channel and class-A operation remind one of the classic Mark Levinson ML-2. Mellower and richer than the Krells, and lacking dynamics, the Classe DR-3 produces a sweet, detailed sound, with surprising output capability for the modest power rating. Particularly well suited to Apogee Scintillas. (Vol.8 No.8)
Conrad-Johnson Premier Five
Superb soundstaging, imaging, balance, depth, musicality, and realism. An almost archetypal tube amp with few flaws, it is surpassed slightly by some others in low-end heft and range, and in high-end openness and transparency. Compared with the D-250-II, the Premier Five is more “tubey”; a “mid-hall” sound with sweeter and more forgiving highs and slightly less bass control—though plenty of power. The choice between the two amps is a matter of taste and the speakers with which they’ll be used. (Vol.7 No.8, Vol.8 No.7)
Krell KSA-50 Mk.II
The latest ’50 sounds similar to the ’100, giving up 3dB or so of ultimate level, but has less good—if still outstanding—soundstaging. Nearest of all Class B amps to achieving Class A status. (Vol.8 No.4 KSA-50 Mk.I)
Meitner MTR100
Impressive and physically attractive solid-state monoblock, lacking soundstage depth, despite very transparent sound, when compared with Class A units. One of the more musical amplifiers around, according to AHC. (Vol.10 No.2)
Nestorovic Alpha-1
Driven in balanced mode (by, for example, the Klipsch SK5 preamp), this tube monoblock comes close to combining the best of solid-state performance with the best of tubes, being euphonic-sounding but with a tight, well-controlled bass. (Vol.9 No.8)
PS Audio 200C
Some controversy over this amplifier, as AHC feels that in DC-coupled mode, it redefines amplifier sound, but JGH, while impressed by its neutrality, found its upper midrange subtly irritating. Audition carefully. (Vol.8 No.8)
Quicksilver
The Audio Cheapskate found the mono Quicksilvers to be ideal with the Quad ESL-63s. Others have found them to work beautifully in a lot of low-power situations. Wonderfully tube-like, superb, standards-setting midrange; can drive low impedances due to excellent output transformer. A bargain, even at $1400/pair. (Vol.7 No.3, Vol.8 Nos.2 & 4)
C
Adcom GFA-555
Wide, deep soundstaging, excellent imaging, very neutral sound, smooth, detailed and open highs, excellent low-end heft and control. (Vol.8 Nos.4 & 7)
BEL 1001
A versatile and very powerful 100W amp with extended high end, sweet upper midrange and lower treble, tremendous drive in the midbass. Not as powerful in the very low bass (below 30Hz) as its brother, the 2002, and not as much like an instrumentation amplifier. Perhaps a bit more listenable on a wider range of systems, and significantly less expensive at $1395. Potential Class B, but re-auditioning necessary. (Vol.7 No.7)
British Fidelity P170
Designed by tube maven Tim de Paravicini, this MOSFET power amplifier from a go-ahead British company, is similar to the less-expensive B&K ST-140 but is more transparent. “The finest all-round power amplifier,” the Cheapskate has heard, “for under a kilobuck.” Not as lifelike in the mids as the C-J MV50. (Vol.9 No.4)
Conrad-Johnson MV-50
A classic tube amplifier, with under-controlled bass, but also a quite superb midrange and lower treble, which happen to be the most critical regions for music reproduction. Very liquid. The antithesis of grainy sound. (Vol.9 No.2)
Discrete Technology LS2
More musically natural than the PS 200, and a warmer balance than the Adcom GFA-555, the solid-state
Distech is less powerful than either. A touch of highest-end sound with a taste of tube quality for less than $1000. (Vol. 10 No. 2)

**Electron Kinetics Eagle 2**

Now in Mk.II form. Alive, up-front sound, very wide, moderately deep soundstage, excellent imaging, crisp, smooth, detailed and open highs, excellent definition and inner detailing, unsurpassed low-end punch and control, but a tendency for the sound to become too up-front. Borderline Class B rating, depending on the loudspeakers with which it is mated, but expensive at around $1300. (Vol. 8 No. 4)

**D (Separates)**

**B&K ST-140**

The B&K costs little enough ($440) to make it into Class D and the sonics are almost good enough for Class B. It features a very easy and enjoyable high end, deep but not extraordinarily powerful low bass, and good performance elsewhere. We can't figure out how B&K does so well for so little. (Vol. 7 No. 4)

**Berning EA-230**

If you have an efficient system that likes tubes, the Berning offers you the best sound available for $900, it also puts out the most refined sound for a Class D amplifier, albeit at low power. Very sweet, with superb resolution of inner detail. Be careful of the output rating, though: 30 watts just isn't enough for most of the speakers popular these days. (Vol. 5 No. 1)

**Hafler XL-280**

Forget the fuss about the claimed "perfect" performance, this new Hafler offers high power and basically good performance at an affordable price. Bass is a little exaggerated and treble too dry for JGH's tastes, but otherwise recommended. (Vol. 10 No. 1)

**NAD 2600**

One of the highest-powered amplifiers available in its price range. Depth slightly flattened, and mid-range a little laid-back, but this NAD features a high end that, according to JGH, is "gorgeously smooth," not a bit like the typical "mid-priced solid-state amp." (Vol. 10 No. 2)

**Carver M1.0t**

The result of Bob Carver's notorious challenge to Stereophile that he could make an amplifier sound the same as a selected tube amplifier, the M1.0t's sound is definitely tubey, although the production version doesn't sound like the target amplifier. Dynamic range is excellent, soundstaging is somewhat two-dimensional, low frequencies are extended but a little ill-defined in the upper bass, and the treble is "tinkly" Good value for the money, though. Full review in this issue.

**D (Integrated Amplifiers)**

**Audiolab 8000A**

Probably the finest-sounding British integrated amplifier, as well as one of the most versatile. A little expensive in the US. (Vol. 9 No. 1)

**British Fidelity A-1**

Underpowered class-A integrated amplifier, runs too hot for comfort, but provides superb sound within its dynamic limitations. An ideal amplifier for old Quads and small, efficient boxes. (Vol. 9 No. 1)

**Harman/Kardon PM-655**

A good buy, this integrated amp with very good built-in MC inputs has clean, punchy, very detailed sound that is just a little cold. It has good depth and detail, moderately good bass. (Vol. 8 No. 5)

**Mission Cyrus One & Two**

Two small, visually identical, British integrated amplifiers (the Two being more powerful than the One), which have garnered almost universally good reviews. Add the PSX power supply to the Two and you have the basis of a surprisingly good budget system. (NR)

**Rotel RA-820BX**

Only 25 watts per channel, this integrated amp has better bass than the Creek CAS-4040 but is otherwise not quite as good. Slight treble hardness. (Vol. 8 No. 5)

**K**

Audio Research M-300 & Adcom GFP-535 power amps, British Fidelity A-100, AR integrated amplifiers

**Deletions**

Creek CAS-4040, due to uncertain US availability; Conrad-Johnson MV-75A-1 no longer current; Rowland Research 7 has been significantly improved since our last audition, we await its arrival; Sumo Andromeda, which hasn't been auditioned for three years.

**Speaker Systems**

**A**

**The WAMM**

This $45,000 system does everything extraordinarily well (delicacy, balance, authority, pinpoint imaging), but in two respects it's unequalled. No other system we've heard does as well at telling you what the other components in your system are doing; and none other gives you quite the feeling of weight and authority of a real orchestra. (Vol. 6 No. 3)

**B**

**Apogee Duettia Mk.II**

Elevated low frequencies, a rolled-off high treble, and chronic insensitivity prevent this superbly transparent and always musical loudspeaker from becoming a universal recommendation. Coupled with Krell-standard electronics and a light-balanced cartridge—the Carnegie, for example—the latest Duettas could be the basis for a system capable of giving extended musical enjoyment, due to the lack of any kind of resonant signature impressed upon the sound. (Vol. 9 No. 7, Vol. 10 No. 1)

**Apogee Scintilla**

Very fussy in set-up and revealing of the quality of the electronics used to drive it, the Scintilla can provide very revealing and coherent sound when everything is just right. Low bass is generous but integrated and cohesive, midrange has extraordinarily natural timbre, and detailed soundstaging. You'd better have an amp capable of lots of current as the load impedance dips below 1 ohm. (The previous 4-ohm option has been discontinued.) (Vol. 8 No. 3)
Celestion SL600
A miniature, admittedly, lacking the bottom octave- and-a-half of bass extension, and possessing slightly depressed mid- and extreme treble ranges that makes system optimization difficult, the SL600 combines transparency and holographic imaging with a musical balance unique for a box speaker. Poor perceived value for money, but sees off most of the moving-coil competition in these areas. Worth using with high-end (solid-state or Audio Research) electronics. (Vol.10 No.2)

Celestion System 6000
Based on what is possibly the finest subwoofer extant, the 6000 combines the virtues of the SL600 with a true 20Hz bass extension and improved midrange transparency. Expensive, however, not even including the need for a separate stereo power amplifier to drive the enclosureless subwoofers. (The latter are worth auditioning with the Quad ESL-63 to give that attractive system bass extension and power handling.) (Vol.10 No.2)

KEF R107
The first British loudspeaker with truly extended bass, JA feels the '107 to be one of the best speakers to come from the UK, main shortcomings being a lack of transparency in the treble, perhaps being due in equal parts to its aging tweeter and to the active equalizer, and upper-bass fatness. Low frequencies are capable of an exceptional level of fine-tuning to best suit room acoustics and positioning. (Vol.9 Nos.4 & 7, Vol.10 No.2)

Magnepan Timpani IVA
Offering excellent performance for their $3800 price, the IVAs have exceptional high-frequency performance and a delicate midrange with excellent harmonic accuracy. Though not as fussy as the Scintillas, room considerations and placement are more important than with most speakers for proper imaging. Bass is good, but requires an amp with high current capability. Most serious weakness is a lack of impact, particularly in the lower midrange. (Vol.8 No.6)

Magneplanar MG-III A
Hard to set up, requiring more than the usual love and care, but uncolored and easy to drive. Works beautifully with smaller ARC amplifiers. Toneally very neutral, apart from a tendency to brightness in smaller rooms, which can be alleviated by inserting 1 or 2-ohm resistor in ribbon tweeter feed, and a degree of "Maggie slam" in the upper bass. Coherent, transparent, musically satisfying, excellent value for money. JA, MC and AHC recommend this speaker highly; JGH could not, based on its failing his "goose-bump" test, albeit when compared with more expensive speakers. (Vol.7 No.4, Vol.9 No.4, Vol.10 No.1)

Martin-Logan Monolith
This hybrid electrostatic/dynamic system is very detailed, transparent and realistic, with very good imaging and soundstaging, but it tends towards excessive brightness. Lows require lots of current capability from the amp, but can be very deep and tight, though the Monolith gives up something to the best competition in this range. (Vol.8 No.3, Vol.9 No.3)

Quad ESL-63
Very musical, natural imaging, excellent soundstaging, tight but not-very- deep bass, very good resolution, limited maximum-volume capability. (In Santa Fe; with its 7000-ft altitude, this was a strict 97dB on peaks.) Later models are less dry-sounding than early production. Can really come alive with the right amp, usually tubed (Putermans are ideal). Benefits from numerous modifications, most especially suitable stands. Aficionados should investigate the Celestion dualmono subwoofers. (Vol.6 Nos.4 & 5, Vol.7 Nos.2 & 7, Vol.8 No.3, Vol.10 No.1)

Sound Lab A-3
JGH's current reference, this big curved-panel, full-range electrostatic produces exceptional imaging and a stunningly natural midrange. Warm-balanced, the treble is sweet and musical. Sensitivity and dynamic range are on the low side. Unlike all other Class B speakers, is very close to JGH's personal Class A. (Vol.9 No.6)

Spendor SP-1
The Cheapskate reports that these successors to the classic BCI don't do anything wrong! Very neutral, excellent imaging and depth, tight and moderately deep bass, somewhat lean, forward sound, sweet and liquid midrange, smooth yet crisp highs. DO concurs down the line. Class B if you lean to a classic British sound, otherwise high Class C. (Vol.8 No.3)

Thiel CS3.5
One of the finest US-designed box speakers, the 3.5 is a result of a long collaboration between designer Jim Thiel and the drive-unit manufacturers. Combines excellent low-bass extension—an active equalizer is used—with superb transparency and imaging. A balance opposite to that of the Apogee Duetta, with a slight tendency to a tilted-up HF; makes system matching crucial. (Vol.10 No.1)

C
Acoustat 1 + 1
The 1+1s are quick, detailed, alive-sounding speakers that image better than most electrostats, produce a broad, deep soundstage, and have better low end than you'd expect. More expensive at $1395 than most of the speakers in Class C, but worth it. (Vol.7 No.7)

Rauna Tyr II
Very smooth, neutral, musical with excellent imaging and soundstaging. A good, musical buy at $400. (Vol.9 No.2)

Snell Type C/i
Expensive for Class C and an unprepossessing array of drive-units, but a sound very well-integrated from bottom to top. High frequencies, in particular, are surprisingly natural, and deep bass is impressive. We suspect borderline Class B performance, but further auditioning is required. (Vol.10 No.2)

Spica TC-50
The coherence and imaging of the mid- to upper-midrange rival the Quads and would be considered excellent in a speaker of any price; at $450 they're a steal. The high frequencies roll off above 14kHz and the low end is designed to be very controlled down
The Carver M-1.0t Power Amplifier

"Very beautiful and sweet highs, well balanced with the upper and lower midrange."


"Opinion is truth filtered through the moods, the blood and the disposition of the spectator."

Wendel Phillips, 1889

Form your own opinion at your local Carver Dealer.
For a free reprint of the entire M-1.0t review from the March 1987 issue of The Inner Ear Report, a highly respected Canadian underground audiophile publication, call or write us.
The Carver M-1.0t. $499.
The power amplifier for the committed audio enthusiast who is also enthusiastically committed to value.
to the lower limit of about 55Hz. This makes it perfect for matching to a subwoofer—Spica subwoofer is best used in pairs but still limited dynamics—but it sounds a little lean as a stand-alone. Easily damaged by amplifier overload. (Vol.7 Nos.2 & 3, Vol.9 Nos.5 & 7)

Thiel CS2
The CS2 has a slightly better high end balance than the earlier CS3, and a markedly lower price, but lacks an LF equalizer. The CS2 does it all: remarkable coherence, excellent imaging, natural midrange, extended highs. Based on experience in Santa Fe, though, the HF content has to be watched—anything too extended or peaky preceding the speakers will make the sound a bit relentless. (Vol.8 No.6)

Vandersteen 2C
After nine years of continual refinement, an excellent full-range box speaker, according to AHC. Balance a little rolled-off in the highs but “a joy” in the midrange and bass. Borderline Class B. (Vol.9 No.6)

D
Editor’s note: when it comes to Class D, the last five years have seen great strides in the design of inexpensive loudspeakers, and to recommend just the few which have been reviewed recently would not be fulfilling the role of this Recommended Components guide. We have listed therefore, not only those speakers which have received good reviews in Stereophile but those of which we have had good reports, in an expanded class K.

Nelson Reed 5-02 Satellites/Subwoofers
Very good middle range, wide and deep soundstage, mediocre imaging, smooth and slightly soft highs, lows very respectable with subwoofers. A little expensive for Class D, but worth it. (Vol.8 No.3)

Spectrum 108A
For $229 a pair, these small speakers have good balance, no deep bass, but tight and well controlled mid and upper bass, good imaging, and smooth but somewhat closed-in highs. (Vol.7 No.8)

Spectrum 208A
Very similar to the 108s (above) but with deeper bass and higher power capability. Won’t go well with many low-priced amplifiers and preamps because they’re so revealing at the high end. (Vol.5 No.10, Vol.8 No.3)

Wharfedale Diamonds
Nothing in the way of low end, but very well-balanced from 70Hz up to about 10kHz. The Diamonds image superbly and reproduce instrumental timbres surprisingly well. One major flaw: a tendency towards high-end sizzle which is almost gone with the best electronics available but increasingly evident with anything less—which includes most of the electronics with which they’ll be used. Very small (no more dimension than 10 inches) and only $190. (Vol.8 No.3)

K (D)
B&W DMI10
Gale GS301
Heybrook HBI
JBL 18Ti

Spendor/Rogers LS3/5A
Celestion SL65
Mordaunt Short MS100
Spectrum 410
Thiel CS1
Wharfedale 504
Spendor SP-2
Magneplanar SMGa
Celestion DL4
Tannoy Mercury

Deletions
Nelson-Reed 6-02, Fourier 6, Phase Tech PC-60, QLN Model 1, due to lack of auditioning for a long time; AR Connoisseur 19 replaced by version with titanium-dome tweeter, yet to be auditioned; Sieffert Maxim III replaced by version with updated tweeter; preliminary reports of which were that it was too bright (full review to appear soon); Infinity IRS-111 replaced by un auditioned Mk.V; Infinity RS-1B not auditioned seriously for a while and new Infinity Kappa 9 promises more. Watkins WE-1A, as, despite JGH’s enthusiasm for its listenability, is too veiled for Class C and too expensive for Class D.

FM Tuners
A
Magnum FT-101
An analog tuner, the FT-101 is superb from an RF standpoint, particularly in quieting and sensitivity. Selectivity is bettered only by the Onkyo, but the 101 consistently sounds superior on most stations. Used as a reference. (Vol.8 No.4, Vol.10 No.3)

Onkyo T-9090
RF champ. This tuner gets more stations clearly than all others tested. Very slight high frequency distortion. “A $2600 tuner that sells for $600.” (Vol.7 No.7)

Yamaha T-85
Excellent noise performance—one of the quietest DAS has tested—is coupled with good selectivity and a sensible balance between sound quality and RF performance. “A winner!” (Vol.9 No.8)

B
Accuphase T-107 (not T-106)
Good looks. Only flaw is a mechanical mono-stereo relay that makes popping noise. Less selective than Class A tuners but is a champ at capture ratio. Very effective noise reduction does not significantly reduce stereo separation. Good sound except for bass dynamics—lacks the punch to really impress on rock or pop. (Vol.8 No.7)

ADS Atelier T2
Offset tuning for use on cable FM. Good high-blend and no serious problems. No built-in antenna on AM. (Vol.8 No.1)

Akai AT-57BN
A relatively inexpensive ($280 list, discounted heavily) tuner that performs along with the best of Class B. Good appearance, very good selectivity and sensitivity, and good performance in other areas. Very quiet stereo with only 10uV. Only weakness is an inconvenient tuning meter and poor interface with preamps having less than 50k input impedance. (Vol.8 No.4, Vol.9 No.8)

Luxman T/02
Excellent S/N, good selectivity, and superb SCA rejection. Sounds best in narrow bandwidth position on most stations. Good AM. (Vol.9 No.3)

Stereophile 111
Mission Cyrus Tuner
“One of the most sonically satisfying tuners” read Das’s review. Excellent separation, but merely average RF performance keeps this little British tuner from Class A. A sonic best buy for those who live in strong signal areas. (Vol.9 No.5)

NEC T-6E
A best buy in Class B for $229, the NEC is still our value champion. Good sound and performance surpassing several $1000 class tuners. AM very sensitive. (Vol.8 No.1)

Onkyo T-4087
Most selective of all tuners in group B. Does most things well, but not quite up to the more expensive T-9090. Low noise reception on cable FM. (Vol.9 No.3)

Quad FM4
Good quality construction. Very sensitive with flaw- less audio if properly aligned. Lacks high adjacent channel selectivity and mono-stereo switch. (Vol.8 No.4)

C

Arcam Alpha
Straightforward analog model, with tube-like sound quality that lacks the graininess common to many tuners. Recommended within its RF limitations. (Vol.9 No.8)

Proton 440
The best of the Schotz noise reduction tuners. Superior fringe performance when high adjacent channel selectivity is not needed. Audio good, but not as clean as Class B tuners. One of DS’s favorites. (Vol.8 No.1)

Sansui: TU-D99 AMX
Receives Kahn and C-Quam AM stereo. Very low distortion and noise on FM if unit purchased is aligned correctly. Lacks only high selectivity on FM. (Vol.9 No.3)

Pioneer TX-V1160
Very sensitive and selective FM; unlike other products here, the V1160 includes a TV tuner, which has good AFC. AM mediocre. Lacks manual mono-stereo switching and has slight distortion on FM. Both an excellent value and a means of enjoying stereo TV at low cost. (Vol.8 No.7)

D

Bogen TP-100
Very clean sound; good stereo. Small size, good looks make it a good choice where space is at a premium. Usable only for medium strength signals. Sensitive AM. (Vol.9 No.3)

Harman/Kardon TU905
Sensible tuner with separate muting, stereo-mono and high-bend switches. Stereo separation is top-notch; all other specs are fair. A good utility tuner for $215. Close enough in price, however, to consider moving up to the NEC or other under-$300 tuners in Class B. (Vol.9 No.5)

K

Carver TX-IIA, Pioneer F-77, Sansui TU-D33X (ex- cellent), Adcom prototype (great)

Deletions
 McIntosh MR80, Denon TU-767, HH Scott 559-T, Creek 3040, due to uncertain availability.

Signal Processors

Editor’s Note: I feel that to continue to recommend dynamic range expanders, compressors, aural ex- citers, equalizers, ambience extractors, etc., etc., is not in the true spirit of high fidelity, where the reproduction should be true to what the engineer and producer intended. The only processors still recommended are those which can prove useful in rendering acceptable the playback of historical material.

A Packburn 323 and 103 disc-noise-reduction devices
Quite expensive, and frankly intended for profes- sional (archival) use, the Packburns are the best such devices made. They can remove the maximum of surface noise—ticks, pops, and hiss—from shellac or vinyl discs with a minimum of signal degrada- tion. (Vol.5 No.8)

K Cello Audio Palette

Surround Sound Decoders
(Dolby MP, Ambisonic UHJ, SQ)

A

We have yet to hear a Class A surround-sound pro- cessor

B Fosgate 3601
Good Dolby surround decoding, but not as spec- tacular as the Shure; good stereo synthesis and am- bience extraction; full surround synthesis from stereo is ping-pongy, but effective and fun; center channel and sub-woofer output; variable bass boost; power amp for rear speakers. Hard-wired remote control; sound more colored, less suave, than the Shure. (Vol.9 Nos.2 & 4)

Shure HTS-5000
Cleanest, most transparent and detailed sound of ANY surround decoder; spectacular, “theatrical” decoding of MP; if less good than the Fosgate; very good stereo synthesis and ambience extraction ex- cept that the image collapses in the presence of front-center info (audible only when you use a center speaker). It does not synthesize full surround from stereo; center channel and subwoofer outputs; convenient wired remote control. (Vol.9 No.2)

C

Aphex AVM-8000
Good MP decoding, without a delay line; potentially spectacular sound, with up to 8 distinct outputs; SQ decoder has severe audible crosstalk; sound less col- ored and slightly less transparent than 3601; good full-surround synthesis from stereo; center channel and subwoofer output; excellent cordless remote control. (Vol.9 No.2)

Fosgate Tate 101A†
Best SQ decoder yet produced; discontinued, but worth looking for if you need SQ decoding; has position for Dolby MP, but there is some front/back spill at higher frequencies; hard-wired remote con- trol; rough top end and some veiling.
Minim AD-10
BS judges this to be the best UHJ decoder for the best (Ambisonic) surround system; ambience extraction dependent on quality of program material, but generally very good; excellent full-surround effects, which are continuously variable; can produce stable side images from both UHJ and stereo material; outputs for up to six speakers; dull, slightly veiled sound. (NR)

Home Recording Equipment
Editor’s Note: microphones have been dropped from the list as no-one on the staff has recently had extensive enough experience with the latest types to make accurate judgments. Professional models to look out for on the second-hand market, however, are cardioids from Sony (C37P & C500), Milab and Calrec, figure-eights from AKG, B&O and Coles, omnis from Schoeps and B&K, and PZM mikes from Crown. The Shure C81 cardioid is also reported as having quite a flat response. Ignore all “amateur” microphones; as a rule of thumb, you should spend as much, or more, on a good pair of mikes as you did on your recorder.

A
Apart from second-hand professional models—by Ampex, Studer, etc.—there are no Class A recorders available to the home recordist.

B
Nakamichi DMP-100 PCM processor
Almost identical to the Sony PCM-F1, the DMP-100 is built by Sony for Nakamichi, but has some additional work done by Nak to the analog circuitry. The DMP-100 sounds somewhat sweeter than the F1. (Vol.7 No.5)

Sony PCM-F1 digital audio processor
Professional recordists report some (but not huge) differences between their F1 tapes and tapes made on highly modified, 30ips analog machines. The first almost-perfect home recording system, JGH has reported a certain ineradicable dryness on his F1 recordings. (Vol.5 No.7, Vol.6 No.1)

Tandberg TD20A SE Open-Reel Tape Recorder‡
The best buy in an open-reel deck, this now-discontinued deck offers professional-calibre performance at a modest ($1150) price. Better sound than many professional decks, but ergonomics less good than the still-current Revox B77 III. (Vol.7 No.7)

C
Aiwu AD-770
Almost Nakamichi quality at bargain price. (Vol.9 No.7)

Nakamichi ZX-7/ZX-9 cassette deck‡
Excellent controls and adjustments, very extended high frequencies, sophisticated tape transport. Neither of these Nakamichis is current, but the latest model from Nak is likely to be just slightly better. (Vol.7 No.1)

Revox B-215 cassette deck
Automatic bias adjustment; a superb transport. According to JGH, “A superb cassette recorder, for the person who wants and is willing to pay for the best quality cassettes have to offer.” AHC emphatically disagrees. The latest Nakamichi, with their automatic play azimuth adjust, probably get a slight bit more off prerecorded tapes. (Vol.8 No.7)

Tandberg TCD 3014 cassette deck
Superb midrange headroom, good transport, accessible and useful controls. Better at $1400 than their previous $2200 model, the 3004 (which is also a good-sounding deck). Not the most extended high end, but overall the best sound from a cassette deck. (NR, but see Vol.7 No.1)

D
Sony WDM-6 Pro Walkman cassette system
A pocketable stereo recording system of surprising quality and versatility. (Vol.7 No.6)

Accessories
A
Arcici Quad ESL-63 stands
Latest and greatest method of getting the Quads to perform as God and Peter Walker intended. Clamps the ESL-63 in a rigid embrace, also raising it an optimum 16 inches off the ground. (Vol.10 No.1)

ASC Tube Traps
Relatively inexpensive (Hah!) but remarkably effective room acoustics treatment. These soak up low-to-high bass standing-wave resonances like a sponge. (Vol.9 No.3)

DB Systems DBP-10 Protractor
Fiddly but accurate guide for setting cartridge tangency. JA’s and JGH’s preferred alignment protractor. (NR)

Mobile Fidelity Geo-Tape
A valuable test and shopping aid for cassette decks. (Vol.8 No.5)

RATA Torlyte Turntable Support
An elegant, low-mass stand that enhances the performance of suspended subchassis turntables. Recommended to owners of Linns, SOTAs, and Oracles. (NR)

StyLast Stylus Treatment
StyLast won’t make a difference every time you put it on, but it will help provide smoother high-end sound, and is claimed to extend stylus and cantilever life. (NR)

SOTA & Goldmund record clamps
Though these clamps have a somewhat different sound, they are the best record clamping devices on the market. They can both improve top and bottom end extension and reduce resonances on any table, including those employing vacuum clamping systems. Well worth their cost in a high resolution system. The SOTA clamp has a somewhat richer, warmer sound and is more effective against upper midrange and lower treble resonances. The Goldmund shapes up a flabby lower midrange and controls the more serious lower treble/upper midrange problems. Both work well with the SOTA Supermat.

Sumiko "Flux Buster"
Cartridge demagnetizer; it really works; you need one. (Vol.9 No.4)
Tiptoes
The least expensive way of improving the bass and midrange definition of virtually any loudspeaker.

Tweek
This contact enhancer for use on plugs and terminals actually does improve the cleanliness and resolution of the sound of an already excellent system. (Vol.7 No.6)

Watkins Echo-Muffs
Effective means of reducing amplitude above 200Hz of early reflections of loudspeaker from nearby surfaces, thus improving imaging. Whether or not the aesthetics will be domestically acceptable will be down to personal taste. (Full review to come.)

WBT RCA plugs
The best, complete with locking collett. (NR)

Good Speaker Stands
There are too many possibilities, but briefly a good stand will have the following characteristics: good rigidity; spikes on which to rest the speaker, or some secure clamping mechanism; the availability of spikes at the base for use on wooden floors; if the stand is steel, provision to keep speaker cables away from the stand, to avoid magnetic interaction; and the correct height, when combined with your particular speakers (correct height can be anything from what you like the best to the manufacturer's design height for best integration of woofer and tweeter in time-aligned systems). Though Stereophile has neglected to review speaker stands, it doesn't mean we think them unimportant.

Headphones

A
Stax Lambda Pro
Probably the most neutral and transparent headphone available, the Lambda Pro is capable of ear-bopping bass, though it doesn't blend well with the rest of the range. Neutral perspective. As delivered, the Lambda suffers from upper-midrange suckout, which disappears after some hours' use. Expensive ($800), but includes own solid-state amp. Very comfortable.

D
Sennheiser HD-420 Mk.II
Veiled in the upper mid, but these inexpensive dynamic all-purpose cans are astonishingly good value. (NR)

Sony MDR-282 Turbo
Best of the in-the-ear cans, with LC-OFc wiring, excellent bass response, and a relatively uncolored treble, despite a somewhat overbright balance. (NR)

Deletions
Signet TK-33 not auditioned in many years, replaced by new model.

Record-Care Products

A
LAST record-preservation treatment
This actually works. It significantly improves the sound of even new records and is claimed to make them last longer, though we haven't used it long enough to verify the claim. (Vol.5 No.3)

Nitty Gritty Pro II record cleaner
This semiautomatic wet cleaner cleans both disc sides at once. Slightly less rugged than the VPI, but both do an excellent job and the Nitzy Gritty Pro II is faster. Significantly better design than earlier Nitzy Gritys. (Vol.8 No.1)

Rozol Gruv-Glide
Record destaticizing agent that also leads to better sound. Apparently doesn't leave a film or grunde up the stylus. (Vol.9 No.8)

VPI HW-17 record cleaner
Clearly an industrial-quality machine of reassuring quality, the VPI does one side at a time, semiautomatically, and is slower than the Nitty Gritty. "A highly functional and convenient luxury." (Vol.8 No.1)

B
Nitzy-Gritty 2.5FI and 3.5 record cleaners
Instead of a vacuuming tonearm as on the Monks, the NG cleaner use a vacuum slot. Cleaning is efficient but they are noisy and harder to use than the Monks. Cleaning is just as good as Nitty Gritty's Pro, at half the price. (Vol.7 No.5, Vol.8 No.1)

VPI HW-16 record cleaner
Manually-operated version of HW-17 (above), noisier motor; less money. (Vol.5 Nos.7 & 9)

C
Decca, Hunt-EDA, Goldring or Statibrush record brush
Properly used (held with the bristles at a low angle against the approaching grooves and slowly slide off the record), these are the most effective dry record cleaners available. And they work on low torque 'tables. Better than the DiscWasher for everyday use, but no substitute for an occasional wet wash. (NR)

D
DiscWasher record brush
If you don't have a cleaning machine, the DW system will do an adequate job on relatively clean records, but won't get out the deep grunde. If you begin to accumulate lots of gunk on your stylus after cleaning your record with an older DW brush, the bristles are worn out; send it back for resurfacing or buy a new one. A high torque turntable is required. (NR)

Deletions
Keith Monks record cleaner, due to uncertain availability

Component Interconnects

A
van den Hul MC Silver
A silly price, but this elaborately-wound coaxial cable is apparently flat up into the microwave region, which suggests precision construction. "The best there is!" according to DO (and also MC) as of Spring 1987. The least signature of any interconnect, with the most improvement noticeable on sound-
staging and imaging. (Vol.10 No.2, see also vdH interview in Vol.9 No.8)

B

Aural Symphonics As-One
90% of the performance of the other Class B cables for a significantly lower price will make this Teflon-insulated cable a best buy. (Vol.10 No.2)

Magnan Type 2
Remarkable clarity and focus, but less spacious than the Monster, Siltech or vdH. Midrange is slightly rich, but overall laid-back balance will render its performance somewhat more system dependent than usual. (Vol.10 No.2)

Monster Cable M1000
Pristine bass, smooth mids, spacious highs, and a tube-like dimensionality render this the best interconnect ever produced by Monster. (Vol.10 No.2)

Siltech 4-24
Astonishing transparency and imaging even better than the already outstanding Monster M1000. (Less neutral, though.) The best, were it not for the three-times-as-expensive vdH Silver. Needs "running in." (Vol.10 No.2)

Siltech 2-20
Lower cost Siltech preserves the 4-24's remarkable midrange but sacrifices overall cohesion and some of the definition at frequency extremes. (Vol.10 No.2)

van den Hul D-102 Mk.II
Not as good as the majority of the other Class B cables, broadly comparable with the Aural Symphonics, with a better treble but slightly worse focus. (Vol.10 No.2)

C

Discrete Technology
Available in two versions, differing in quality of high-frequency reproduction and midrange balance. Almost uncolored; highly detailed; smooth, excellent resolution. A "fast" cable, sometimes at the expense of musical coherence. (Vol.9 No.1)

Monster Cable Interlink Reference A
Reasonably neutral, but with slight HF sweetening tendency, and a fat bass. A safe recommendation, but not in the same league as Monster's new M1000. (Vol.8 No.2)

Straight Wire LSI
A clear best buy in Class A just over a year ago, such has been the pace of development that this undramatic-sounding cable drops to class C, lacking the degree of focus and transparency of the Class A and B cables. Excellent detail, open, airy highs, however, and still an AHC favorite. (Vol.9 No.1, Vol.10 No.2)

D

Hitachi LC-OFC
Open, clean, transparent, but high frequencies can get frazzled and low-level detail obscured when compared with the best. Always listenable. (Vol.10 No.2)

Deletions
Livewire FMS Blue replaced by new version not yet auditioned; Peterson Emerald, Randall Research TX, Straight Wire Flexconnect, Aperature, all not auditioned in a while. Monster Cable original Interlink Reference no longer available.

Loudspeaker Cables
(Reported in Vol.8 No.2, Vol.9 No.1)
Editor's note: a thorough update of loudspeaker cables is long overdue and will appear in the magazine when we can persuade some benighted soul to undertake the necessary multi-man-weeks of concentrated listening.

A

Kimber 4TC and 8TC
The latest Kimber has greatly improved Teflon dielectric, and widely varying gauges among its strands. The result is widely compatible in different systems, and not too expensive. (Vol.9 No.1)

Livewire Type 10
Polypropylene insulation and a kind of LC copper. Clean and extended highs, deep bass without overhang. Class A sound quality will be more system dependent than some. (Vol.9 No.1)

MIT MH-750 "Music Hose"
Winner take all! This is the best of the best, almost impossible to fault; bulky, stiff, and awkward to get around, expensive. Still the best.

Randall Research 64TBC
Similar to the MIT but can become very subtly bright with certain components.

Straight Wire Teflon 12
Very neutral, fast, clean, extended treble & bass, excellent HF resolution.

B

Distech
Teflon dielectric and OFC conductors. Fast, detailed, extended HF and LF, unusually good bass range and shift. Expensive, though.

Kimber Kable 4VS and 8VS
Excellent, coherent across the board, not quite as transparent at frequency extremes as the A cables.

Monster Cable Powerline II and III
Class A cables except for some HF softening; the III is softer than the II.

Straight Wire Music Ribbon
Used straight (Hå) from the packaging, this has good frequency extension and timbre, but variable soundstage characteristics. Tweaking the options, however, can give a Class A sound. (Vol.9 No.1)

C

Kimber Kable 4PR and 8PR
Good imaging, balance and dynamics but not quite as transparent as some.

Livewire BC-4
Excellent except for some upper midrange hardness.

Monster Cable (Original)
Very good but lacks resolution and upper-range openness of the better cables.

K

Siltech, Monster M1, van den Hul.

Stereophile
"The Mod Squad Compact Disc Damper is an inexpensive device that gives better sonic results than any $25 device has a right to. If it will fit in your CD player, it comes with my highest recommendation."

Allen Edelstein
Stereophile, vol. 9, no. 2

"We know of no other audio accessory that provides so much sonic improvement for so little cost. A must, if application dictates, for any system having compact discs as a program source."

Earl C. Hudson
Audiogram 21

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**JGH is worried**

The Carver M-1.0t is unlike any other solid-state amplifier. But then, it is not *supposed* to be like any other solid-state amplifier. It is, in fact, the only solid-state amplifier which was designed to sound like a tubed amplifier.

Those of you who read our “Carver Amplifier Challenge” article in Vol.8 No.6 will know what we’re talking about. For the rest of you, a word of explanation is in order.

About two years ago, during a casual phone conversation with our esteemed publisher Larry Archibald, Bob Carver declared that he could make a $600 “generic” solid-state amplifier sound exactly like any amplifier of our choice. LA declared flatly that he couldn’t, and I later agreed with LA—particularly if the amplifier we chose for comparison was a tubed unit with all the sonic earmarks we know to be unique to tubed power amps. So we told Carver he was on, and rather dismissively wished him luck (although we were a little concerned that he was not at all daunted by our choice of a then-SOTA tubed amplifier as our reference).

We’re glad there was no wager involved. After a mere four days of work, Carver presented us with a solid-state amplifier that, after two days of listening comparisons, we could not distinguish from the reference amplifier. Whether or not we might have heard subtle differences had we listened longer is beside the point, because no two amplifiers—even different samples of the same model—are ever *exactly* the same; the longer one listens, the more one hears in the sound of any component. The operative requirement here was not that Carver’s customized amplifier be *identical* to the reference amp, but that it be *similar* enough that we wouldn’t be able to hear the difference. It appeared to meet that requirement.

*Stereophile*
We were not at all surprised when, some months later, Carver started promoting his new M-1.0t amplifier with the claim that it sounded identical to a very expensive and highly respected tubed amplifier. After all, what he had accomplished as a result of the Challenge was a tour de force. We were disturbed, however, when we started hearing reports from some of our reviewers and readers to the effect that the M-1.0ts they had heard in dealer showrooms sounded "miserable." That was when we arranged to obtain a sample production M-1.0t for direct comparison with the original reference amp, which we still had on hand. (We don't always return equipment that we're still using unless the manufacturer insists. Or threatens to sue.)

The Carver was allowed about a week of warmup time, the reference amp (which had been in use within the previous week) 48 hours. I then spent several days listening only to the reference amp, using a variety of mostly classical signal sources, and making notes of the various aspects of its sound. I also referred to my report on the amp, which had appeared over a year ago in these pages, and was interested to find that, despite entirely different loudspeakers from those originally used, the amp's archetypal tubelike qualities were still abundantly evident.

At first, I would have been willing to sign an affidavit declaring the two amps to be identical. But then I started to hear differences I had not heard before. The M-1.0t seemed, consistently, to be just a little less "fat" and rich than the reference amp, and not quite as liquidly textureless at the extreme high end. And front-to-back depth seemed not quite as great. After another couple of days, there was no mistake about it. The two amps were clearly not identical.

The differences were greatest at fairly high listening levels, of about 90dB and more (from my rather inefficient Sound Lab A-3s). But since the Carver's output-level lights never reached the top row, and I never measured more than about 150 watts from either amplifier on signal peaks, I hesitate to attribute the discrimination to differences in the overload characteristics of the two amps. The differences at high listening levels were not dramatic, but there was no doubt that they existed, and that they were consistent from one program source to another. Why I did not pick them up during the first few days' listening is something I cannot answer. Perhaps the amplifiers themselves changed in characteristics during the listening period, or — more likely — perhaps I simply became more attuned to what each was doing. (It is well known that short-term listening, as in the usual A/B tests, reveals only the grossest differences between similar products.) On the other hand, the differences I heard were enough for me to have unequivocally chosen one amp (the reference) over the another in an equipment review, had not the Carver cost about one tenth of the other amp.

Compared with the reference amp, the Carver had less (ie, more neutral) midbass, better LF extension, a very similar mid- and upper-midrange, and a somewhat crisper extreme top. Its bass quality, however, was something I was unable to get a handle on, because this seemed to change according to what was going on through the upper part of the spectrum. When the signal was predominantly low-end, bass definition and control were both excellent. But during moments when the whole orchestra let loose, the LF range was ill-defined and characterless. It was almost as if the amplifier was saying "Look, fellas, gimme a break! I can't concentrate on everything at once!"

Worried about what I had heard, which contradicted Bob's advertising claims, I foisted both amps off onto our International Editor, JA, and without cueing him as to my own conclusions, asked for a second opinion.

—JGH

John Atkinson lives with the M-1.0t

As I was not on Stereophile's staff at the time of Bob Carver's original amplifier challenge, I was very interested to get my hands on the resulting Carver model, the M-1.0t. In particular, I had been intrigued by the claims made in Carver's advertising, first that his earlier M-1.5t had been made to sound the same as the classic Mark Levinson ML2, and then, more recently, that the prototype M-1.0t could not be distinguished from the high-powered tube amplifier chosen by Stereophile as the subject of the challenge. (I ignored for the moment the question of whether his
production amplifiers would sound the same as his prototype).

If Carver had managed to produce an inexpensive solid-state clone of one of the world's most highly respected tube amplifiers, it would seem to expose high-end amplifier manufacturers as cynical exploiters, and audiophiles as gullible, if well-heeled, self-deluders. Frankly, I was skeptical. The only Carver-designed amplifiers I had spent any time with were the original Phase Linear 700—15 years ago—and the 400 "cube" in 1983. Though the latter was remarkable for its efficiency, small size, and ingenuity of circuit design, it was not marked by the ability to produce sound approaching the standard I deem acceptable in my own system. (In fact, when I borrowed one to use at a public demonstration, the audience asked what was wrong!) Nevertheless, Bob Carver is undoubtedly an original thinker when it comes to amplifier design and, as I have considerable respect for both JGH's and LA's ears, I approached the auditioning of the M-1.0t and the reference tube amplifiers with enthusiasm.

The system I used for auditioning the amplifiers consisted of Denon DCD-1500 CD player and Linn Sondek/SME V/Koetsu Red front ends, feeding an Audio Research SP-10. Loudspeakers were Celestion SL600s on Heybrook spiked stands, and cables were Siltech interconnects and Monster's new M1 speaker cable. I spent a week living with the reference amplifiers (the same samples used for the 1985 tests) in order to become familiar with their sound signature, and bias was checked before each bout of listening (I used the 4-ohm tap exclusively). While these are not amplifiers that I would recommend for use with the Celestions, the sound was still very musical, with an excellent midrange tonality. Highs were just a little ragged, and low frequencies were fat in the mid-to-upper bass, without the low-bass definition I'm used to from my Krell KSA-100. Soundstaging was well-defined, if a little on the narrow/shallow side, and overall transparency was again a little less than I'm used to.

The M-1.0t was then inserted in the system and allowed to warm up for 24 hours or so. Physically, the Carver is an impressive little package. It uses a commutator on the primary side of the transformer, so that the amp is only allowed to suck current from the power line when the dictates of the signal require it. The transformer primary doesn't have to conduct all the time whether the power-supply capacitors need charging or not—Carver's "Magnetic Field Amplifier" concept. Despite that, the centrally placed transformer is still quite hefty. No less than five pairs of flat-package bipolar power transistors per channel take up the full depth of the chassis, and the output stage uses three voltage rails. In effect, what we have here is a very high-dynamic-range amplifier, in terms of voltage swing, with a power supply that will remain just ahead of signal demand at all times. This is the opposite of a typical high-end design, where the power supply is massively over-specified most of the time, and thus cruises well within its capabilities with music at normal listening levels.

Care has obviously been taken in the production engineering so that the amplifier can be assembled reliably and quickly, to keep costs down. The amplifier, made in the USA, features internal construction to a high standard, with all circuitry laid out on three boards, plus one more for the front-panel metering. Components are arranged for automatic insertion, and the three smaller boards were obviously originally part of the main board, snipped apart once stuffed with components in order to minimize assembly time! You have to hand it to Bob Carver: the benefit of this cost saving is passed along to the consumer, who is getting a lot of amplifier for under $500. In fact, Carver is perhaps the only indigenous US electronics manufacturer capable of taking on the Far Eastern hi-fi manufacturers at their own game: efficiency in manufacture.

Enough of the journalistic stuff; the Carver was warmed up. I put on a CD and started in on some serious listening.

To say I was surprised would be an understatement. I had expected a sound tonally, if not identical, then at least very similar to the tube amp, with differences—if any—detectable in the fine print of soundstaging and transparency. What I heard was a sound quite...
different from the reference amps. Initially, my feelings were positive. Dynamics were most impressive; the M-1.0t is obviously capable of swinging volts. Whereas I can drive my preferred Krell KSA-100 into clipping into the SL600s for occasional rocking out, the Carver knocked the Celestion's woofers against the endstops — causing not a little anguish — in such OTT tracks as the 12 * 45 of Huey Lewis's "Power of Love." The low bass seemed more extended, upper bass more transparent. The soundstage was wider, but with reduced depth. (In my opinion, the reference amps don't shine here either, but the Carver was even more shallow.) The low treble was more detailed, and the sound, overall, was more bright, even "tinkly," in the presence range.

This was not what I would regard as even a near miss for the Carver. It sounded like a good, medium-priced, but high-powered design, not immediately identifiable as a typical "solid-state" design, but not much like the tube reference amplifier either.

Over the next few days of listening, I became aware of shortcomings. The greater apparent detail and lifted presence contributed a somewhat fatiguing edge to sounds, much like the white Mackie lines you get around areas of deep black in underexposed/overdeveloped photographs of low-contrast scenes. Recorded cymbals sounded like they always had rivets, even when they didn't, and snare drums had an HF "splash" which obscured the sound of the snare wires. Voices had a little more throat tone than they did with the references, where the throat and chest tones seemed more naturally integrated. The extended bass was a consistently pleasing characteristic, but the transparency and definition of the upper bass seemed variable, dependent on program. When the music was simple — with, say, high levels of just kick drum and bass guitar — the definition of bass sounds was quite good. When midrange or treble levels also got going, then the upper bass suffered accordingly, almost as if the amplifier was being forced to concentrate its current delivery where the demands were greatest. (Remember, I did all my listening before discussing my findings with JGH.)

While individual areas of performance seemed good, and even better than the reference amplifier — the low bass definition, the soundstage width — the whole just didn't hang together as it did with the references. If there is one consistent characteristic of high-end amplifiers, it is their ability to allow the listener to hold on to small details of the sound while all hell breaks loose elsewhere; the listener can follow individual instrumental voices within the overall melee, just as in real life. This the Carver failed to do.

Maybe frequency-response differences between the two amplifiers would explain the subjective differentiation. Accordingly, I measured the response at the SL600 terminals driven by both amps, so that I would throw up not only intrinsic response differences but also those due to the interaction between the output impedance of the amps and the load impedance of the speakers. The measured differences, however, were hardly dramatic. The Carver — surprisingly, considering its subjective bass extension — actually rolled off a little earlier than the reference (fig.1), though at -0.5dB at 20Hz, this would hardly be thought audible. (I assume that the subjectively loose upper bass of the transformer-coupled reference amplifier is due both to the reduced damping of the LF drive-unit resonance — see the kink at 45Hz in fig.1,
which is not present on the Carver response—and to the fact that when the amp does roll off, it does so at a faster rate, giving a sharper "knee" in the response.) The M-1.0t also had a tad more lower midrange.

The reference started a gentle decline in HF output half an octave lower, but actually had a slightly more extended ultrasonic response, the Carver rolling rapidly above 28kHz when driving the Celestions. I must stress, however, that I am not talking about major differences: 0.5dB here, 1dB there, certainly not enough to fully explain the subjective results.

Much was made in the original "Challenge" about the ability of the hand-tweaked Carver amplifier to obtain a null of up to 70dB against the reference amps on music signals. Any differences between the two would then be, at most, three parts in 10,000, and the amplifiers would be virtually identical. Carver's production amplifiers are all nulled against the original Santa Fe prototype, so this is an important aspect of the M-1.0t's "similarity." Accordingly, I set up a null test between the production Carver and the reference amplifier. One channel of each drove a Celestion SL600, and I used a battery-powered Heathkit analyzer across the hot terminals of the two amps.2 Mono pink noise was fed to both, and the relative levels adjusted to get the deepest null. The across-the-band figure was around -21dB, while spectral analysis showed the deepest null to be around -40dB at 2kHz, diminishing to -20dB below 100Hz and above 15kHz (fig.2).

To put these figures in context, Bob Carver had stated in the original "Challenge" that it was rare to achieve a null greater than 48dB between the two channels of the same amplifier. I set out, therefore, to see what sort of null I could produce between the two channels of a Krell KSA-100 under the same conditions. The overall figure was nearly 20dB better at -40dB, but more significantly, this was maintained right across the audio band, the worst figure being -38dB above 16kHz (fig.2). In other words, any difference between the two channels was, at most, just over one part in a hundred. Apart from the broad midrange, where it would be reasonable to predict—on pink noise at least—that the two amplifiers would sound similar, the difference between the production M-1.0t and the reference amplifier was up to ten times greater.

On the basis of my experience with the Carver M-1.0t, I must conclude that, while it offers an acceptable, even good, sound quality at its price level, coupled with exceptional dynamic headroom, it doesn't sound like the high-priced tube reference amplifier.

If the original prototype did sound identical—and LA and JGH are adamant that, at least as far as could be determined within that listening period, it did—then the conclusion...
must be drawn that Carver is unable to duplicate this feat in production. Which brings me to the political conclusions of my testing. Much has been made of the results of the original “Carver Challenge,” both in the popular press and in Carver’s advertising and that of his dealers. In particular, Bob’s ad copy writer directly addresses the fact that the tests were carried out with a hand-tweaked prototype: “The inquiring audiophile can’t help but wonder if M-1.0t production models will sound as good. Ask the man who designed it. ‘I promise they will sound exactly the same. And just as good. In fact, I stake my reputation and that of our company on it.’”

The ball’s in your court, Bob. —JA

JGH is flabbergasted:
I spent an evening at JA’s, listening to the two amplifiers, and was at first flabbergasted at the differences which were immediately audible. Even though I am unfamiliar with his speakers and his room, I immediately picked up differences between the two amplifiers that I could only describe as dramatic. Even at moderate listening levels, the reference amp had much more midbass output than the M-1.0t, less deep-bass output, and a softer, silkier high end.

I still think the M-1.0t is a very good buy. But no way is it what its ads claim it to be: identical to a “state-of-the-art tubed amplifier.”

—JGH

Further developments
When Bob Carver was informed of our findings, he was naturally perturbed; perturbed enough, in fact, to fly to Santa Fe the next weekend to see whether the differences we reported hearing were real or imagined.

The first thing on Bob’s agenda was to check whether both the M-1.0t and the reference amplifier were performing as expected. The reference amplifier, for example, is extremely sensitive to variations in line voltage, any major change requiring a readjustment of bias. Having spent the best part of an afternoon measuring, among other things, the output impedances of the two amplifiers, Bob pronounced that it appeared that all was well; we got down to some listening. First, we wanted Bob to hear the differences we were hearing, so the amplifiers were auditioned informally in JA’s system and room, a selection of music being played through each amplifier in turn. The results were inconclusive. Though JA and JGH were confident that the amplifiers were sounding as expected, Bob felt that they were sonically identical. There was no rigor in the test, however, as — against JA’s wishes — the levels were not kept identical on the same pieces of music. Even a small level-difference can create or eliminate subjective differences in comparison tests, and the reference amplifier was consistently being auditioned one or two notches higher on the preamplifier volume control than the M-1.0t. This would be sufficient to bury any identification, or lack of it, in methodological “noise.” Either way, neither party was going to prove anything to the other.

Next, we investigated one of the sonic differences we had described to Bob, the relatively “fatter” mid-bass of the reference amplifier. Bob accordingly set up the 1.0t with about 12 feet of thin single-core wire in the hot lead of each channel, and asked us what we thought. Both JGH and JA felt that the Carver was then closer in its bass sound to the reference, but if that was the case, then the point had been made: the amplifiers did sound different at low frequencies. Bob was noncommittal, however, as to whether he heard any difference.

We spent the rest of the first day investigating the poor performance JA had observed in his attempt to replicate Bob’s deep null between the original prototype Carver amplifier and the reference amplifier. Repeating the test in Bob’s presence gave, within normal margins of experimental error, an identical result. It was postulated that perhaps the discrepancy was due to the reference amplifier being in a different state of bias and line voltage at the time of the original “Challenge,” so we repeated the nulling over a range of line voltages (applied via Bob’s heavy-duty Variac) and misbiasing, and also via its 8-ohm tap. (Bob wondered if the original tests had been done via that setting, JGH and LA were positive, however, that it had been done via the 4-ohm tap, because the primary speaker system for those tests required connection to the reference amp’s 4-ohm tap.) The depth of

3 Audio, October 1986.
the maximum null changed between 3 and 6dB up or down, or shifted up or down in frequency by up to an octave, according to conditions, but the overall null shape remained as in fig.2: good in the midrange, but less so at low and high frequencies. When the conditions of line voltage and bias were such that the midrange null was at its deepest, then the nulls at the frequency extremes were less good. Overall, the null achieved was about the same as when we were certain that the reference amplifier was behaving as intended.

Bob was concerned that one aspect of the production M-1.0's design may well have accounted for the difference in results. Part of the circuitry he uses to synthesize the transfer function of the reference amplifier involves a small-value resistor lifting the 1.0's output ground above the true signal ground. When the two amplifiers are driven in parallel for the purposes of measuring the null signal across their "hot" terminals, their two grounds are referenced back to the system ground at the preamp via the interconnects. As the Carver's small resistor will be in circuit for the null test, the signal current flowing will cause an error voltage to be developed across it, a voltage which will not appear at the corresponding point in the reference amplifier circuit; thus it would contribute to the measurement.

This had still to be resolved at the time of writing—see "Manufacturers' Comments" later in this issue—but JA would make the point that, within sensible limits, he was not that concerned with the absolute nature of the null figures he achieved. Virtually "breath-ing" on the potentiometer used to trim the amplifier gains changed the depth of null by 3dB or so. What did concern JA was the frequency-related nature of the null achieved between the two amplifiers, when compared with the results for both channels of the same amplifier; a frequency dependence that correlated with what both JGH and he had heard independently under extended listening conditions. (Remember that no measurements were carried out until the listening tests had been concluded, in order to rule out the possibility of the listeners' hearing their measurements.) And if this resistor was introducing an error voltage, JA would have expected this error, and hence the shape of the null with frequency if the error was significant, to reflect the modulus of impedance of the loudspeaker. It didn't.

We broke for martinis and dinner, in that order, Bob intending to spend the next day setting up more rigorous auditing in order to prove to his satisfaction, and maybe even ours, that the amplifiers were identical. The martinis were strong and cold. Dinner, at Santa Fe's best restaurant, the Palace, was deeply satisfying. Not only were the food and wine good—good, they were superb!—but the conversation, the usual Stereophile table talk of hi-fi, music, sex, and bad puns (most of them courtesy of JGH), turned to a discussion of the Einstein twins paradox and the wave/particle duality of reality as Bob, fuelled by the martinis, got into his intellectual stride.

The next day Bob turned up bright and early at JA's, armed with a variety of Radio Shack components. JA, it being too early for him to be bright, dove into the Sunday paper while Bob arranged things to his liking. The result was a more complicated set-up: both amplifiers were now fed in parallel with the input signal, via potentiometers where appropriate, to ensure that each channel of each amplifier had identical sensitivity. (There wouldn't be any level differences today.) The speaker outputs fed a 4-pole changeover switch via varying lengths and gauges of wire, so that the speakers could be led from either amplifier's output as required, both signal hots and grounds being switched. This was necessary as the output socketry on the two amplifiers was different enough that changing amplifiers could not be done in less than three minutes or so, quite impractical for Bob's desired A/B switching.

This may sound rigorous, but there was now a significant variable introduced as far as JGH, LA, and JA were concerned. Based on the previous afternoon's auditioning, they felt the additional wiring and switchbox would have more effect on the sound of the Carver, if it had a "sound," than it would on that of the reference amplifier. The magnitude of audible difference would thus be reduced. In addition, both JGH and JA felt that neither amplifier would then be auditioned under the conditions in which they had made their original value judgments, i.e., with the speaker cables connected directly to the outputs,
exactly as a customer would use the amplifiers.

Nevertheless, JA, feeling that the audible differences would be rugged enough to survive the now less-than-optimum conditions, agreed to listen seriously. Listening on his own, at levels where he felt comfortable, and with Bob controlling the switching, he auditioned each amplifier, knowing its identity, for a period of a few minutes each on a single piece of music. Confident that he was hearing differences when he knew which amplifier was playing, he repeated the test with different pieces of music. This time, after listening to the music on each amplifier, he asked Bob to switch one amplifier into circuit at random so that he could attempt to identify it, checking his attempt by asking Bob to switch to the other amplifier. This procedure, which lasted between 15 and 20 minutes each time, was carried out twice, but the third attempt was interrupted by phone calls, and people knocking on the door. This may sound trivial, but it was sufficient to disturb JA’s concentration to the point where he felt that to continue would be meaningless. (To be receptive to subjective differences under the arduous conditions of blind testing, with the designer of one of the components under test actually present, requires significant mental preparation of the order of any other demanding discipline: performing a musical instrument in public, for example.)

Bob had two observations to make on JA’s auditioning. The first, and more serious in its implications, was that at JA’s preferred listening levels, Bob felt that there was a chance that the reference amplifier, though within its nominal drive capabilities, would occasionally run into voltage-clipping problems at low frequencies when operated from its 4-ohm tap, owing to the low sensitivity of the Celestions. This would be expected to lead to an audible difference, and a specific criterion for the “Challenge” was that neither amplifier would be driven into overload. The second was that the Carver amplifier seemed to running too cool, and that its standing bias current might have been set incorrectly. Again, this could account for an audible difference.

Had JA identified the amplifiers correctly?

Unfortunately, Bob had lost track of what was the unknown amplifier on the first test, so that there was no way of confirming JA’s identification. JA did get the second test correct, but scoring one out of one is hardly conclusive proof of anything. In addition, Bob felt it only fair to include a null identification from the morning’s set-up testing, meaning that, overall, JA had scored one out of two, the same as if he had tossed a coin. JA, who had not taken the morning’s auditioning seriously, felt this to be a little unfair, and retired fatigued, clearing the stage for JGH. (Bob had wanted LA also to take part, but LA felt that to participate in a blind test using an unfamiliar system in an unfamiliar room without devoting at least a day or two to “training” was, to say the least, foolhardy.)

Straight away, JGH declared that the amplifiers now sounded very similar, astonishingly so when compared with his previous feelings of strong identification in the same room with the same system. Had Bob proved his point? No, felt JGH: the effects of the wires and switching was unknown, and we could hardly be expected to take it on trust that they had no effect.

More testing was called for. (Those who feel that this all sounds very easy should note that we were well into the second day of testing, and all of us were feeling not a little weary of the whole business.) The switch and wires were disconnected, leaving only the level-matching pots in place, and we agreed to a test procedure. JGH would choose two pieces of music, and decide on a listening level for each. These levels would be identical each time that piece of music was used. Bob would flip a coin to decide a random playing order for the two amplifiers, and JGH would each time attempt to identify which amplifier was being used. Each amp would be connected by Bob directly to the SL600s, and both amps would be behind an improvised

4 Levels weren’t measured at the time, but were between 96dBA and 101dBA (peak).
screen so that JGH could not see the wiring. JGH would leave the room during the set-up each time so that he would not pick up any other clues. In addition, Bob arranged the auditioning to be via the reference's 8-ohm tap to avoid the possibility of overload (although JGH's original auditioning had been via the 4-ohm tap), and, worried that the M-1.0t was still running too cool, covered its vents with paper.

First, JGH auditioned the two amplifiers knowing their identity so that he would have an aural yardstick. He then listened five times to the two pieces of music, the identity of the amplifier in each case known only to Bob. It would have been useful for JGH to repeat the test a few more times, but fatigue and hunger were becoming significant. (It was, by this time, 8 pm.)

Had JGH identified the amplifiers correctly? Five tests are too few to be truly meaningful, but JGH did, in fact, manage to correctly identify which amplifier was which four times out of five. The odds of him doing this by chance are about one in five, which, while not impossible, are certainly quite low. However, coupled with the consistency between the results of this test and the earlier auditioning, the evidence for the amplifiers being different was now too strong for Bob to overcome: he conceded that it was likely that JGH, at least, could identify the production Carver M-1.0t from the reference amplifier by listening.

In turn, JGH said that under the conditions of the blind test, he felt the audible differences to be small in magnitude, involving mainly the low end (particularly on double-bass, where the Carver was better defined), and the amount and nature of high frequencies, where the reference was smoother and sweeter. But regarding the claims made in Carver's advertising—that the two sounded identical—"Close, but no cigar!"

**JGH Frets About a Loss of Difference**

At no time during the weekend spent auditioning the amplifiers with Bob Carver was I able to hear the same magnitudes of difference that I had experienced either at JA's or in my own system. With the throwover switch and flimsy wiring Bob had added, I was not at all certain I was hearing any difference at all. With the switch and its wiring out of the system, differences were again apparent, but under the conditions of the test they were never greater than slight. The results of the single-blind tests described by JA above, while not conclusive, nonetheless indicate a fairly high level of discrimination consistent with my original observations concerning HF and LF differences between the two amplifiers.

**Larry Archibald wraps it all up**

My comments will be primarily of a philosophical nature, since my participation in the listening comparisons was (with one exception) mostly casual.

- 1: *Stereophile* has, with both this examination of the 1.0t and the original "Challenge," opened its listening procedures up to the intense inquiry of an engineering-oriented designer in a way that is, I think, unprecedented. (And if the story told so far is incorrect or incomplete, I am sure Bob Carver will point this out in his Manufacturer's Comment.)
- 2: The result for us has been a) a huge amount of respect for Bob Carver's engineering cleverness; b) renewed faith in our standard procedures for product evaluation, which in this case have stood up to (admittedly limited) blind A/B verification in a test situation which, as it took place, was as bad as I could imagine; and c) a "loss of innocence" with respect to challenges, and the rules that would need to be established were we to do another one.
- 3: With respect to point 2a, it should already be clear that Bob did, with his original prototype amplifier, come astonishingly close to his target. As JGH points out above, it is possible that we could have heard differences in the modified Carver 1.5, had we had a long enough time, but it's almost beside the point. Even with the result given by the production 1.0t, I wouldn't be surprised to see Bob put into effect changes in his production line that would make future 1.0ts closer to the reference amps.
- 4: With respect to point 2b, after listening to both JGH and JA describe the sonic differences they heard between the references and the 1.0t, in both JGH's and JA's listening rooms, and then seeing them strain to hear the same differences in the blind listening.
situation—and hearing for myself how difficult the detection of differences is in the "focused" listening situation, even with the amplifiers' identities known (which was my situation)—I estimated that our standard evaluation procedures are three to four times more powerful.

I think that Stereophile should now launch a research program into why the kind of focused listening always involved in an A/B test seems to disable the very observations one is trying to make. JA has speculated that it has to do with right brain/left brain differentiation: the left, analytical hemisphere is brought to the fore in the A/B comparisons, while the right, intuitive hemisphere (which I would guess is principally involved during the relaxed listening we try to do when evaluating components) takes a back seat.

Of course, the engineering-oriented cynics in our audience may well say that our relaxed listening—while knowing the identity of the components—just allows us to make up the supposed characteristics of the amplifiers. But I offer this evidence:

What did JGH notice in his long-term evaluation? Differences in the low end and the high end of the amplifiers, as well as differences in soundstage depth, and concern about loss of LF detail in the Carver with a lot going on elsewhere.

What did JA notice in his long-term evaluation? Differences in the low end and the high end, and differences in soundstage width and depth, as well as less low-end detail from the Carver when a lot else was happening.

What did the null test reveal? A relatively poor null between the amplifiers at the low end and the high end (and, of course, no information about "loss of LF detail with a lot going on elsewhere" since the test is static, nor about soundstage width, since mono pink noise is, well, mono).

What did the blind A/B listening tests reveal? Five out of six correct identifications (discarding JA's casual morning test), in which the chief identifying characteristics were differences in the low end and in the high end of the subject amplifiers. But in the blind test, it was much more difficult to bear those differences! I think it would be a poor scientist who concluded that the long-term listening results were the result of prejudice or imagination.

- 5: With respect to point 2c, a lot of thought about our original "Challenge" conditions and results leads me to conclude that a definitive confirmation of identity between the reference and the modified amplifiers would require long-term, non-pressured listening in the same way we normally evaluate amplifiers, without the amplifier modifier present. At the end of this time, a carefully organized blind A/B test might be conducted, but the results would be viewed as an adjunct to the long-term listening results, rather than as a "resolve-the-conflict" event. (Readers of the original "Challenge" article will remember that JGH and I agreed with Bob that, in the event we heard differences he didn't hear, we would submit to a blind listening test with anything better than 50-50 as conclusive.) We will also require that there be no use of our "Challenge" results in any advertisement for a resulting production unit until after we evaluate the production unit. (This is academic anyway, as we do not plan to participate in any more challenges of this nature.)

- 6: Most important of all, as I mentioned in my reply to Harvey Rosenberg's "answer" to the "Challenge" article (Vol.9 No.1), I still await Bob Carver's assault on state-of-the-art amplifier design, based on his own perceptions of musical reality, not the perceptions of some other amplifier designer, as he has done with the 1.0t. After all, even 100% successful manufacture of an imitation of an amplifier that was a mature design in 1985 will not allow you to produce state-of-the-art in 1987! The reference amplifier's manufacturer has continued to refine his designs in the form of updates (though none were carried out on our sample) and new products, in accordance with his vision of better preserving musical reality as it can exist in the home. (In fact, the irony is that, with the departure of the speakers that amplifier was uniquely suited to drive, we have used the references very little since the Challenge took place.) Bob's design has no hope of continuing refinement of this nature, since his originating design did not share the vision of musical reality. Come on, Bob, show us the best you can do in amplifiers.

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EMINENT TECHNOLOGY LFT-III LOUDSPEAKER

Anthony H. Cordesman


There is something especially exciting about a new loudspeaker design, if only because speakers are the component where one constantly hopes for the sonic miracle that will suddenly make it all sound real. No other component has the same overall impact in coloring the system, presents more room problems, or inspires more frustration on the road to the perfect system.

The Eminent Technology LFT-III also clearly qualifies as a new design by any standard. Like the Apogee Ribbons, it is one of the few new speaker systems since the appearance of the Magneplanars and Quads to introduce a major new departure from cone- or dynamic-speaker technology.

Technical Details

The Eminent Technology LFT-III is a new planar-magnetic doublet design, using a single-diaphragm transducer claimed to give a response ranging from 35Hz to beyond 40kHz. Unlike both the Magnepan planar magnets and the Apogee bass driver, which are topologically similar, the Eminent's magnets are on both sides of the diaphragm. This results in true push-pull operation, which, Eminent Technology claims, produces substantially more linear operation, keeping the diaphragm within a constant-flux magnetic field over its entire displacement range.

The conductors within the diaphragm, etched as if they were on a circuit board, are flat, with narrow gaps between each trace. The traces are very thin, keeping the impedance...
at a high 8-22 ohms. Crossovers segment the diaphragm so that a 2 " line source reproduces the full range for good dispersion, and the remainder of the diaphragm plays only low frequencies.

The specifications are outstanding. You may never read all the type we put right under the title of a review, but this time you should. Few companies have ever been as thorough in providing such specifications and few have ever made claims as strong, including very flat frequency response, outstanding power handling, astonishingly flat phase response, and exceptional speed.

There is also considerable flexibility in set-up. You will need at least three feet of clearance from the rear- and side-walls to get the best response, but the speaker already has jacks for biwiring, and can be rewired internally for use with an electronic crossover (although I see no reason for such additional devices). The treble-energy level is also variable over a reasonable range, with three settings allowing you to tailor the speaker for a given room and system, although even the most significant treble cut still leaves a lot of apparent upper-midrange and treble energy.

In short, the Eminent Technology LFT-III is an innovative planar speaker with significant design advances. It is also relatively good looking. While hardly small, it is thin, and the mix of oak and a black grill cloth gives it styling that should be acceptable with most decors."

Three Minor Flies in the Magnetic Flux
The Eminent Technology LFT-III does, however, have three design problems that you should know about:

First, it has a highish modulus of impedance for a modern speaker. Coupled with its lowish sensitivity, it will need an amplifier capable of giving at least 100 watts per channel into 16 ohms: many modern high-current amplifiers simply lack the necessary voltage swing.

Amplifier compatibility is hard to predict. An Adcom 555 will drive the LFT-III quite well, but Krell 100 watt mono amps will not. My advice is to plan on using an amplifier spec'd at around 200 watts per channel into 8 ohms, or check with your amplifier manufacturer. Eminent Technology is considering a 4-ohm version—something I would emphatically endorse.

Second, the speaker is top-heavy unless you use the spikes in the feet and adjust them so they reach firmly into the floor. Even then, it is not kid-proof without a few bricks on the back of the feet, and can present problems on padded carpets. Shadows of the Infinity RS-1B!!

Third, it unpacks like a dream and is quick to assemble, but does require some minor tweaking to tighten the diaphragm and ensure proper bass. Instructions come with the speakers: it is an easy five-minute job for both, but you do have to read the instructions thoroughly.

The Sound
These quibbles set forth, we now come to the sound of the LFT-III: this is one speaker whose sound lives up to the promise of its design technology. Its performance is worth reviewing step by step:

- Frequency Response: exceptionally flat, with natural timbre and no apparent coloration. The overall response curve is very flat, and even the adjustments do little to alter the fact that it extends beyond hearing with great smoothness and speed. I could not detect a major frequency coloration on any instrument or type of voice.

While the LFT-III certainly has a different timbre from the Quad ESL-63 or Apogee Duetta IIs, it is one of the very few speakers to approach them in overall coherence. Further, there are no detectable shifts in speed or transient character and dynamics with frequency—as is the case with the Magnepan IIIA and Infinity RS-1B.

The energy level in the upper midrange and treble may, however, be high for some listeners. The sound has none of the aggressiveness of the smaller Martin-Logans, but is much more like a Thiel in overall timbre than an Apogee.

- Treble, Bass, and Midrange: It doesn't make much sense to talk about the treble and midrange character of this speaker. When properly set up, it is virtually without individual character in these ranges—although the overall response is as described above.

1 Although my design-research group informs me that an all-black and all-beige/off-white version is badly needed to meet WAF (Wife Acceptance Factor) standards.
This often makes it seem to lack character—but then, a speaker should. It will not romanticize anything, or add euphonic touches. It won't spoil or color anything, either.

The bass, however, is restrained and detailed, rather than warm and full. The speaker is tuned for flat bass to about 30Hz with no hump or extension. There is lots of bass power when there is lots of bass, but there is no subwoofer effect, and the Eminent does not match the Apogees in their apparent ability to reproduce the gut dynamics of the lower bass.

Good bass also requires tightening during set up, careful room placement on the basis of a lot of experimentation, and a good, compatible amplifier. The Eminent Technology LFT-III may sound a bit bass-shy—like the Magnepan IIIA or Quad ESL-63—if you don't pay attention to set-up.

- Transient Speed and Detail: The LFT-III is much closer to a ribbon or electrostatic in apparent speed and transient than it is to the Magnepans or most dynamic speakers. Performance is outstanding.
- Dynamics: With the wrong amp, it can sound weak and seem to clip. With the right amp, the performance is great. With a good amplifier, the LFT-III plays loud by any standard, and its dynamics are excellent, resolving shifts from low- to high-level passages as well as virtually any speaker around.

Be aware, however, that these dynamics are coupled to a speaker sufficiently lacking in frequency coloration and bass overhang so that you have to keep the volume high enough to approach natural musical sound levels to get the best results. Like other relatively uncolored speakers, there is nothing to warm the bass or lower midrange at lower volumes, and the Fletcher-Munson effect means your hearing's severe lack of sensitivity to low frequencies will then make the speaker seem lacking in bass.
- Soundstage: The soundstage is wide and coherent, with excellent placement of instruments and voice without artificial detail or seeming to etch the imaging in place. Depth is very good. The overall sound is just slightly forward, but few are likely to quibble. With careful placement, a pair of LFT-III's can sound very natural over a relatively wide listening area.

**Summing Up**

The Eminent Technology LFT-III is a speaker to be shortlisted by any reader who can afford a top-quality, high-end system. My own tastes tend slightly more toward the Apogee Duettas, but I'd have to say that this is one of the few speakers I'd add to my personal shortlist—which is currently limited to the Apogee Duetta II, Quad ESL-63, the top-priced Thiels and Vandersteens, and the better Infinities.

The Eminent Technology LFT-III is clearly of reference quality. It has outstanding analytic accuracy and resolution over a wide range of frequencies and a wide dynamic range. Its coherence and integration of all important listening parameters is likely to make it popular both for monitoring recordings and designing electronics and cartridges. Only true bass freaks are likely to miss anything, and they will miss much less than with most speakers approaching this level of coherence. Recommended!

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**RATA LINN LP12 MODIFICATION KIT**

Christopher Breunig

Torylyte Linn Sondek LP12 Turntable Modification Kit. Price: still to be decided at time of going to press. Manufacturer: Russ Andrews Turntable Accessories, Edge Bank House, Skelsmergh, Kendal, Cumbria LA8 9AS. Distributor: May Audio Marketing, 646 Boulevard Guimond, Longueuil, Quebec, Canada. Tel: (514) 651-5707.

Hens strut and fret, a quartet of ducks wanders across the yard; the pale winter sun casts long shadows across the stone-walled outbuildings and main house. A picture of English rural innocence, Edge Bank House is set in Kendal, Cumbria, a part of England so far north it’s almost in Scotland. No one would suspect it to be a center for heretical experi-
mentation! Nor would you suspect its owner, cherubic and inquisitive Russ Andrews, though he does have that disconcerting habit of fishing a stethoscope out of his briefcase in order to test door surfaces and panelling in your listening room. Not to mention the reputation of recognizing an ill-set-up Linn turntable at 30 hotel rooms' distance.

Russ's thinking has led to the development of Torlyte, a ply sandwich board with softwood cellular core, from which isolating platforms and stands are constructed, for use under turntable, CD player, and electronics. The philosophy is set out with admirable clarity in his booklet, Torlyte, the inside story. Basically, acoustic feedback affects components in the audio reproducing chain, the energy releases of different materials producing a "time smearing" of the music, altering our perceptions of pace and rhythm. Frequency balances are changed by the LF resonances of coupled objects: eg, the turntable sitting on a heavy piece of furniture on carpet. The Torlyte slabs, which have adjustable nylon point supports, are worthwhile; but independent floor stands are better. The three-legged stand for turntable/CD player weighs just 1100gm (39oz), and has locking spikes to penetrate carpet and underlay, and to level the player precisely—important with suspended-chassis turntables. The top-plate of the Linn LP12 thus sits 49cm from floor level, which makes both tonearm and cartridge more vulnerable to small children and large dogs (for photo, see Vol.9 No.5, p.79).

Having developed these products, Russ Andrews set about "improving" the Linn Sondek itself. This would be an indictable offense in Scotland, and 1985 brought more than the usual share of gale-force winds to the Lake District—a chilly response from Ivor Tiefenbrun, perhaps? That has not stopped Russ from marketing his conversion kit; essentially comprising a new subchassis, armboard, and plinth base. This year he is working on a replacement for the Valhalla mains-regulating board, and this should not only give 45rpm by electronic means, but also improve the 33rpm stability. Naim Audio, for some years a close collaborator with Linn Products, has also developed mechanical changes for the Sondek with Ittok arm. A transformer supply replaces the Valhalla circuitry, and a collar armboard support has been redesigned for the Ittok. Further, the termination of the signal cable has been altered radically: a short flexible leadout goes to an RIAA preamplifier module within the plinth from the base of the tonearm. This "Armageddon" modification is not available to the public, only to approved Naim dealers.

The main problem areas of the LP12 tackled
by Russ are the pressed-steel subchassis (now with glued-on stiffener)—which, he contends, flexes and stores energy like a bell—and the coupling of arm to armboard. The standard ply/hardboard laminate armboard is fixed by three tiny self-tapping screws; the whole making up a deliberately introduced energy filter. (Experiments with through-bolting show that the sound quality is thereby impaired, rather than enhanced.) The RATA arm-board is a composite, with softwood core and hardwood in critical areas, fixed with three substantial screws having large surface areas of thread into the 1* -deep Torlyte subchassis. The trapezoidal plan shape is slightly different from the Linn's, increasing the surface coupling to the armboard. The increased subchassis depth improves the main-bearing housing rigidity, a tight fit for its full depth. This necessitates greater clearance depth for the Valhalla board than is possible with the standard hardboard base, so the third main component of the kit is a Torlyte plinth with three spiked wooden feet to couple to a Torlyte stand. (The feet can be reversed for users unable to accommodate a floor stand for the deck.) The tray-plinth has three upward spikes which couple to the LP12 hardwood surround.

Another small irritant with the LP12 is the occasional "chuff-chuffing" set up by the motor clutch assembly. This comprises a greased mushroom on a spring set in a plastic push-fit cup; it fits to the underside of the motor. The RATA modification is a simple set-screw through the base of the cup, which can safely be adjusted to achieve silent motor running. (The Valhalla board has components at mains potential: touching these whilst energized will result in a potentially fatal shock! One used to need a steady hand to tweaks the clutch assembly with the motor on. Formerly a frustrating trial-and-error procedure, this is now made foolproof and, with due care, shockproof as well.)

The final parts are a simple setup jig and well-written instructions. Originally, a guide on videotape was planned, but this did not materialize. Russ thinks the mystique about setting up a Linn deserves knocking on the head, and he believes any competent audiophile should be able to manage it. For my part, I'd say adjusting the three springs and grommets to center the armboard in its cutout is the fiddly part—it's well worth stripping each out in turn, and dusting the rubbers with talc; this will ease rotation. Silicone spray polish can also be used as a lubricant, but this works less well with the RATA subchassis than with the steel original.

The LP12 has been notorious for sagging, and requiring frequent retuning. With the much reduced subchassis weight, it will be found that the front spring probably needs hardly any compression, in which case, with the most recent nuts (those superseding the pattern with nylon collar inserts) the nut should be fitted inverted. I found the suspension required slight raising after a few months' use, but the adjustment time was rewarded by a better sound.

I am lucky in having a Well-Tempered Arm on my Linn; this obviates the adjustment and securing of any internal arm-cable vis-à-vis free suspension mounting. Here I disagree with the comment, in the Vol.9 No.7 "Recommended Components" listing, suggesting mechanical incompatibility between the WTA and LP12—was this written in the belief that a conventional tonearm cable terminating in the plinth P-clip is an essential part of the suspension control? Neither Russ Andrews, nor Naim Audio's Julian Vereker, believes this to be the case.

At the time of writing, I have been using a RATA-modified Linn for some four months. As with all system improvements, one quickly takes for granted what it does. According to Russ, it makes the standard unit "flat, two-dimensional, and confused—more like your old auto-changer." His more serious claims for performance improvement in the areas of perceived bandwidth, instrumental separation, dynamic range, and musicality, are all supportable. These will be most dramatic on the more mundane digital recordings, where an increase in treble information should be obvious: not brightness, but a natural extension of surprising quality.

This was my experience the moment Russ had finished setting up my deck. Earlier, I had been trying to convince him that some CDs were not that bad, not too inferior to their LP counterparts. (Russ makes the analogy that LP

1 Partly, but also because using the WTA on the Linn necessitates removing the lid. —JA
versus CD is like being drawn to listen to a band playing in a park and hurrying away from road-menders using a compressor! We sampled the acclaimed CBS recording of Murray Perahia and Radu Lupu playing Mozart and Schubert in the Snape Maltings in each format. Russ was puzzled by what he viewed as a passing away of the treble — though he preferred the openness of the LP. After rebuilding the deck we tried the same LP: it was remarkably clearer, sweeter, and more spacious. Now, Russ said, one could actually sense the attack of felt on the piano strings.

It may take quite a while to realize that the same is true of the low registers: where these are extended, as on older Deccas, or pre-digital EMIs, you feel the power of the music is increased. And, of course, reduced muddle and distortion coax a more generous and exciting listening level with favorite LPs. But the resolution has been so improved that it is still possible to enjoy late-night listening at low levels.

You will find that with, say, a good analog recording like the Argo/ASM Rossini String Sonatas, it is easier to hear whether one, or both, cellos play a certain passage, and the "tunefulness" is magically enhanced. Similarly, string quartets in a resonant acoustic do sound like just four instruments playing, not like, as can often happen, a small string ensemble. In big orchestral scores the working dynamic range — i.e., the ability to hear instruments adding their own modest colors in large tuttis — is expanded. As in the concert hall, it becomes easier to follow strands in the texture at will, at the same time taking in the broad sweep of the musical argument.

The RATA kit is not inexpensive, but the cost can be justified by what it does for an already well-engineered unit. (Regardless of CD, turntable designs seem to be flourishing in the UK at present, with particular acclaim for the Roksan and Pink Triangle "T00.")

You may feel you should ask a dealer to rebuild the deck for you: it does involve a complete stripping. But if you do it yourself, it's probably worth having a phial of bearing oil to hand (the bearing housing has to be transferred from the old to the RATA subchassis). Either way, I promise you'll not want to fit the old parts again!

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**TENNESSEE SOUND COMPANY**

**SYMPHONY ONE LOUDSPEAKER**

**Dick Olsher**

Two-way, rear-firing, dynamic loudspeaker using a 6" woofer and a 2" cone tweeter in a closed-box alignment. Claimed frequency range: 60Hz-18kHz, +4dB. Price: $750/pair. Manufacturer: Tennessee Sound Company, PO Box 1252, Bristol, TN 37621. Tel: (615) 878-4121.

Unquestionably, the Symphony One is an innovative design that attempts to correct what designer Lloyd Smith perceives as a major source of distortion in moving-coil loudspeakers. Unfortunately, innovation is neither a necessary nor a sufficient condition for achieving sound-reproduction excellence.

Visually, this speaker conjures up the image of a winged insect. Imagine, if you will, a segmented body with a large trunk, a small head and two pairs of wings—one pair of which is attached to the head or tweeter module, the other to the trunk. If you can put all of this together in your mind's eye, you'll have a fair first impression of the Symphony One's appearance. The wings are metallic, and act as sound reflectors for the drivers placed on the rear of each module. A small cocoon of absorbent material is suspended between each pair of reflectors in close proximity to the central portion of the cone. The entire assembly is to be positioned next to a hard, smooth wall so that the bass reflectors are precisely 5.5" away from the wall surface. The drivers fire toward the reflectors and the wall, so that above about 200Hz, only reflections (either off the reflectors or the wall) reach the listener. This, according to Tennessee Sound, is to give a
wide, even dispersion over a 90° angle. The front of the speaker (facing the listener) is decorated with the facade of a grill, either to generate some semblance of normalcy or to save on finishing costs.

Why even consider such an elaborate design? To understand the rationale of this design, it is useful to examine the behavior of a moving-coil driver on a microscopic scale (as the designer, Lloyd Smith, did). No current driver-cone is sufficiently rigid to undergo ideal pistonic motion, even at low frequencies. For example, a mechanical impulse applied at the apex of a cone causes the region of the cone nearest the voice coil to compress, after which the impulse is propagated toward the cone rim. The displacement travels along the cone at the velocity of sound in the cone material (for a paper cone, about 500m/s). Therefore, a finite time will elapse before the rim of the cone senses the disturbance at the apex.

This time delay depends on the distance to be traveled as well as the speed of the disturbance in the cone. For a 20cm paper cone having a 120° central angle, the delay is about 2.5ms, so that at frequencies below 500Hz, the time delay is small compared with the period of vibration; conventional wisdom has it that the cone may be assumed to vibrate as a rigid surface. At high frequencies, however, the cone no longer vibrates as a unit, but instead does so in separate zones separated by nodal circles—areas of relative calm—the so-called breakup mode. The amplitude of vibration in the outer zones is relatively small compared with that in the central zones. The phenomenon Tennessee Sound is addressing, the subject of a US patent, has nothing to do with the breakup mode of the cone but concerns itself with cone behavior in the pistonic region of frequencies. Their research data show that the apex of a woofer cone generates much more harmonic distortion than does the periphery of the cone. This, of course, can be explained by the severe deformation of the cone apex by the applied mechanical impulse. Further, they postulate, on the basis of theoretical grounds, that midrange and tweeter cones behave in a similar fashion—a sensible assertion, but very difficult to prove experimentally.

It is now possible to understand the design in terms of its primary goal of suppressing acoustic radiation from the cone’s apex. The absorbent pad is designed to preferentially absorb acoustic energy from the inner region of the cone, while the curved metal reflectors allow the peripheral cone regions to radiate toward the listener. However, other mechanisms also produce distortion in drive-units; this approach strikes me, therefore, as rather unbalanced in that it goes to heroic lengths to eliminate one form of distortion regardless of the sonic cost. For example, the use of reflected sound makes it very difficult to achieve a uniform frequency response because the reflectors are frequency-dependent in their action. In addition, they exhibit resonances which color the sound. Also, the desire to extend the design principle into the treble region has, l
believe, led to the use of a 2" cone tweeter—a type of tweeter that can no longer be considered adequate in terms of treble extension or transient behavior.

Because of the strict placement requirements, I was forced to audition the first pair of Symphony Ones—S-1s for short—(SN 110301 & 110302) in what is normally the dining room in our house, with the furniture removed of course. According to Tennessee Sound, the spacing between the bass reflectors was reduced by ½" in early December 1986, and a second pair (SN 110349 & 110350) was sent in February 1987. The second pair was evaluated in my new listening room at JGH’s house. In both cases, the manufacturer’s recommendations concerning placement geometry were precisely adhered to.

It was readily apparent, even after only a short exposure to the S-1, that it suffers from a serious midrange-response anomaly. I will offer a diagnosis, but first let me describe the symptoms. Female soprano voice through the S-1s was slightly hollow, with HF speech formants noticeably muted and grainy in texture. High notes were diminished in intensity, and tinged with a metallic edge. My soprano spouse Lesley’s voice (from master tape) was shockingly altered in character through the middle and upper registers. Violin tone (Strauss Sonata, Sheffield Lab 18) lacked sheen, sounding rather bleached and grainy. Piano timbre was overly dark. Brass lacked any conviction, while nylon-strung guitar sound lacked the requisite amount of brightness. In fact, with the exception of male voice, timbre accuracy was almost nonexistent.

Putting these impressions together led me to suspect an upper-midrange irregularity in the response; this was borne out in my frequency response measurements. The first pair of S-1s were found to have a response depression over the range from 1 to 4kHz, with the response minimum centered at about 2.5kHz. One channel was down 8dB, the other 6dB at 2.5kHz. This is bad enough, but, believe it or not, the S-1s actually sounded worse than they measured in this respect. I discussed the midrange problem with Mr. Smith of Tennessee Sound. He claimed that they were aware of the dip and had taken steps to correct it in current production by reducing the gap between the bass reflectors. However, the letter accompanying the second pair of S-1s admitted that the problem was not entirely solved.

The second pair of S-1s measured essentially identical to the first, and sounded no better. In fact, JGH strolled in during this stage of the testing and his immediate reaction of “no midrange” pretty much sums it up.

There are other serious problems with the S-1s that need to be mentioned. I left them for the end because they are overshadowed by the anemic midrange. However, even if the midrange balance were fixable, these remaining problems would, in my opinion, still seriously compromise the sound quality.

The measured treble response took a nose dive above 13kHz, which helps explain why the extreme treble of the S-1 was subjectively muffled and lacking in spaciousness. The lower treble (6-10kHz) was somewhat grainy, fuzzy, and lacking in transient detail. The fuzz extended into the middle octaves, along with a moderate amount of veiling. It was very difficult, for example, to resolve hall-reverb information with these speakers. The chorus in Laudate! (Proprius 7800) was not only muffled, but also very difficult to place spatially in the hall.

I was not able to get these speakers to image properly, there being no depth perspective. The image consistently localized in the plane of the rear wall, with no sense of mic-to-instrument distance. Playing the Opus 3 “Depth of Image” test record through these speakers was an exasperating experience: the soundstage was forever two-dimensional.

There was no deep bass, unless the speakers were positioned close to the corners of the room, in which case there was useful response to about 45Hz—but the smoothness of the response suffered greatly. Away from the corners, the bass response was very smooth—which you’d expect from half-space bass loading, where the rear wall acts as part of the speaker baffle. Unfortunately, used in this manner, the -3dB frequency was a high 75Hz.

I’ve had to paint a rather bleak picture of the S-1’s sonic performance, and deservedly so. Yet, I do believe the S-1 does represent an honest, innovative, but failed, attempt to advance the art. In its present incarnation, the Tennessee Sound technology leaves me cold—a good example of the cure being worse than the disease.

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Stereophile
Four years after its launch, the CD medium would appear to have come of age, at least in production terms. Annual player manufacture is now big business, and there is hardly a major audio brand without a CD machine to its name—even such analog stalwarts as Audio-Technica and Shure have succumbed. A huge range of models is apparently available—"apparently" because many machines are repackaged versions of a few basic designs. Prime originators include Yamaha, Philips, Nagaoka, Toshiba, Kyocera, Denon, Hitachi, and Sony, these serving certain specific model requirements as determined by such manufacturers as Audio-Technica, Lux, Sansui, Shure, Mitsubishi, NAD, Micro Seiki, Marantz, Magnavox, Sanyo, and Fisher, to name but a few! Philips' technology, often in the form of complete players, forms the link to Mission, Meridian, CAL, Kinergetics, Sonographe, AR, Proton, B&O, Cambridge, PS Audio, McIntosh, and Revox, as well as the new series of Rotel and Tandberg players.

However extraordinary it may seem, the majority of players sound significantly different from each other; given the concept of an identifiable (but at present unattainable) idea of sonic perfection, each shows its own degree of failure or success in its approach to that ideal.

One model in question, the Cambridge Audio CD1, remains a most useful reference machine; in several respects it forms the cornerstone of this review, though stories circulate concerning its below-average reliability and an unacceptable failure level in transit—things that should be history, now that it is distributed in the US by Sumiko. My sample dates from early 1986, and has continued to perform well over this extended test period. On the basis of considerable listening tests, if I score this deck at a notional 11.5 points (with the finest analog disc replay currently rating around 15), other CD players currently on sale have sound qualities covering an amazing 3.5 to 12-point range.

The worst-sounding are of music-center, rack-system quality; they may play the discs, but subjectively they have little to do with real hi-fi. Nonetheless, they comfortably beat some of the worst, all-plastic, music-center turntables, though that's not saying very much! These sonic underachievers are not necessarily the cheapest, and there are a few budget CD machines offering pretty good sound for the money, especially those of Philips derivation. On a statistical basis, Philips-based designs have consistently achieved the best review points.

There is a fascinating contrast between older Philips machines: 14-bit, dual DAC chip, 4x oversampled, noise-shaped and digitally filtered designs; and the newer 16-bit, dual DAC/one chip, 4x oversampled and digitally filtered units. In the hands of manufacturers such as Meridian, the older designs typically achieve a fine 15.5-bit resolution—ie, the least-significant bit has a 50% chance of being wrong—while a surprising number of "new tech" Philips 16-bit players have been delivered with substandard 14-bit resolution, only the most costly examples exceeding 15-bit precision.

One can easily make too much of the player technology and of any specific parameter associated with the typically excellent lab results generally obtainable from CD players. In terms of sound quality, factors such as linearity, bit count, or ultimate channel separation appear to be less influential than structural integrity, disc damping and clamping, error control, transport decoupling, the segregation of analog and digital sections, integrity of power supplies and internal grounding, as well as dual-mono construction, and, not least, component quality—all of which seem to have a strong influence on sound quality (although not all are of equal importance).

Equally relevant is the implementation of the circuits used for analog filtering and final output stages. The judicious use of a specific grade of decoupling capacitor at a unique circuit position can sometimes have a remarkable influence on sound quality.
It is worth noting that almost none of the above remedial factors have any effect on the measured lab performance; indeed, some of the “improvements” verified sonically have resulted in poorer test results: high-level linearity, for example, with a consequent increase in distortion at full modulation. As with the best preamplifiers, such contradictions only serve to illustrate our ignorance of the relationship between the objective and subjective domains of audio engineering.

Alert readers will have noticed an alarm bell ringing earlier in this introduction, namely “top analog at 15 points” — three ahead of the best current CD replay at 12. For all the marketing pressure of the digital bandwagon, the fact remains that, at present, analog vinyl has the edge. There are only too many reminders. Try Paul Simon’s *Graceland*, an analog recording which sounds noticeably poorer in its digital transcription replayed via CD. I recently had temporary use of a Goldmund Studio turntable fitted with the T3 arm and a Koetsu Signature Red. While I was not wholly convinced by the ultimate precision of the high treble provided by this arm, the overall performance of the vinyl replay — via a Cello “Premium” Suite preamplifier, Krell KMA100 II, and biwired (and custom modified) Celestion SL600 speakers — was something special.

Good CD, with appropriately ambient recordings, can sound dimensionally spacious and is capable of invoking pretty good depth impressions, but the “small” Goldmund’s ability to build a deep, focused soundstage, fired with subtle musical detail and involving dynamics, went far beyond the current top CD standard.

It is the responsibility of the CD-player designer and those involved in the CD sector of the recording business to find an answer to this discrepancy if CD is not to remain “just another source,” as AJ van den Hul recently put it (Vol.9 No.8, pp. 135-142).

The following group test, to be published in two parts, includes machines from most of the main companies, with one or two omissions; the Accuphase, for example, was unavailable for test in the UK at the time of writing.

**Test Program**

The CD players were subjected to a formal sequence of tests. In the lab, a range of tests was applied to explore the linearity and resolution of the machines. Factors such as shock and vibration immunity, error correction, and the like were all investigated. If A/B assessment is to be attempted, it is vital to determine absolute output levels, and it is well worth checking any deviations in frequency response which might affect the auditioning.

The precise bit resolution delivered is at present academic, as we have not yet been able to satisfactorily prove that effective resolutions better than 14.5-bit are audibly superior, in the light of current recorded program quality. Very few players can reach 16-bit at present, and there is little correlation between sound quality and the actual bit resolutions displayed by most of the better players. An engineering examination, however, is still useful, as it can show just how much care has gone into both mechanical and electrical design and build.

The auditioning was carried out on an absolute, single-presentation basis, with a variety of material, as well as by more detailed A/B/A (not switched or instantaneous) comparisons. Care was taken to match absolute levels to ensure fair comparisons.

Where possible, the sound of various CDs was referenced to analog originals using the most neutral vinyl players, namely the Goldmund Studio and the most recent Pink Triangle. Program material included Sheffield Lab recordings from Dave Grusin and James Newton Howard, Paul Simon’s *Graceland*, Vivaldi’s *Four Seasons* on Argo (Marriner/ASM), Miles Davis’s *Tutu*, Joe Cocker’s *Civilized Man*, and the Ashkenazy/London Rachmaninov Symphony 1 recording.

Direct analog vs digital comparisons can be misleading due to differing tonal balances. The subjective analyst, however, must reach beyond this superficial difference and attempt to quantify the musical, as well as the emotional, content of the replay. Factors such as stereo focus and depth, transparency, treble purity, dynamics, and bass definition are key areas of judgment.

**California Audio Labs Tempest (revised) $2095**

The original Tempest, produced through the end of 1986, was reviewed by JA in Vol.9 No.6. As a result of using Mike Moffat as a consultant, however, CAL introduced some changes
in early 1987, mainly relating to improvements to waveshapes and to power-supply noise levels in the digital sections. The new Tempest is not designated differently from the original, and an upgrade from original to current can be had for the difference in their prices ($200). CAL has also introduced a less-expensive, 16-bit player, the Aria ($1495), introduced at CES in Las Vegas and shipping since February 1.

Setting some sort of reference, the Tempest proved to be an interesting addition to this group, noteworthy for its complement of 6DJ8 tubes used in post-DAC circuitry. The case is large enough to contain the original Philips/Magnavox 2041 chassis as well as the new section, complete with its subchassis and substantial power supply. The Tempest is clearly built with great care, and the main circuit board is populated with high-quality parts. A good measure of the content of a high-end tube preamplifier is undoubtedly present.

The glowing tubes are visible under the perforated top plate, and the standard of finish is high, as befits a top-line model such as this. Why should a designer add tubes to a technology that is so thoroughly solid-state from start to finish that even sound itself is stored as an array of on/off binary numbers? The answer is simply that, whatever the music source available for the audio, there always seems to be scope for improvement in the playback quality. Whatever distortion, compression, masking, etc. occurs in the recording/replicating process, there is still scope, within reason, for a better preamp or a better cable to let through more of the music. It is just such improvements that the audiophile community values.

Thus, in the case of a CD player, whatever the ultimate quality of the system, the designer's eye will alight suspiciously on the relatively low-grade audio components used in the filtering and output sections of a stock machine. His response will be: "I can do better than this! No doubt, customers will value and be prepared to pay for the obvious improvements which I can bring to this section."

CAL felt that tubes offered both the best chance of ameliorating the more aggressive solid-state aspects of CD, and the best sound in the exchange. By and large, that supposition appears to be true; the future looks bright for this company.

On the technical side, the player requires quite complex circuitry to first accept the output current delivered by the D/A converters: a simple preamp-style, voltage-gain stage is not viable here. The automatically switched de-emphasis must be implemented, as well as the overall three-pole Bessel filtering specified for the original Philips system. To summarize, separate left and right 14-bit DACs yield 16-bit accuracy: 4x oversampling at 14 bits, plus a
cunning combination of digital filtering and digital noise shaping, result in an enhancement of resolution by two bits, providing the low-level distortion and noise of a 16-bit system. That this process works has long been confirmed by measurement, where, in general, Philips 14-bit players out-resolve many systems based on the use of full 16-bit linear DACs—even Philips' own!

The combination of digital and slow-rolloff analog filtering results in a transfer characteristic which is essentially linear phase. The original Tempest, however (though not the revised), was unfortunately absolute-phase-inverting, an audible effect in a player of this class. For the listening tests, it was necessary to invert the polarity (by turning over the speaker connections) in order to match the correct phase of the majority of other players.

my view, this would be insufficient to account for the tonal quality. That player was a little bright, with a more forward presentation—the converse of the old Meridian, for example, with its more laid-back, mildly rich character. The revised was better in this respect (fig.2), and was also absolute-phase correct.

In the midrange, the CAL was unique. By CD standards, its performance was exceptional in purity and clarity, the sound being well-detailed with a good feeling of transparency.

Stereo soundstages were well defined, stably focused, and showed fine width and depth. With the "right" CD, a close approach to high-quality vinyl replay was apparent in this area, though still better focus was possible.

The Tempest proved a little shy in the upper extreme of the midrange; a touch more authority and bite would be helpful here, but in the treble its former brightness was countered by the promising level of treble clarity, which was so much better than the usual tizzy grain heard from many cheaper players. Some care over choice of cable and system matching will help the Tempest here; conversely, with a poor system match, the treble balance could prove an irritant. For example, the Tempest will suit a system based on the Apogee Duetta better than one based on the Magnepan MGIIIa.

The Tempest's bid for audio dominance fi-
nally rests on its dynamics, which, in CD terms, are among the best. The inner shading of textural dynamic contrast, masked to a perceptible degree by many other players, stood revealed. The bass was generous, with a natural quality on orchestral instruments, though judged a touch lacking in slam and speed on rock.

**Test Results:** The bulk of the test data relates to the original Tempest. As regards frequency response (fig. 1), this deck was less flat than most; not only does it have the usual Philips 14-bit system HF-ripple, which imparts a subtle but identifiable sonic signature, it also showed a hint of treble lift (+0.2dB) by 20kHz, coupled with a 1dB droop in output by 20Hz (into the 11k chart recorder load) due to the finite size of its output capacitors. In consequence, input impedances in the 50k-100k ohm range are recommended to help maintain good bass extension. 100k loading gave a 20Hz response within fine 0.03dB limits.

Tempest revised maintains the treble lift; indeed, it was perhaps a mite brighter (fig.2). Channel matching was very good, measuring exactly 0dB at 1kHz with no phase differential. Very good channel separation was recorded at just under 100dB midband, degrading a little to 73dB by 20kHz. As noted earlier, the early Tempest was marred by absolute phase inversion, but the impulse response still showed a linear phase characteristic. In the current player, impulse response is identical, apart from being non-inverting.

At full modulation, the harmonic distortion levels were little better than -60dB or 0.1%, this a function of the heavily driven tube amplifiers rather than of the digital system. Thus at a level three times lower, -10dB, the distortion improved to 0.03%; in fact, the low-level distortion results were pretty good. Fig.3 shows a full-level 20kHz tone: negligible effects can be seen downband. Above 20kHz, however, the second harmonic at 40kHz is only 40.2dB down. The higher-than-usual levels of distortion may also be seen in the intermodulation measurements, using 19 and 20kHz tones. The level of 1kHz difference product was -61.1dB at full level, improving at -10dB to -72.2dB. (See fig.4, where the 1kHz product can be seen at the far left; the revised result was -68dB at -10dB modulation.) With a 1kHz tone at -60dB, the CAL showed a clean characteristic, though the third harmonic was strongest at -40dB.

A point to note is the high output impedance—high by any standard, and in fact unsuitable for some of the lower-impedance preamp inputs. The output was normal at 2.04V into a 100k load, but sourced from 4.9k ohms. Some loss of bass will be audibly evident in low-impedance loads.

![Fig. 4](image)

**Fig. 4**

![Fig. 5](image)

**Fig. 5**

Fig. 5 shows the -90dB sinewave form to be fairly smooth if the bursts of digital noise are averaged. The original Tempest did fairly well on this low-level signal, and, given a typical level error of +3.3dB (i.e., a tone recorded at -90dB plays back at -86.7dB), the resolution can be estimated at 15.4-bits overall. The current version yielded a less good -90dB sine-
wave, but gave a fair result at -80dB (fig.6).

S/N ratios were very satisfactory at typically 95dB (a basic Philips will reach 105dB). As with all Philips decks, the ultrasonic spuria varied with signal level. Fig.7 shows the spuria plotted on a linear frequency scale from DC to 100kHz, referenced to a 1kHz tone at -20dB. The double spuria are modulation products generated in the filtering/noise-shaping section: eg, 44kHz ± 1kHz, 88kHz ± 1kHz, all around -70dB.

The other parameters measured—de-emphasis, fingerprint, gap and dot error, immunity to shock and vibration, and freedom from any clipping on the white noise test signal—were fine. Aside from the modest full-level distortion results, there was little to suggest that this was a tube- rather than a transistor-based player.

**Conclusion:** CAL have succeeded in setting a new reference standard for CD sound without the specific benefits of 16-bit D/A converters or heavily rebuilt digital sections and the like. The fundamental technology is early Philips, but the subjective results show just how much can be achieved with careful post-development.

In a sense, CAL proves what we already know: an audiophile-quality analog filter section is preferable to the usual collection of ICs and electrolytic capacitors. (With their Sonographe CD, C-J have achieved a similar demonstration at a lower price/quality level.)

The CAL Tempest revised offers less fancy facilities and features than usual, but makes real claims to audiophile status and deserves very serious consideration by any CD enthusiast.

With the benefit of foreknowledge, we know that a well-toleranced current-generation Philips 16-bit, 4x oversampled chassis should be capable of about a 20% uplift in sound quality compared with its 14-bit predecessor. Let us also look to the future, and see what CAL can do with one of these new chassis in a more advanced model.

The CAL Tempest is the best player for reproduction of classical, naturally balanced, program, and will give the best depth and soundstage perspectives.

**Cambridge Audio CD1 $2800**

This substantial-looking two-box machine comprises a lower deck containing the decoder and analog filter sections, these separated
and screened from the larger upper deck that carries control, transport, and power-supply sections. Finished in typical Cambridge style, with dark teak end-panels in solid wood and an overall matte-black finish, this player offers two pairs of output terminals, one fixed, the other passively variable via a moderate-impedance potentiometer.

The player transport is based on a modified version of the Philips CD104/Magnavox 1040 that incorporates a diecast metal chassis. A drawer-loader, this player may be programmed for up to 20 tracks, albeit laboriously, while the multipurpose display is a small, green, fluorescent type that needs looking at closely if it is to be read easily. High-quality pushbutton switches are used for control, forming a dominant row across much of the width of the machine. A secondary set of three switches may be used singly or in connection to provide a variety of filter functions, numbered #1 to #7, #1 corresponding to the standard flat response.

The player uses Philips' digitally filtered, 14-bit, 4x oversampled system, but with a difference: three DACs are used per channel, two in parallel and one for ranging. Dither is added to improve the resolution, rounding the result up to 16-bit overall. While the analog circuitry is based on 5534-type op-amp ICs, this section is carefully built with good power supplies, van den Hul mono filament cable, and Wondercaps. Care has been taken over the mechanical construction—lead metal bars damp the CD transport and provide the suspension with a low resonant frequency, said to be tuned to 1Hz.

**Sound Quality:** This player has stood the test of time; it continues to give the best-focused, most stable, and widest stereo images I have yet heard from CD. The sound was dynamic, with a fast, strong, articulate bass that carried a surprising punch on the right materials. Essentially well balanced, the sound of the Cambridge featured a consistently high level of clarity and instrumental separation, particularly good when it came to treble timbre and the differentiation of tonal color. Stereo depth was very good, only (just!) beaten by the CAL Tempest, though its stereo stage was a little forward.

The sound could be faulted slightly, due to a hint of coarseness in the mid and treble—a touch "solid-state," if you like. Nevertheless, it was clearly more elegant than most of the competition, even in this respect. Sonically, the CD1 had a lively bounce, with a good sense of involvement in the music.

The variable output was inferior, but proved useful for driving a power amplifier direct via short, high-quality cables. We preferred filter #1 for most listening work.

**Test Results:** On the filter #1 setting (fig.8), the response was essentially flat, measuring -0.2dB at 20kHz. On #2, the response fell away beyond 3kHz to -2dB, 20kHz. With filter #3, the output shelved just a little, this being the designer's preferred characteristic. On #4 (#1 and #3 depressed), the bass rolled off early by 2dB into our low-impedance chart-recorder loading, while the high treble was slightly depressed—anti-fuzz, perhaps? On #5, the treble rolloff accelerated, while #6—all filter buttons depressed—gave a maximum level of cut at both extremes.

Channel balance was excellent at 0.07dB, 1kHz; channel separation was also excellent—worst case 105dB at 20kHz!—as was the interchannel phase match.

The distortion results were fine at high levels (fig.9 shows the upband products for a full-level 20kHz tone), and were even better still at -60dB modulation (fig.10), as well as at -80dB, where the distortion of a 1kHz tone measured -27dB. This correlated well with the minimal level error at -90dB, which averaged less than 0.4dB, confirming true 16-bit resolution. The -90dB sinewave form (fig.11) was a bit noisy, but a reasonable shape may be seen underneath.

The output is higher than usual at 4.3V, sourced from a low 110 ohms, which rose to a maximum of 40 kilohms from the variable output.

The rejection of ultrasonic spuriae was exceptional at a typical 53dB, but no problems were encountered with respect to error correction, de-emphasis, or mechanical noise. Electrical signal/noise ratios were excellent at 113dB or so. The impulse response (fig. 12) showed a non-inverting, linear phase result.

**Conclusion:** The Cambridge Audio CD1 is a reference-standard, true 16-bit resolution, 4x oversampled player with as yet unrivalled dynamics, stage width, and precision. Suited
(just) to rock more than to classical material, the sound quality was ranked very close to that of the other tested reference, the CAL Tempest—personally, I would not like to choose between them.

As regards features and operation, the CD1 is somewhat primitive, but nonetheless a worthy contender. At the time of writing, rumors of an improved Cambridge CDI were circulating, as well as the possibility of smaller versions that would come close to replicating the performance of the existing machine at much less cost. One story even hinted at a prototype Cambridge with 16x oversampling, which will place the center of the first alias image at 0.352MHz, allowing very simple passive filtering to be used well away from the audio band, with a consequent improvement in audible transparency. Conversely, very wide bandwidth circuitry will be required to avoid slew and high-frequency intermodulation problems.

**Kinergetics KCD-20a $995 (remote control), $895 (non-remote)**

When we started this review, we were using a KCD-20, which was auditioned in full. However, before the review was finished the "a" version arrived and the data were accordingly augmented in light of this current model.

Kinergetics has tooled a new case, finished in brushed black-stained alloy, for this Philips-based player; in consequence, it looks more original than its companions. Kinergetics licenses a US-patented technology, which, it is claimed, produces a superior subjective performance without significantly influencing any of the usual measured parameters.

At first sight, the KCD-20a is a rather mysterious machine: the principle behind its design covers the modeling, in real components, of all the accumulated errors occurring in commercial resistors, capacitors, switch- and connector-contacts, and cables that are supposed, by the designer, to exist between the sound source and the CD recording. A synthesized, balanced "heap" of these parts, in a non-frequency-conscious network, is placed in the negative feedback loop of an amplifier in the Kinergetics player, essentially providing a "negative" error system to balance the "positive" errors present in the recording chain. To take one example, suppose that a capacitor has a time signature where some voltage recovery occurs within a small time interval following a transient. This is a "positive" error added to the audio signal. Now, if a model of a similar capacitor were present in the negative loop of the Kinergetics processor, it would provide a negative error signal in the forward path timed to cancel the anticipated error present on the audio feed.

The conceptual problem lies in predicting the complexity and level of errors present, **Kinergetics KCD-20**
knowing that these will vary from recording system to recording system, and record label to record label. Kinergetics has had to audition a large number of discs to find a synthesis which does a suitable job of "correction" on the majority of recordings; therein lies the system's weakness.

Suppose a label sets up a nearly perfect CD recording in, say, the Sheffield manner, with selected cable, a minimum of contacts, no mixers, etc., and a hand-tuned, electrically "short" digital encoder. How would such a disc fare with the KCD? If the recording really was near-perfect, then playback on the KCD would sound as bad as some of the worst unprocessed discs, since the KCD processor would be adding an unnecessary set of uncanceled sonic errors.

There will be few recordings where the KCD tuning is just right, providing a sound quality (given the overall limitations of the player) that could potentially beat all comers. However, other recordings might just catch it out. Indeed, the early model auditioned seemed to offer a generally "altered" and "processed" quality in the treble, which was improved in the "a" version; a case of misjudged synthesis, perhaps?

If CD recordings continue to improve, will successively optimized versions of better KCDs appear? I suspect so. The particular synergy of the KCD-20a with some recordings might explain why the player has been "flavor of the month" with some critics.

With respect to design, the usual Philips format is on offer, with the exception that the power supply is housed in a separate box. Returning to basics, the Kinergetics comprises a recased 14-bit player, with 4x oversampling, digital filtering, and noise-shaping allowing it to achieve approximately 16-bit resolution. Kinergetics advises a 24-hour warmup prior to serious auditioning, which advice we duly followed, noting an improvement over the cold condition.

The output level has been set at a maximum of 4V nominal, allowing direct connection to power amplifier inputs, this facilitated by the variable-output level control on the front panel.

As regards facilities, the KCD-20a follows standard Philips practice with fairly fast track access and all the usual features, including in-
Technical Results: As expected from a dual DAC player, no interchannel phase difference was evident, and the Kinergetics processor did not appear to have any deleterious effect on the impulse response. This was still absolute-phase correct and retained its linear-phase character.

Channel separation was inferior to the Philips original—down to an average of 83.5dB at 1kHz (still very good, by the way!)—but significantly weaker than average at 54dB, 20kHz. On charting the frequency response (fig. 13), there was the merest hint of treble lift, measuring about 0.1dB in the final octave. With the filter “in,” the mildest of rolloffs was evident above 10kHz, this typically -0.2dB. (The ripples are characteristic of the first-generation Philips digital filter.)

In common with some other Philips-based US conversions, the distortion at full level (0dB) was rather worse than for the original chassis. For example, the 1kHz figure for the 20a was 64dB down, 0.06%, compared with the usual result of 0.006%. The 20kHz figure held its original, good, -85dB level since this measurement only weights the products below 20kHz; the spectrogram (fig. 14) shows the third harmonic to be at -65dB.

The distortion at high levels was a mild compressive effect: it was also seen in the rounded clipping observed on the plus and minus peaks of the full-level, white-noise test signal. For the full-level IM test, a poorer than average result was observed, with noticeable asymmetry between channels, eg, -65 dB left and -85dB right. It should be worse, in theory, at the lower -10dB signal level, with fewer bits to play with, yet both the harmonic and intermodulation results were improved: the former to an average of -79dB, the latter to an average of -82dB (fig. 15).

At -60dB, 1kHz, the spectrum showed a normal, wide distribution of even- and odd-order harmonics (fig. 16), indicating the roughness of lower-level distortion.

Regarding resolution, the 20a delivered a moderate level error, averaging 3dB at -90dB. The -90dB sinewave shape (fig. 17) was typical of the genre, and the moderate bursts of noise did encompass a reasonably smooth wave-
shape: 15.5-bit resolution was indicated.

An accurate de-emphasis was noted, while the usual very good results were also found with respect to error correction. S/N ratios were satisfactory, but not up to the usual standard. In addition, while noise levels were almost identical for both channels at 90/91dB with CCIR weighted, when unweighted one channel was 11dB noisier than the other, with 95dB (left) and 84dB (right), the difference probably due to low-level hum induction.

The output level was higher than specification, measuring 5.1 volts from a variable output impedance, the latter with a value of 740 ohms at full level. Levels of ultrasonic spurious were satisfactorily filtered at -62.9dB, typical for this type of machine.

**Conclusion:** While it is undeniable that the performance of this Kinergetics player was substantially better than that of the chassis which forms the basis for the product—a sonic gain estimated at a little above the 25% level—improvements in the second generation of Philips decks have begun to erode that advantage. One must be careful not to judge the 20a too critically, however, since it represents relatively good value for money in the US.

On balance, the KCD-20a must be considered a good player, and a fairly priced one for the build and quality offered. Audition one and see how the clarity, dynamics, and liveliness appeal, although I would not be unduly influenced by the effect of the compensation technology *per se*.

**Meridian 207 $1500**

Meridian can justly claim to have produced one of the first audiophile designs in their MCD Pro, still a fine player. Its replacement, the 207 Pro, is intended to build upon its success, and is a key member of the new family of Meridian audio equipment.

However, the new 207 bears no physical resemblance to its predecessor. Styled and engineered by Allen Boothroyd, the other half of the Meridian team, it is a radical, and to my mind at least, attractive design. Despite being a two-unit player—the sections are connected via a multiway detachable umbilical cord—the 207 is surprisingly compact and is hardly any wider than many midi machines, although it is about one third higher.

Both components have durable glass front panels, screen-printed in a tough, cured enamel. The box with the larger panel contains the CD transport and main power supply, with the processor and control sections in the second box.

In contrast to earlier Meridians, the 207 has full remote control and comes with a large palm-sized handset that carries most facilities. A larger “system” remote control (model 209) is also available as an extra option, which provides a replication of the more comprehensive commands available on the front panel of the 207. It also offers such enhancements as a
numeric button array for rapid track-selection and programming.

The full Meridian system comprises full remote-control preamplifier and tuner, with the ultimate option of a low-level communication link through a house providing both remote control and a low-level audio feed to local self-powered loudspeaker enclosures in each room. The 207 is ready for such possibilities, but also has its own line preamplifier section, with two inputs. This complicates the value rating, for the addition of a good line preamplifier with the bonus of a high-quality remote control may be important enough to make the 207 the machine for you.

The control section is distinguished by its transparent vertical-bar function buttons, which illuminate when selected. There is a complication, however, in that a number of secondary commands cannot be accessed directly, but require pressure on the "alternate" (shift) key before pressing the key that is actually wanted. These include the track number keys. Track numbers from 0-99 can be entered but only as two-digit numbers: for example, track 8 requires the entry "08." This minor complication, however, is not a feature of the full keyboard present on the 209 remote control. The player panel-array includes polarity invert (done digitally so that the listener can be sure that any resultant change in sound quality will be due to the absolute phase change), and the auxiliary-input switching functions. These and the powered volume control are major components of the matching 201 preamplifier which will be available later this year.

The 207 line stage has substantial gain available and can handle such conditioned sources as the equalized vinyl disc output from a preamp "record out" socket, easily driving a power amplifier.

Various modes may be selected for the display, including volume settings from 1 to 64. The steps are quite fine at 1.3dB, while on first switch-on it resets to a mid setting of "32," (40dB of attenuation). Indications of pre-emphasis and error rates are also given on the display, the latter classified as C1 and C2; these are dimly illuminated, and are for checking purposes only. C1 flags fully corrected errors, while C2 will occasionally indicate an interpolated or concealed error. This can help answer questions on substandard or damaged discs.

In addition to a standard 3.5mm mini headphone socket, under the control of the attenuator, the rear panel sports an array of ten phono sockets for the various input and output facilities.

Technical Details: The 207 is based on the established Philips 14-bit, 4x oversampled technology. Digital filtering, noise-shaping, and dual, closely tolerated D/A converters, lead to proven performance. A nonresonant, extruded aluminum box houses the transport, while the drawer tray loading section has a thick-glass front panel which automatically seals the enclosure via a thin felt surround strip.

High-grade power supplies ensure low ripple, reducing the incidence of errors and maximizing sound quality. In particular, designer Bob Stuart has paid considerable attention to the stability of the quartz oscillator used for the reference clock; this is known to directly influence the resolution at high frequencies (see JGH's interview with Bob in Vol.9 No.2).

Sound Quality: Auditioning was mainly conducted using the fixed CD output, but also via the variable-level preamp output. The former should be used by the audiophile with a front-rank preamp, while the latter is both for those who appreciate the convenience of remote control of level and are less fussy about ultimate sound quality, and for those who use the 207 as a preamplifier in its own right, plugging their tuner, tape deck, etc. into it and connecting directly to their power amplifiers.

The variable output did sound inferior to the fixed, adding some mild brittleness, and stripping out some of the subtlety, although in the majority of cases this will prove less damaging to fidelity than the line input of a preamplifier. In this respect, the Meridian is a case of "heads you win, tails you win."

Via the fixed output, the standard of sound quality was impressive; like the Sonographe, it proved to be one that endured well over prolonged listening. The standard was substantially advanced compared with the MCD Pro—by about 15%, in fact, this over and above its existing reference level.

The 207 possesses a quick, lively quality, yet with little glare or hardness apparent. The
bass was firm, with good levels of clarity and extension. The mid register seemed broadly well-balanced, with a neutrality reminiscent of FET and tube designs. A marginal shortfall was noted in the treble, with a hint of exaggerated excitement, or "zing," noticeable on brass instruments, which also hinted at a mild dulling of sparkle and air in the highest reaches of the treble range. With only a mild loss of width, stereo soundstages were well-formed, with particularly good perspectives, realistic depth, and stable, precise instrumental focus.

A high level of musical detail was achieved, this accompanied by a dynamic quality that was only a small degree behind that of the top references.

In fact, the Meridian 207 beat a number of brand flagships, some of which are far more highly priced.

**Test Results:** Taking the CD section first, the 207 delivered a standard 2.09V maximum output from a low 58-ohm output impedance. Via the preamp section, up to 9.06V was available from an even lower 20 ohms.

The 207 featured a flat frequency response up to 1kHz (fig. 18), and was then gently tailored to yield a mildly, but increasingly, recessed treble: it measured -0.3dB by 5kHz and -1.5dB by 20kHz, this a little more than usual with other audiophile players.

Channel balance was excellent at 0.01dB midband, while very good results were also obtained for channel separation: 78dB, 20kHz, rising to a typical 102dB at 1kHz, (L on R and R on L differed, eg, 108dB versus 95dB). No interchannel phase difference was observed, while the impulse characteristic was free from overshoot and possessed the familiar Philips non-inverting linear-phase characteristic. (Note that this may be true for playback, but almost no digital systems use phase-corrected filters.)

With a slight imbalance between channels, the level of harmonic distortion at 1kHz was about average at around -90dB, this also true of the result at -60dB (fig. 19). If a little noisy, the recovered sinewave at -90dB had quite a good shape (fig. 20), while the level error averaged 3dB in the negative direction — ie, expansion, whereas most CD players compress at this level — indicating substantially 15.5-bit resolution.

At high signal levels, the distortion results — 0.005% at 1kHz and 20kHz (fig. 21) — were most presentable, with correspondingly good IM results.

Track access was quite rapid at 4s, though
the 207 does not offer the popular audible-music-search facility on slow cueing. Mechanical noise was very low, and no problems were experienced with the most severe error tracks.

The white noise test signal was cleared without impairment while rejection of ultrasonic spuriæ was well maintained, at typically 88dB (fig. 22, baseline is -136dB)—better than the MCD Pro.

Finally, very good signal/noise ratios were recorded, with typical values of 96dB.

Turning to the line preamp, measured at 1HF levels (0.5V in/out), the distortion was better than 80dB down for both harmonic and HF-intermodulation: eg., -100dB, 0.0001%, at 1kHz. The S/N ratios were fine at 90dB, 0.5V—better at the 2V CD level—while good results were also obtained for overload margin, and very good results for separation.

A 52mV input was required for a 0.5V 1HF input, indicating a gain of just under 20dB, or ten times. Thus, for a standard power amp delivery of 1 to 2V rms, a line output of 100-200mV will be required. Tracking of the remote attenuator held to close tolerances of typically ±0.15dB and this worked very well in terms of resolution and ergonomic usefulness.

**Conclusion:** The Meridian 207 offers a lot of CD player for the money—high sound quality, good finish, and unusual styling. Uniquely, it also offers error displays and unambiguous polarity inversion, as well as a more than competent, remote-controlled line preamplifier.

I have no hesitation in enthusiastically recommending this highly versatile and attractive product.

**Sonographe SD1 $695**

Sonographe is one of Conrad-Johnson's mid-priced audio lines, which includes a notable turntable. For their CD player, by basing it on the 14-bit, 4x oversampled Magnavox 2041, the company has found its own route to sonic improvement by employing some of the FET technology used in the Motif preamplifier.

In several respects, the SD1 is not a "me too" design: the 2041 chassis is large enough to carry additional circuit boards, while the easily accessible main board provides for easy modification. Amplifier designers can be free to let their imaginations roam over this virgin territory, with its primitive components and a level of build one step above a rack system. No wonder there is room for improvement of the kind that audio enthusiasts thirst after.

The facilities follow standard practice, with the option of an accessory infrared remote control whose "pyramid" sensor plugs into the rear socket of the player.

**Sonographe SD1**
There have been two series of Sonographe players. The first did well in a *HFN/RR* review in January 1987, but we were fortunate to obtain a current sample—complete with some minor revisions—to review for *Stereophile*. Its styling is distinctive, with solid hardwood and stained-oak sides, and a strongly labeled front plate, this an addition to the original Philips fascia.

Track numbers up to 99 may be entered, and the machine can also be programmed for up to 20 tracks, in random order. The player provides sensible access times, and is quite straightforward to operate.

**Technical Details:** Based on a 14-bit, 4x oversampled system, with digital noise-shaping and digital filtering, the DAC accuracy, while of 14-bit resolution, is to 16-bit accuracy. With typically 2 bits of resolution gain due to the oversampling/filtering/shaping process, a tolerably close 16-bit overall resolution is, in theory, attainable.

C-J have taken this player to a higher performance level by replacing the later op-amp-based filter stages in the analog circuitry with a discrete circuit using the single-ended class-A FET stages in a simple tube-like topology similar to that used in the Motif MC-7 and MC-8 preamplifiers. The earlier IC stage covering the auto-switched de-emphasis remains, but benefits from addition of a C-J dual-rail power supply, which also serves the FET filter circuit. As in the original Magnavox, the 2041 comes with a three-pole low-pass Bessel filter, with linear phase properties, C-J has used a Sallen & Key form based on a single selected FET follower, choosing to bring the rolloff some 10% nearer the audio band, thus providing some gentle rounding of the extreme treble.

The C-J board is built to a high standard, with extravagant use made of custom polystyrene capacitors. Some changes have also been made to the power supply decoupling stages on the main Philips board.

**Sound Quality:** We had our suspicions concerning a higher-than-usual output impedance from the Sonographe, due to the simplified circuitry. Accordingly, tests were conducted both using a typical 100k line impedance and a less common but entirely possible 10k input impedance. It must be said that the SDI performed well into both loads, but with the lower-impedance load there was not only a loss in output, but also a mild loss of weight and scale—some of the “grace” was missing.

Fed into 100k, the Sonographe attained a high musical standard, going some way toward contradicting one’s notions concerning CD sound. It sounded quite unlike a Philips player, yet did not lose out on the essential strengths of that basically sound chassis.

In a sense, the sound was more “classical” than “rock,” more tube than solid-state (in a CD context, of course). Less obviously forceful than some, the Sonographe rewarded the listener with its greater introspection, and an ability to hold life and dynamic contrast in the quieter, more subtle passages. Such ability is, in fact, characteristic of top amplifiers. In addition, this player sounded relaxed in a musical sense, allowing the music to flow naturally, due to a comparative lack of hardness, edge, or glare. A good sense of perspective was added by a natural-sounding tonality. Instrumental timbre seemed correct, right through from firm bass, via the mid, to the treble.

Soundstages were well-defined and focused, with good depth and a pleasing transparency. Slight narrowing was noticed, however, and the player also lost some clarity on the loudest and most complex passages, as seems common with CD. Could this be due to a complex multiple intermodulation effect in the CD medium which imparts dynamic modulation to the effective noise floor?

The midrange was good, the treble admirable for its lack of edge or grain, its sweet, strong tone, and generally musical character. In the bass, the SDI set a good baseline but did show a mild softening, as well as a degree of loss of articulate “slam,” specifically when compared with the references. This was more evident on rock rather than classical program.

In the longer term, one appreciated the Sonographe’s more restrained view of the proceedings and welcomed its ability to fit into a system without drawing undue attention to itself or the CD medium—surely a most valuable characteristic.

**Technical Results:** There was a fascinating lack of correlation between the results of the lab testing and the Sonographe’s sound quality. It was quite obvious that many of the origi-
nal specifications for the chassis had been degraded by C-J, yet the sound quality is improved. How can this be? The assessment of audio-related parameters is multidimensional, and the logical view, given that we trust our aural sense first, is that many of the parameters we measure are relatively unimportant, while those that we do not—due to present ignorance—are more important. It is these "invisibles" which conscientious designers unconsciously manipulate in an empirical approach to sonic excellence.

For example, the following high-level results for the C-J measured as inferior to those for the original Philips chassis: channel separation, harmonic distortion, intermodulation distortion, frequency response, output impedance, and signal/noise ratio. No Japanese designer would allow himself such liberties!

Beginning with frequency response, note that the mild low-frequency rolloff (fig.23) is a function of the 11k chart-recorder load, and vanished with a 100k loading. The measured response was essentially flat to 5kHz, then followed a gentle rolloff to an average of -0.4dB by 20kHz, barely audible in practice.

Channel balance held within 0.2dB, while good separation results of 90dB or so were obtained at low and mid frequencies, falling to 66dB at 20kHz.

The impulse response showed a well-damped, non-inverting linear phase characteristic. The output level was lower than average at 1.87V, sourced from a higher-than-usual 2.6k ohms. Level error at -90dB modulation was moderate—typically -2, +3.1dB. Viewed in conjunction with the smooth, if noisy, recovery of the -90dB sinewave (fig.24), this indicated a good 15.5-bit resolution.

Interestingly, the very earliest Sonographe sample we tried gave poorer results (fig.25), though please note the larger vertical scaling on this graph—500uV/division as opposed to 200uV.

At -60dB, 1kHz, the distortion was fairly normal at -38dB. Fig.26 shows the spectrum analysis for the earlier sample; fig.27 is the current player. The main difference here is due, in fact, due to the current model's having a higher noise floor—approximately -120dB relative to full level—which masks the lower-level discrete-noise spectrum. At full modulation, this player showed an increase in low-order harmonic distortion to -62dB at 20Hz and 1kHz. As with the Kinergetics, the improvement at 20kHz (to -79dB) was an artifact of this measurement definition, the second harmonic at 40kHz being around 50dB down.
(fig.28). Again, the high-frequency intermodulation test gave an improved result at the lower -10dB level (-61.6dB vs -52.7dB). S/N ratios were satisfactory at a typical 92dB, this better than all current software, but not to the standard of the original chassis' typical 105dB.

The SDI was mechanically quiet, track access was decently quick, and no problems were encountered with error correction. Shock and vibration were well-resisted, and no premature limiting was seen with the white noise test track. Ultrasonic spuriæ were well-suppressed at typically -80dB (fig.29).

**Conclusion:** C-J has been notably successful in their conversion of a basically good player. The results suggest that the 14-bit, 4x oversampled system can be made to subjectively perform to a high standard. Potential customers need not worry about the 14-bit vs 16-bit question since this Sonographe delivers the goods. It might well be true that, after a period of development, machines based on Philips' 16-bit chip set may match or beat it, but that is for the future.

I enjoyed listening to this player, and consider the price very reasonable. I have no problem in recommending it: sonically, I rank it among the top four models tested so far.

**Prelude to Part 2**
The machines in this first part of the review—

"audiophile" models all—are based on the original Philips oversampled 14-bit circuitry, but it can be seen that this in no way compromises sound quality. Neither Philips nor the Far Eastern manufacturers have been letting the grass grow under their feet, however, and I will be looking at what the latest Philips 16-bit technology, in the form of Mission's PCM7000, can do, as well as reviewing Japanese flagship players from Technics, Sony and Nakamichi.

California Audio Laboratories
7231 Garden Grove Blvd., Suite F
Garden Grove, CA 92641
Tel: (714) 894-9747

Cambridge, Imported by Sumiko, Inc.
P.O. Box 5046
Berkeley, CA 94705
Tel: (415) 843-4500

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Middletown, CT 06457
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Tel: (818) 345-2851

Sonographe
2800R Dorr Ave
Fairfax, VA 22031
Tel: (703) 698-8581

Stereophile
THE MOD SQUAD LINE DRIVE
CONTROL CENTER

Anthony H. Cordesman reviews a straight wire without gain

The Mod Squad Line Drive System Control Center is a purely passive stereo switching unit with a volume and balance control, five line inputs, and additional facilities for two tape decks. It allows the audiophile to replace a preamp, with its active gain stages—and resulting coloration—with a device that introduces no distortion or coloration other than that in the wiring, switches, and controls.

Construction is also of very high quality, even for a $400 device. Tiffany jacks are used selectively for two pairs of inputs and one pair of output jacks. The unit uses Lorlin selector switches. Wonder Wire, Wonder Solder, and Teflon-insulated LC/OFC wiring. Construction is on the battleship side, and the styling and feel are excellent.¹

Having said this, I have to confess that I have mixed feelings about the Line Drive. I do have to say that it performed very well with a wide range of electronics. In fact, it provided cleaner sound on high level stages with all electronics with a reasonable gain and impedance match than any active preamplifiers I could try, with the exception of the Audio Research SP-11 and Krell KRS-2.

Like the PS Audio 4.5 and 5.0 when used in their purely passive modes, the Mod Squad Line Drive demonstrates all too clearly that many preamplifier designers have spent too much time on their phono stages and too little in making sure that their line stages are totally neutral. The vast majority of high-end preamps simply cannot meet the challenge of the equivalent of a straight wire bypass with controls. As a result, it is clear that you can get a unit for $400 that will outperform most active preamps, including some costing six times as much.

Further, the Line Drive is, in my opinion, infinitely preferable to the use of a CD player directly into an amplifier simply because it provides a higher-quality volume control and a balance control. No serious audiophile is going to be so much of a purist as to eliminate the balance control, simply because so many recordings have slightly unbalanced channels. Since the balance control acts as the "imaging control," and minor adjustments are essential to getting the proper spread and depth of instruments from right to left, no halfway decent system can do without one. Only an audiophile content with a system that never had proper musical focus could bear to listen to music without at least occasionally adjusting system balance.

If this makes the Mod Squad Line Drive sound like an incredible bargain, let me mention two major reservations. First, as a lukewarm member of the "analog record must never die" club, I should stress that the Line Drive is based on the thesis that the sound of compact disc has advanced to the point where the audiophile can now eliminate the phono gain stage in a preamplifier, and rely solely on the high-level gain stages of his or her CD

¹ Truly passive audiophiles should be aware that there is an $875 super version with WBT RCA jacks and Penny & Giles Conductive Plastic potentiometers.

Mod Squad Line Control Center

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player, tuner, tape unit, or DAT. While I realize that some separate phono preamps are still available, I know of none that I would want to use in a purist system, and while the Mod Squad is developing one, I have not heard it and cannot comment on the resulting cost-effectiveness of mixing it with the Line Drive.  

I'm not sure that I'm ready to advise anyone to take the risk of not buying a unit with a top-quality phono stage, no matter how well CD or DAT perform. I still prefer analog phono for reference listening, and I've heard more CD players and digital tape units than most. More importantly, I would be worried about giving up so much music that is only available on record. The point of audio gear is not, after all, technical excellence, but access to music.

Second, I have some question about how well a purely passive control unit can deal with the problems of impedance matching, buffering a tape recorder from the rest of a sound system, and gain matching. It is certainly true that CD players, in particular, provide enough level from a suitably low output impedance to produce high-quality sound without additional gain or buffering from the preamp.

I could not fault the way the Line Drive performed with the electronics I currently have available, although there were a few cases where I would have liked more gain. I have, however, had CD players and tape units for review in the past where I felt the output was inadequate for anything but a preamp with high line-stage gain. I have also had equipment which does not interact well, particularly cassette players that require an active buffer, and units involving awkward differences in impedance.

Once again, the Mod Squad has an add-on active stage under development, but I have not evaluated it. Accordingly, you will need to be very careful to make sure that your system will perform well with a passive control. You may find that even a few dB of gain can sometimes make the difference between a dull sound and a dynamic one, and that a slight loss of detail as the result of an active gain stage is better than buffering problems and tape recorder interaction, or the loss of timbre and dynamics from a major impedance mismatch.

If you use long interconnects, you will need to check very carefully to make sure your equipment has the right combination of input and output impedances to be used with a passive "preamp"—if source output impedances are less than 1000 ohms and load input impedances are more than 10k ohms, you should be OK with interconnects less than 2m in length, depending on their capacitance. Further, be advised that manufacturer specifications of impedance are often rather sloppy. Dealer assistance (if you can find one that knows what impedance means) is advised.

This raises the alternative of the PS Audio preamps, which also provide an affordable way of getting what is basically a passive high-level control center. The PS Audio 4.5, for example, sells for only $100 more than the Line Drive, but includes an excellent moving-coil/moving-magnet phono stage and a good switchable line stage. I have to say that, from a purist point of view, the passive components in the Mod Squad Line Drive sound very slightly cleaner. It is, however, a close thing, and I'd think long and hard about the choice. It may well be that the Line Drive is the better choice for a second system based around CD than as the "preamp" in the primary system for today's audiophile.

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2 A point made. I think, by Martin Colloms some time ago, was that a device such as the Line Drive could be used to get the optimum sound from a high-level source such as CD, the user's existing phono preamplifier then being used to feed one of the passive preamplifier's other inputs. —JA

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TEAC ZD-5000 CD Player

J. Gordon Holt

Many audiophiles will be unaware that TEAC has been a leading manufacturer of professional audio products ever since the mid 1970s. The company's TASCAM division is one of the best-known brands of semiprofessional mixing boards and analog tape decks, yet in the area of digital products for the consumer, TEAC has practically no track record among perfectionists. Their ZD-5000 CD player was among the list of Best-Products-of-1985 in two Japanese magazines, but no TEAC CD player has, as yet, caught the fancy of US perfectionists. Or US perfectionist magazines either, for that matter. The ZD-5000 may change all that.

Before listening to the ZD-5000, I allowed it to warm up for 48 hours, during which time I perused the accompanying literature, including (Heaven forbid!) the instructions. The latter were well-written, unusually literate, and easy to understand, despite the relative complexity of some of the unit's features. I won't catalog them, except to say that the ZD-5000 allows for programming of up to 20 selections, and will do just about anything that any other CD player will, plus a couple of things that most others won't, such as: Auto Space, which inserts a 4-second pause between selections, and Intro Check, which samples the first 10 seconds of each track. (It will not, however, do Shuffle-Play—random-order playback of selections—or Exclusion programming—allowing one to choose which bands will be omitted from a normal-sequence playback.)

The ZD-5000 is the first CD player I have seen whose so-called Subcode Output connector acknowledges the existence of a computer interface standard by actually using an RS232-type DB-25 receptacle. Whether or not this becomes the standard connector for CD-I subcode outputs, there are good reasons why it should. (Most players use various different kinds of round, multi-pin connectors, which means almost every such player will be orphaned if a different standard receptacle is adopted.)

The "ZD" in the model number stands for—you'll never guess—"Zero Distortion," that's what! Yep, TEAC claims to have invented a DAC that has no distortion, particularly at low levels, where CD players in general have more distortion than at high levels. Now, we all know that there is no such thing as zero distortion, any more than there is perfection of form, content, style, or daily regularity. So, what does TEAC claim for a distortion spec? A mere 0.0025%. Now that is very low indeed, but while we may argue endlessly about the audibility of 0.0025% distortion, I think even TEAC would agree that 0.0025% distortion is not zero distortion. And at what signal level is the distortion 0.0025%, anyway? The specs don't say.

What, then, does this ZD converter do? Well, according to TEAC's promotional literature: "...the ZD circuit uses a specially developed LSI to increase and decrease the noise known as dither which occurs when D/A conversion takes place, thus eliminating conversion aberrations." This makes no sense at all. Dithering does not "occur" during D/A conversion; it is added intentionally during A/D conversion to eliminate quantization noise and to extend the available dynamic

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1 *Radio Technology* included the ZD-5000 in its "15 Components of the Year" list, and *Stereo Sound* included it in its "85 Components of the Year" awards.
range to below the system's theoretical encoding floor. I phoned TEAC for a clarification, and found that what they do, in fact, is add digital dither (random numbers) to the digital signal prior to D/A conversion, in order to randomize the effects of DAC nonlinearities at and near the lowest-significant-bit (LSB) point. The conversion is thus randomly imperfect rather than consistently imperfect, and distortion harmonics which otherwise would be present will be dissipated as harmless white noise. Clever!

The ZD-5000 uses a separate 16-bit DAC for each channel, thus eliminating the 11us delay between channels that occurs when a single DAC is used. (There's a simple test for the presence of this delay: play an A+B sweep tone through the system with the channels blended, and measure or listen for decreased output above 10kHz. If there is none, the output signals are perfectly synchronized. A dual-trace 'scope will also dramatically demonstrate the presence of a delay.)

The power supply looks adequate but no more, consisting as it does of a single moderate-sized power transformer with two output windings, one apparently for the motor drive and servo circuits, the other for the analog and digital audio sections. Supply regulation was, as far as I could determine from visual inspection, minimal. Physical construction was quite good, with no flimsy pressed-sheet-metal parts, and with quite a substantial-looking drawer-drive mechanism. Human engineering was typically Japanese, which is to say, pretty much beyond reproach. Every control was where one would expect it to be, and they all had a nice, sexy feel to them.

The ZD-5000 comes with a remote control which duplicates practically every one of its front-panel functions, including control of volume out of the headphone and variable-output jacks. Maximum output-signal level is rated at 2V, which is more than enough to drive any power amplifier to beyond its overload point, something always desirable for direct-connection purposes. You may occasionally miss a balance control, but my own observation has been that unbalanced CDs are rare, and very few of those that are good enough in other respects for you to care about the channel balance.

Although the ZD-5000 is only moderately fast on drawer openings and closings, it is extraordinarily fast on track finds, taking a mere 3s to go from the start of track 1 on the Denon Technical CD (38C39-7147) to the start of Track 99. The only thing I found a little irritating about it is the fact that you have to close the drawer before you can start any track selection, and that even after the drawer shuts you have to wait about 5s before it will accept any commands. (You can close the drawer and start the TEAC playing from Track 1 by pressing Play, but you can't select any other track until after the drawer is closed. Most other players I've worked with allow track call-out as soon as the disc is placed in the drawer; door closure and playback are initiated merely by pressing a track-number button. A minor quibble to be sure, but why do things the more roundabout of two ways?)

There is a very slight loss of definition and smoothness in the sound when coming out of the variable sockets. As the losses in the same areas introduced by practically any preamp other than an Audio Research SP-II are likely to be much greater, I recommend an open mind in deciding which configuration to opt for. In many, if not most, systems you'll get better sound by feeding the CD player directly into your power amps than through your preamp—that is, if you can find a suitable switcher to reconnect the power amplifier inputs from the preamp Outs to the CD player Outs. (The Mod Squad Line Drive, reviewed in this issue by AHC, comes to mind.)

Ah hah, but how does the ZD-5000 sound? Well, Sir... it's very, very good. But while I would not have hesitated to describe it as being "outstandingly good" a year ago, I cannot do so in the Spring of 1987 because, in recent months, there has been a proliferation of almost equally good CD players. This pleases me because it is evidence that CD technology is maturing and starting to fulfill its potential. But I also view this trend with mixed feelings, for purely selfish reasons. As CD players come to sound more and more alike, my job as a reviewer becomes more and more difficult, because I am still expected to compare players in terms of their sound.

I'll give you an example of what's been going on recently. Just a few months ago I auditioned
a $600 Denon CD player whose sound was almost identical to that of a one-year-older $1300 Sony unit I have been using as a reference standard. (Actually, its reference status is based on its use with an outboard D/A decoder, which jacks the total system price up to $3100. The Denon was comparable to that Sony CD player as a stand-alone, without the outboard decoder.) Now, along comes the ZD-5000, priced at little under the Sony at $1100, and differing from it sonically by such a small degree that I really have to split hairs to make any quality comparisons. They differ only in that the TEAC may be very slightly sweeter and more open-sounding through the upper treble, and seems to “do” low-level detail just a tad better, while the Sony 650 is better able to cope with horrendous disc problems, like coarse bits of dust on the playing surface. (One such, which caused the TEAC to get hung up and mute, didn’t faze the Sony.) But I don’t consider the ability of a CD player to cope with disc abuse to be an important consideration for audio perfectionists, most of whom learned long ago to care for their analog discs and now exercise appropriate care of their CDs.

Summing up, then, it is my feeling that the TEAC ZD-5000 approaches the state of the art in CD players, being only slightly surpassed in listening ease and spatiality by Sony’s CD-P650ESD/DAS-703ES combo—at more than three times the price. Whether you will prefer the ZD-5000’s sound to that of some other comparably priced players, or even to that of your favorite analog phono unit, is another matter altogether. But if you’re looking a reference-quality CD player at much less than the going price for CD perfection, I would say the choice is between this TEAC or the slightly more expensive Sony 650—or the Denon DCD-1500, at a bit more than half the price of either. But among those three, I would be hard pressed to make a choice.

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LUXMAN LV-105 INTEGRATED AMPLIFIER

George M. Graves

Luxman LV-105 amplifier

Type: Hybrid tube/solid-state integrated stereo amplifier with MC and MM inputs. Power: 80 watts (minimum) per channel into 8 ohms at 0.3% THD. Weight: 23 lbs. Price: $800. Manufacturer: Luxman Division of Alpine Electronics, 19145 Gramercy Place, Torrance, CA 90501. Tel: (213) 326-8000.

What?! An integrated amplifier? A full review? In Stereophile?

Outrageous!

Precisely. It is true that we lofty audiophile types seldom stoop to review a lowly Japanese integrated amplifier, and when we do mention such an animal at all, it is usually the redoubtable Sam Tellig, of “Audio Cheapskate” fame,

Stereophile
who does the honors. But the LV-105 is something different. First, it is the first new major product from an old and valued friend (Lux / Luxman) who has only recently been reintroduced to these shores after a distressing absence of several years. (Thanks are in order to Alpine, who bought the Lux company a couple of years ago, for bringing Lux back.) Secondly, by anybody's standards, this is one bell of an integrated amplifier!

Musicality. That's exactly the word which comes to mind each time I turn this thing on. Oh, to be sure, a Threshold or an Audio Research it ain't, but in my opinion it is probably the best 800 bucks worth of amplifier one can buy. There is an almost indefinable quality that some components possess which transcends their pretensions and lets the music come through. One expects these qualities in a $2000 preamp or $3000 power amp, but it is rare indeed to encounter these qualities in so-called "budget" components, and more so to find them embodied in a Japanese integrated.

First of all, this amp has tubes. Yes, tubes. Two 6CG7As peek at one through the front panel. These two dual triodes are in the power-amp driver stage, and are complemented in the rest of the circuit by MOSFETs.

Second, when it comes to switching facilities, I sure wish some of our more esoteric preamp designers would tear a page from Luxman's book. This amp has about every switching convenience one could possibly hope for: inputs for Phono (MM or MC), Tuner, CD, two tape decks, and two Audio-Video Auxiliaries (that's right, it switches composite video as well as audio). It also sports tape-switching facilities which allow for every conceivable tape-recording option. Oh, yes, I almost forgot: the AV/Aux 2 input is switchable from the back apron to the front panel. So, in reality, you actually get three high-level inputs. What a boon to us harried reviewers, being able to hook up a piece of equipment without, for once, having to crawl behind the amplifier and disconnect something else to free up an input. Talk about A/B capabilities!

While I'm on the subject of features, switching facilities, and inputs and outputs, I should mention one of this unit's few shortcomings—the speaker terminals. For some reason, I have never seen a Japanese amp or receiver with decent speaker-wire connectors (except for the NAD 7130, which, having a US and UK pedigree, sports real 5-way binding posts). The Luxman LV-105 is no exception. At first glance, the round speaker connectors on the back look like 5-way binding posts, but on closer examination it becomes apparent that banana plugs won't fit, and if you unscrew the binding post, you see that it has a high skirt around the base. This, of course, makes it impossible to use spade lugs either. The only thing that will fit is bare wire, and that only if it's not too thick. I found that Monster Cable "Superflex" will fit, as does "Powerline-2," but "Music Hose"? No way!

The Top

The Luxman LV-105 has a very musical top end. Strings sound much better than one has any right to expect from a Japanese Integrated. The high percussion on Farrell Morris's Bits of Percussion and Jazz (Audio Directions AD-102) is reproduced in a very neutral manner. Brushed cymbals, especially, are very well delineated, it being possible to distinctly hear the difference between the brush sound and the sound of the cymbal itself. This amp lacks all that nasty "transitory" sound possessed by virtually all of its countrymen. This is quite a revelation. I own (but rarely use, except for comparison purposes) a highly modified Hafler DH-110 preamp, and a DH-220 power amp. When I compared the Luxman with the Hafler separates, the biggest difference was the top. The Hafler stuff was very dry in comparison, and strings took on a hard metallic edge that I found unpleasant. The LV-105 reproduces chuff on orchestra flutes with just the right amount of air, and high-frequency image stability was outstanding.

The Middle

In the midrange, the LV-105 continues its musical sonic signature. Trumpets have good bite, and cellos are very mellow, with none of the upper-midrange glare that characterizes so many amplifiers of this ilk. When compared with the Hafler separates, the Luxman lower midrange seems to have a slight suckout. This makes many woodwinds sound somewhat lean. Maurice Bourge's oboe on the Nimbus Vaughan Williams Oboe Concerto CD (English String Orchestra conducted by William Boughton, NIM-5019) almost sounds as if
played a semitone higher in pitch through this amplifier! (This is a minor flaw in this amplifier, and would probably be overlooked entirely except upon direct comparison.) Careful speaker selection here will somewhat ameliorate this problem. I find that the Magnepan SMG-A almost perfectly complements the 105 here.

The Bottom
One of the reasons why integrated amplifiers are mostly shunned by audiophiles is because of the compromises that a single power supply imposes on them. As we have learned over the years, much amp and preamp performance is dependent upon how stiff and healthy the power supply is. By separating the amp and preamp, it is possible to have power supplies which will deliver the current necessary to each at all times. With a single supply, the power stage’s needs for powering the speaker will often pull the supply down enough to seriously degrade the preamp’s voltage-amplifying chores. This shows up the most in bass performance and dynamic range (more about dynamic range later).

Most integrateds just don’t have adequate bass response. The Luxman is a qualified exception. Obviously, one cannot overrule the laws of physics, and the Luxman does exhibit some compromise in the very low bass. But in the lower mid-bass region (say to 40Hz or so), this amp is punchy, and exhibits good definition with very little hangover. Since I doubt that anyone would be using an amp in this price range with speakers capable of subterranean bass, this is probably not a problem. The speakers most likely to be used with this amp would have little response below 45Hz, and this suits the Luxman perfectly.

Dynamic Contrasts
Most integrated amplifiers, especially those of Japanese mid-fi origins, have very little real dynamic range. Regardless of the power rating of these amps, when the going gets tough they just poop out. A good amplifying system will play softly and then, when the music dictates, will get louder and louder. Typical integrateds, on the other hand, will get loud to a point, and then the sound becomes squashed. This character is not to be confused with the concept of “volume.” Almost any amplifier will play at an average level which would be considered loud, but I’m not talking about average level. I’m talking about an amplifier’s ability to let the dynamics of the music come through. With the advent of digital, this becomes a real-world problem, not just audio crackpot nitpicking.

The Luxman LV-105 has quite a bit more dynamic range than its heritage would imply. That is not to say that it has the dynamics of separates, but when this amp runs out of steam, it does so in a very unobtrusive way. It doesn’t get hard-sounding or harsh, but maintains its musicality, acting like a good compressor.

The Image
The soundstage produced by the LV-105 is a mixed bag. Compared with its competition, it’s dynamite. Compared with the modified Hafler stuff, or my reference system, it’s only fair. The soundstage is neither very wide nor very deep in audiophile terms, but exhibits fairly good height, and the image specificity is excellent. It is possible to pinpoint each instrument across the limited soundstage width, and even that some instruments are located behind others. This is very good for equipment of this type; the mid-fi competition can’t show you a soundstage at all.

The disc stage
One criticism of the Luxman LV-105 has to do with its moving-coil input. The input impedance is switched from 47k ohms in the MM position to 600 ohms in the MC position. The problem is, most modern MC cartridges are best loaded with less than 100 ohms, and the bulk of these need to be loaded with less than 50 ohms. This amp has no facility to alter the input loading to other than the fixed 600 ohms provided.

When the cartridge is correctly loaded—more on this topic in the next issue—the LV-105’s MC input is fine. There is little or no noise, and the input retains much of the character of the MM stage. There is a touch of graininess that can be discerned on direct comparisons with the MM stage, but it is minor.
To sum up
All in all, this is the best integrated that I have ever heard. It does have several rather minor flaws, but, unlike the mid-fi competition, it is a piece of genuine high-end equipment. If you are on a limited budget, or are just starting out, the LV-105 may well be the amp for you. And since I can think of no separate amp/pre-amp combo in this price range at all, I'll have to say that this is the most amplifier for the money that you can buy.

Couple the LV-105 to a good Magnavox (Philips) 16-bit, 4x oversampled CD player, a Linn Axis turntable/arm combo, a good, moderately priced phono cartridge (the moving-magnet Audio Technica AT-160 would be my choice here), add a pair of Magneplanar SMG-A speakers, and you have a system for under two grand which would get you to about 75% of the state of the art. And don't forget your video system. With the two stereo audio/video inputs, this amp would be the perfect thing to switch between your stereo TV, a laserdisc player, and a Hi-Fi VCR.

GNP VALKYRIE LOUDSPEAKER

Thomas J. Norton


You might be forgiven if you haven't heard of GNP loudspeakers. I first ran across them about six years ago—a group of Caltech students led by Bill Gross' selling out of a storefront off the beaten Pasadena track, just a short skateboard ride from the Caltech campus. The three-piece system they were selling then wasn't particularly remarkable sonically, but was still a competent performer at an excellent price. Had I needed a loudspeaker system at the time, I would have been sorely tempted to lay out the required shekels on the spot, fearing that this merry academic band couldn't possibly last the winter with the prices they were charging. Now, I've always held that that little Scottish eatery, McDonalds, would never have gotten off the ground if it hadn't been for their original 15c hamburger;² maybe those techno-types from Caltech were minor in marketing, because they're still in business, thank you very much. Like McD's, their prices are no longer irresistible, merely

1 GNP actually stands for Gross National Products. Honest, Bill Gross is an ex-student of James Boyle's; see Stereophile, Vol.9 No.6.
2 I still remember when they went up to 18c—20%! Talk about runaway inflation. Talk about price gouging. Talk about a reviewer feeling like Methuselah. Talk about that only being 20 years ago. Everybody set for the 2006 $20 Big Mac?
competitive. But lest the reader draw any further conclusions, we're talking prime-rib here—something you won't find under a golden arch.

The Valkyrie is the latest incarnation of a GNP loudspeaker that began life as a product dubbed the "lead cylinder." It consisted of a cylindrically shaped, fiber-composition woofer/midrange satellite enclosure—in other words, a cardboard tube—wrapped with a material consisting of a thin sheet of lead surrounded by thin sheets of foam. The logic behind all this was to reduce cabinet-originated colorations. The remainder of the system included a dome tweeter (mounted atop the lead cylinder in its own tiny tube), and a separate, passively crossed-over subwoofer (the latter did not use the lead lining). The speaker was a decidedly odd-looking creation, but continued to be refined to the point where it developed a respectable reputation in its limited market.

The Valkyrie itself is rather unorthodox in appearance, but its wood veneer is a definite step up in domestic acceptability from the black felt wrap of its predecessor. It's still a three-piece system, but is now four-way. The woofer cabinet contains two 6" acoustic suspension drivers, each in its own isolated subchamber. Above that sits the lower-midrange enclosure. This is the inheritor of the lead-cylinder legacy, and is actually two enclosures in one. What you see is the veneered outer face of the outer enclosure. The 6" lower-mid driver (identical to the two woofer's) is mounted in the inner enclosure. Between the two is a blanket of that above-mentioned lead-foam composite. This mid-enclosure is quite noticeably heavier than the woofer enclosure beneath it!

The final enclosure of the three, capping off the configuration, is for the upper-mid dome and a tweeter. The upper-mid dome radiates to both front and rear, therefore the sides of this enclosure are open (except for decorative grille cloth); GNP believes that this driver sounds best if unenclosed. The top two cabinets form a pyramid-shaped unit (to minimize diffraction anomalies) with their front baffles slightly sloped back. L-pads on the rear of the upper enclosures permit adjustment of the upper-mid and tweeter drivers from full-on to full-off. Built-in spikes are fitted to the bottoms of the upper two cabinets for inter-cabinet isolation; GNP also recommends spiking to the floor (the user must supply the spikes, however). The three cabinets are interconnected by floor jacks of Livewire cable (included). Livewire is also used for internal hook up within each enclosure.

I have two "structural" criticisms of the Valkyries. First, the very stiff jumper cables used to connect the three enclosures, combined with the recessed banana jacks on the enclosures themselves, made for a complicated hook-up exercise with difficulty in properly tightening all the connections. Second, the speaker must be used with the grilles off for best results—the depth and shape of the grille frames is guaranteed to defeat the designers' otherwise obvious efforts to optimize diffraction.

The Valkyries (at least my samples) did not come with any set-up instructions. In particular, there were no recommendations for recommended settings of the "infinitely adjustable" level controls. This oversight definitely got my listening sessions off on the wrong foot. I used 12 o'clock as an intuitive starting point. Big mistake. The sound was forward, overbright, aggressive, and colored. Having had some previous exposure to the GNPs, I knew they were capable of better performance, and found that I had to back off considerably on the controls to get the optimum balance with minimum coloration. I wound up with both controls near nine o'clock.

I found the GNPs to have a distinctly "audiophile" balance—laid-back and a bit lacking in lower-midrange body and weight. Most speakers deviate, to a smaller or larger degree, from a totally neutral balance. (Most audiophiles, it seems, tend to disagree on what constitutes a perfectly neutral balance!) If a loudspeaker errs, I'm inclined to favor deviation in the direction of the GNPs rather than a forward aggressiveness. But a laid-back balance does reduce the drama and immediacy of music, most especially when it comes to large-scale symphonic and choral works that depend on these characteristics for their full impact.

I have to state right off that the low bass of the Valkyries is not up to their other, more positive qualities. GNP apparently chose
multiple small woofers for good transient response. They have succeeded reasonably well in this, though I found the bass-transient quality to be merely good rather than exceptional. But I would judge the usable lower limit of the Valkyries to be around 50Hz in my, admittedly rather large, listening room (the in-cabinet resonance of the woofer system was measured at 70Hz). In defense of the low-frequency drivers, they were successful at hanging in there when the going got rough; I was not able to bottom them out at levels of 95dB-plus. The GNPs never sounded thin or obviously lacking in low-end response, and rock bass in particular was reasonably successful (there is little real bass below 50Hz in most rock music unless synthesizers are used).

But when you get into this price range you start looking for speakers with the type of ultimate low-bass extension that the Valkyries can’t deliver in their present configuration. The low-bass quality of the Valkyries, combined with the aforementioned recessive balance, resulted in acceptable but not exceptional reproduction of large-scale music. But if your taste runs to almost any other type of music, the GNPs, depending on how you set them up, provided reproduction that ranged from capable to mind-blowing. My normal listening position, with all loudspeakers, is fairly far back from the loudspeaker plane. In my experience this is true of many listeners. In this position, and with the level controls now properly adjusted, the Valkyries developed a good, but not exceptional soundstage. Inner detailing was excellent throughout the midrange and high frequencies. Highs were excellent—open and well balanced, without exaggeration but with fine transparency. Coloration was very low, and the loudspeakers were very easy to listen to for long periods.

This might have been enough, but I felt that the fine inner detailing and well-thought-out cabinet configuration of the GNPs should produce a better soundstage than I was getting. It wasn’t bad, but it wasn’t by any means exceptional. So began the tweaking. Substitution of the Yamaha B-2x amplifier for the Adcom GFA-555 reduced a subtle dryness which had afflicted the sound and, more importantly, enhanced the three-dimensionality of the soundstage itself. The relative placement of sources within that soundstage remained merely average.

The final “tweaks” were the most important. The loudspeakers were repositioned and moved well out into the room, a good four feet from any adjoining walls. TipToes were placed under each system. And last, but not least, the listening position was moved to about eight feet from the plane of the loudspeaker pair (themselves about eight feet apart). This is about four feet closer than I am accustomed to listening, and places the listener in a position in which the “near field” response of the loudspeaker tends to dominate the reverberant field response.

In English translation, this means that the influence of the room on the overall system sound is reduced since the listener hears the direct sound from the loudspeakers well before the reflected sound from the walls. Milliseconds are important here: if a reflection arrives within a small time window, the ear regards it as part of the direct sound from the speaker. It’s not possible to generalize because the relative positioning of loudspeakers, listener(s), and room all play a vital part. In my experience, most audiophiles sit as far back as they can manage, a situation encouraged by the colorations of most loudspeakers (less obvious further back), their general frequency balance (it’s hard to sit too close to a hot or forward-sounding loudspeaker without the sensation that the Boston Symphony has sworn to take no prisoners), and the appealing spaciousness that most loudspeakers acquire when listened to well into the reverberant field. There has been some discussion of this in the literature, but not enough in the audiophile press.

I had suspected that the GNPs were capable of excellent soundstaging, but I wasn’t prepared for the overall enhancement of this capability caused by the new positioning. True, the low bass—already less than awe-inspiring in the old location—was further reduced in the new with both speakers and listener well away from bass-enhancing walls (except, of course, for the floor—levitation not yet being in this reviewer’s bag of tricks). And the area of optimum soundstage was

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3 Perhaps more important is the fact that, all things being equal, a small cone will go into breakup at a higher frequency than a large one, hopefully dumping less coloration into the midrange.

—JA
THE END OF THE WIMP LOUDSPEAKER?

Bill Sommerwerck reviews speakers from Angstrom & Spectrum

Angstrom Reflexion loudspeaker: two-and-a-half-way (see text) tuned-port bass-reflex loudspeaker, with one 25mm polyamide dome tweeter and two 205mm polypropylene bass/mid-range drivers; crossovers at 250Hz and 2kHz (see text). Frequency response: 35Hz-20kHz, ±2dB, on-axis. Sensitivity: 95dB at 1m for 2.83V input. Minimum recommended power: 7W. Power handling: 200W (10% clipping). Nominal impedance: 6 ohms. Internal volume: 48 liters (1.7 cubic feet). Dimensions: 3.5" h x 10.5" w x 12.5" d; stand adds 6.5" to height. Weight: 20kg. Price: $900/pair (including stands). Samples tested: 30687/30706. Source: manufacturer loan. Manufacturer: Angstrom Associates, Unit 7, 2175 Dunwin Drive, Mississauga, Ontario L5L 1X2, Canada. Tel: (416) 873-0260. Distributor: Angstrom, 210 8th Street, Lewiston, NY 14092.

Spectrum model 410 loudspeaker: two-way tuned-port bass-reflex with one 25mm dome tweeter (with acoustical impedance transformer), and 10" plastic-impregnated bass/mid driver. Crossover frequency: 2kHz. Frequency response: 28Hz-16kHz, ±1.5dB; Sensitivity: 89dB at 1m for 1W. Recommended power: 30-200W. Nominal impedance: 6 ohms. Dimensions: 40" h x 14.5" w x 11.5" d. Price: $750/pair (includes tilt feet and spikes). Samples tested: 0123/0124. Source: manufacturer loan. Manufacturer: Spectrum, 1021 Nevada, Toledo, Ohio 43605. Tel: (419) 698-4488.

The Angstrom Reflexion

In my report on the Toronto Consumer Electronics Show (Vol.9 No.7), I made some favorable noises about the Angstrom Reflexion speaker. In my own system, it more than justified my good feelings about it. Here's the full report.

The Reflexion is unusual for an audiophile speaker, in that it was designed to be cosmetically acceptable to the housewife. Even odder is the way this approach produces meaningful sonic benefits! Angstrom first decided that the speaker had to look small, so that the missus wouldn't object. This was done with a narrow front panel and a relatively deep cabinet. As we all know, a narrow cabinet moves diffraction effects upward in frequency, reducing their audibility. Another way to make the cabinet look smaller is to bevel the edges. Angstrom didn't do this the easy way—simply trimming off a slice of wood from the panels. Instead, the beveled edge is itself one of the cabinet pieces. Thus, the box consists of eight sides, not four, which should (theoretically) convince with small instrumental groups and voices than with full-blown symphonic forces. But it was impressive nonetheless.

The old GNP storefront in Pasadena has expanded into a high-end emporium, but the former students, now wizened old pros, are still in the serious-loudspeaker business. With a bit more low-frequency extension and a slightly more neutral balance, the Valkyries would be a tough act to follow. Even as they are, they demand an audition if you're anywhere near a dealer. And that might be your toughest problem—you won't find a GNP dealer on every corner. But if you have one nearby, be certain he has the speakers properly adjusted and set up. All loudspeakers profit from careful placement; the Valkyries demand it if their strengths are to shine through.

4 I am still not entirely convinced that this is a natural artifact of the stereo illusion, but can't deny the fact that when it occurs with the Valkyries it is natural and believable.

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make it more rigid and less vibration-prone.

Angstrom took another step toward cosmetic innocuousness by making the stand look like part of the speaker. The black cap at the bottom, unlike the one at the top, is not attached to the speaker; it's part of the stand. This separation allows 3 pins to be inserted between the cap and the speaker; focusing the speaker's weight on such a small area improves the cabinet's mechanical coupling to the stand. The stand itself has four spikes, which are adjustable for leveling. (My carpet and padding are so thick that I couldn't get proper contact with the floor underneath, however.)

Unlike some other designs, which try to make the grille frame a smooth-edged part of the speaker, or factor the sonic effects of the frame into the design, Angstrom decided to make the speaker sound good without the grille: you are encouraged to remove it during listening sessions. I found it snapped on and off without any fuss. To minimize the visual distraction of six drivers staring at you, Angstrom added a wide black inset down the front, which unites the drivers into a single shape.

The two-and-a-half-way aspect of the design is relatively unusual (though it has been featured in speakers from KEF, Wharfedale, B&W, and Mordaunt-Short, among others): the two 8" woofers are not driven by the same signal. Both reproduce frequencies up to 200Hz, but the lower driver rolls off above that point, the upper continuing to about 2kHz. The obvious advantage is that it gives us two drivers for enhanced bass, but only one in the midrange, giving a smaller acoustic source and thus better-controlled vertical dispersion. If the (relatively large) driver can perform competently in the midrange, you've come out ahead.

Now, to say that the Reflexion "performs competently in the midrange" is an understatement! It is almost as subtly detailed as a good electrostatic, and is free of the syrupy-sweet colorations that are sometimes misinterpreted as "musicality." The best commercial recordings and my own tapes have the crisp, neutral sound one would expect from a master tape. In short, the Reflexion has the kind of lifelike, "immediate" sound that, to this listener, is the whole point of high-fidelity reproduction. What it misses in terms of refinement (not a great deal) is made up in overall realism.

The Reflexion's bass is almost as impressive as its midrange. Although not as spectacular as that from a separate subwoofer (I had one on hand for comparison), it is open, airy, and detailed. Pitch differentiation is excellent; it was easy to follow the various threads of bass rhythms and melodies. (Is this what some reviewers mean by a "tuneful" bass?) The low end is sonically similar to the midrange: there is no discontinuity nor disparity. Though the
woofe never seemed to be "blowing air in your face," the bass still had tremendous wallop. Yet it's also tightly controlled—hardly any boom or mud. This is unusual; we usually assume a tight low end will lack impact. The Reflexion has impact.

Imaging was above average (or so it seemed to someone accustomed to the rather vague imaging of planar speakers). Positioning was sharp, and the ambience realistic. Like the Spectrum 410 also reviewed in this issue, the Angstrom Reflexion rendered the RCA "Audio Symphony" disc with considerably less coloration, and a more realistic ambience, than I have heard from other speakers.

The best imaging was obtained with the cabinets toed in, almost facing the listener. Off-axis image stability was exceptionally good, provided you sat at least as far back as the speakers' separation. With careful positioning, the Reflexions should give good results in a video system that covers a large listening area.

The tweeter is, relatively speaking, the Reflexion's weak point. It's nicely detailed and relatively neutral, but tends to exaggerate any hardness or brightness in the program material. Fortunately, it's a quantum effect. Clean material sounds okay, but when the nasties show up, you are sometimes made aware that the Reflexion has a tweeter. This makes the problem sound worse than it is. Even with hard or less-than-perfectly clean material, I never had the urge to turn off the Reflexions, nor did my ears twitch more than a teensy bit. We are talking small birthmark, not body-covering liver spots.

The Reflexion is a really accurate, low-coloration speaker you wouldn't expect to find for under $1000/pair. It represents good value, and I suspect it will give long-term listening satisfaction with any kind of music—classical, rock, or jazz. Even if you have more than $1000 to spend on speakers, the Reflexion is worth auditioning. You won't be wasting your time.

**The Spectrum 410**

...looks like any other conventional two-way system. As with most post-DQ10 designs, there's no specific mechanical correction for time delay; tweeter and woofer sit on the same flat panel. Spectrum supplies four wedge-shaped runners, to be screwed to the speaker bottoms. The resulting tilt brings the drivers into time alignment. (I've been off my Wheaties for a long time, and just could not get the screws started. I got around this by shoving the wedges under the cabinet.) Each foot has two threaded inserts for spikes. Since the feet weren't attached to the cabinet, I didn't install the spikes.

The driver-mounting panel is a separate wooden block, smaller than the cabinet front; it leaves a broad gap. The grille frame is as thick as the panel, and as wide as the gap. Its edges aren't sharp, but rounded-off. When
snapped in place, it sits flush, terminating the abrupt mounting panel edge with a smooth, low-diffraction shape.

Spectrum recognizes that "low diffraction" is not the same as "no diffraction," so both drivers are placed asymmetrically, to reduce diffraction further. (The worst place to mount a driver is at the center of a square baffle; the diffraction effects from all four edges will occur at the same frequencies, reinforcing each other. The least-bad position is with the driver as close as possible to one edge, and the distances to all edges unequal. This puts the diffraction effects at different frequencies.)

The first thing one notices about the sound is that the 410 is not your typical laid-back speaker. The midrange has real presence. Close ly miked recordings sound closely miked, rather than Row M in an echo chamber. Further, the midrange is crisp and well-articulated, unlike many "musical" speakers, where it is coated with a layer of treacle.

This forwardness is not a coloration. Instruments and voices are more nearly palpable, and have a greater sense of lifelike presence. Voices, in particular, sound more like they're right there in the room, and have more of the weight and focus of live sound. You can't get that quality simply by goosing up the midrange, or adding resonances.

One of the most revealing disks I ran past the 410s was Vol. 1 of RCA Japan's "Audio Symphony" series. If your audiophilia goes back more than a few years, you may remember these recordings and their weird sound. The midrange has a uniquely indescribable coloration, and the ambience is flat and artificial.

On the 410s, these colorations largely disappear. The ambience becomes more vividly lifelike and irregularly realistic, no longer seeming the output of a slick-sounding reverb generator. This is surprising, since the received truth holds that speakers with a recessed midrange have greater depth and ambience. Not so. The most important ambience is in the midrange; the more accurately we render the midband, the more realistic the ambience.

The 410s have the kind of accurate, low-coloration midrange that one usually expects from rather more expensive speakers. Although the 410 does not have quite the subtle delineation of detail that one gets with electrostatics, it is not far behind, and makes up for the loss by its increased immediacy and presence. An instrument sounds like a specific instrument, not a generic representation.

More listening revealed the 410's top end to be excellent: it is exceptionally smooth and clean. There's plenty of detail (close to an electrostatic's), but without any tipped-up top or exacerbation of program distortion. The 410s are so clean that I could listen for several hours at a time without fatigue. Spectrum's claim that the highs are almost as open and airy as the best electrostatics' is, in my opinion, largely justified.

Spectrum says this good performance is due to the acoustic impedance-matching device (a quasi-horn) that loads the tweeter. It was computer-designed, and, among other things, quashes an otherwise irritating peak at 16kHz. My feeling is that this tweeter would not be out of place in a much more expensive speaker.

The 410's only real disappointment is its low end. Spectrum's claim that you'd have to buy a separate subwoofer, costing more than the 410s, to get better performance, is, to put it charitably, hyperbolic. The bass is overly ripe, lacks air and detail, and sometimes sounds a bit detached from the rest of the range. The woofer did go fairly low, and could handle almost any amount of bass I threw at it (including Sheffield's Kodo, at a reasonable level), but there was a lack of percussive impact on recordings that ought to have had it. Bass drum showed an excessive decay time, with slight ringing. Other percussive bass sounds did not show any apparent ringing. By the way, note that the 410's port is at the rear, given the 410's bass quality, it wouldn't be a good idea to position the speaker too close to a rear wall.

Imaging, on the other hand, was better than average. The most natural ambience, widest and deepest soundstage, and sharpest positioning all occurred with the 410s toed in, almost facing the listener. Image sharpness was judged especially good, as was the coherence and realism of the ambience. Sounds showed little tendency to bunch up at the speakers (speaker-detent effect), and often seemed to come from outside the speaker boundaries. (This is actually an illusion—which varies with whether or not your eyes are open, and how much your head is tilted—since most recordings do not have the psycho-
acoustic cues to produce the effect. However, it is fair to say that mediocre speakers never create the illusion.)

The 410s offer exceptional value. If you'd planned to spend only $500 or $600 for speakers, give these a listen. You may find that the sonic improvements more than justify the price difference. If you're willing to spend over $1000, but just can't make up your mind, the 410 might be an easy choice that will keep you happy until you move up to something more deluxe. And if you're tired of expensive, blah-sounding speakers, you may find the 410s a welcome change at a reasonable price.

Unhesitatingly, warmly recommended: an under-$1000 system that need make few apologies.

**Overall conclusion**

The two fundamental deficiencies of reproduced sound, in my opinion, are the distortion of ambience and the loss of the sound's presence or immediacy. Live sound has a distinctive "lively" quality generally missing from reproduction. When simply miked recordings (which tend to have these problems) are played through bland-sounding speakers, there is a musically dispiriting antagonism of colorations. Fortunately, the days of moderately priced speakers with "97-pound weakling" midranges are over.

Long before I owned audio equipment, I often heard what was considered "hi-fi" at the homes of friends and acquaintances. If there was one thing that stuck me about the reproduction, it was its consistently insipid quality—bland, vapid, colorless, gutless. Sonic drivel, pure and simple, regardless of the model of amp or speakers. It wasn't just laid-back, it was positively somnolent. Having been brought up on the lusty inaccuracies of table radios and stained-fruitwood consoles, I found the "accuracy" of reproduction to be actively annoying. Though I knew little of the qualities of live musical sound, I nevertheless intuitively sensed that it couldn't be so spineless.

As I learned more about high-end audio, I discovered that my gut reactions had been correct. So-called "accurate" or "neutral" speakers simply weren't. They just seemed that way, compared with the really bad ones, because they had a recessed midrange that eviscerated the sound. Some models (most notably the LS3/5a) managed to combine that midband depression with gobs of sickly-sweet treacle that cleaned up even the worst-sounding recordings—and at the same time obliterated all the musically interesting rough edges.

In fairness, there was some justification for such speakers. If you felt hi-fi should be "musical" rather than literally accurate, then you wanted to protect the listener from everything that was wrong with his recordings. And the "forwardness" of many speakers was the result of resonances. The conscientious designer tried to hide them by pulling in the reins on the afflicted driver. The result, however, was that speakers divided into two groups—Perry Como "classical" speakers, and Sid Vicious "pop" speakers.

Of course, more than a few reviewers pointed out that there was no such thing as a "classical" or "pop" speaker; accuracy was all that mattered. Since the better orchestral recordings were made to sound natural, with only a few mikes, and hardly any signal processing, and pop recordings were, ah, adjusted to suit the producer's "taste," a truly neutral speaker would reproduce both types of recordings with equal listening satisfaction. Yet classical speakers remained bland, pop speakers aggressive.

Perhaps this tendency of designers to create extreme designs favoring one market or another led listeners to believe in the correctness of bland-sounding classical designs. After all, if pop speakers were so wretched, then classical speakers must be right, right?

Wrong. Blandness does not equal neutrality. Blandness is a coloration, and a nasty one. It removes one of the most vital elements of the sound, but we tend to overlook it because it's a subtractive coloration.

Which brings us back to the Spectrum 410 and Angstrom Reflexion. Here, at last, are moderately priced speakers equally at home with classics or rock. Both are largely free of musically euphonic colorations, and have a flat, unrecessed midrange. The sound is crisp and immediate, with a fairly good rendering of timbral subtleties. Simply put, they sound more realistic than euphonic, palpable than

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1 K&L designed several superb tweeters that never made it into commercial products because they exposed too much of the grunge in the program material of 20 years ago.

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laid-back, involving than vapid. They have musical guts.

I recommend both of these systems to critical listeners. The Spectrum 410, with its super-clean highs and disappointing low end, would be more appropriate for the music lover who usually isn't interested in state-of-the-art bass, but does want the least-irritating reproduction from a wide range of recordings. The audiophile, however, is more likely to buy recordings on the basis of sound, and rarely plays the nasty recordings that the Angstrom

Reflexion doesn't handle well. He will also be impressed with the Reflexion's tight but exciting low end.

In several weeks of listening to both speakers, I never had the desire to switch back to my Acoustats. That is high praise, indeed. Both the Angstrom and the Spectrum strike me as likely to be satisfying for a long time. Indeed, they're the first under-$1000 speakers I've heard that I would be content to live with if I couldn't own electrostatics. Even if you're not in the market for speakers, audition them.

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**PIONEER F-77 AM-FM TUNER**

Don Scott

Pioneer F-77 Tuner


Pioneer has four tuners on their current roster, three of which have been evaluated. The TX-V1160, reviewed in Vol.8 No.7, garnered high marks and has the additional plus features of MTS audio, video tuning, and simulcast capability. The top-of-the-line $325 F-99X Elite was tested and rejected because it has an inconvenient combined mute, stereo/mono manual/automatic search switch, high distortion in the narrow bandwidth position, a useless three-step signal meter (all lights are usually lit), and is generally not a good buy compared with the slightly higher-priced Onkyo T-4087 ($389). The untested TX-1060 is Pioneer's low-end tuner at $149, and is available (as the TX-V70 BK) as part of a rack system. I suspect this will be a good-performing tuner because, electrically, it is a cousin to the proven TXV-1160. If—if—you can find one out-of-rack, it might be a low-cost winner.

The latest tuner received from Pioneer is the middle-of-the-line F77. Most of its circuitry, apart from the dual bandwidth, is borrowed from the F-99X, but it does include separated stereo/mono mute defeat and auto/manual search functions. There is a blank switch position, normally used for Long Wave versions in some countries, which could be well used as a high-blend function, but is not. The fairly good overall performance of the F-77 leads me to believe that the F-99X tested was not representative.

The F-77 is a very slim, black tuner. From left to right are power on-off, memory and mode switches, five-digit frequency display, the useless three-level signal meter, 16 A/B memory preselects, and a large frequency up-down rocker. No provision is made to short-step from 107.9 directly to 88.1, a real time saver. Manual tuning is in 100kHz increments.
on FM, 10kHz on AM. No unusual circuits are used.

Specifications
Most specifications are par for a good $200-$300 tuner. On the negative side is a rather poor 56dB alternate-channel selectivity. (The $229 NEC T-6E has 80dB, one reason it remains a winner.) On the plus side is exceptional stereo separation. Pioneer claims 60dB; it tested better than 53dB, and does not suffer from agoraphobia. Other pluses include dead-quiet background (80dB) in stereo, and 60dB subcarrier/SCA rejection. No SCA birds were heard. THD is spec'ed at 0.089%, and is acceptably low. However, there is some higher-magnitude IM distortion that can be tamed by careful selection of interconnects in order to present a favorable load to the tuner’s audio-output stages.

This is the most sensitive AM tuner section I’ve ever tested. A good sensitivity rating of 150uV/m is claimed, and exceeded by 30% at most frequencies. It gets many stations without static, but there is a catch: the highs start rolling off at 2kHz, and the tonal quality is pure mud. An AM stereo accessory jack is provided, although no adapter is presently available.

FM Sound Quality
Wouldn’t it be nice? Present are good detail, solid bass extension, flat response to 15kHz, perfect stereo imaging and separation—but the slight IM distortion referred to above spoils the show. This annoyance is not present, for instance, from the Quad FM4 and the NEC T-6E, which, while doing everything else equally well, sound cleaner.

Conclusion
The F-77 is a mixed bag. Its strengths are good SCA rejection, quiet, full-bodied stereo, and sensitive but muddy AM. It is not useful in areas requiring good alternate- or adjacent-channel selectivity. It is a “try it, you might like it” tuner. At its often discounted $239, it might be good enough for some applications. The Pioneer TX-V1160 remains a better buy; it doesn’t have the AM pizzazz, however.

**RECOTON CD-20 AUTOMOBILE CD ADAPTOR**

**Don Scott**

Adaptor to enable a portable CD player to be used with an in-car cassette system. Price: $24.95. Manufacturer: Recoton, 46-23 Crane St., Long Island City, NY 11101. Tel: (800) 223-6009.

Designed by Larry Schotz, the FM noise-reduction specialist, the CD-20 is a CD-to-cassette adapter housed in a blank cassette shell. A flexible 3½-foot connecting cord can exit from either side or the rear of the unit as needed, and plugs into a portable CD player’s output via a stereo mini-jack. The audio output from a CD player is correctly equalized and passed into a transformer that emits a magnetic signal in close proximity to the cassette playback head, thus emulating the magnetic field of a passing tape. No external power is required.

Tests conducted using a Sanyo M9825 boom box and a TEAC V-300 home deck indicate that the unit should function well with a wide variety of electronics. Exact results are dependent on the quality of the interconnect-ed units. A Sony D-7S provided good results, with an extended dynamic range, wide frequency response, and no RF interference.
Not every audiophile really wants to create a listening room that looks like a sound studio. Many people can't. Apartment owners don't like you to muck around with their walls. Schools, parents, and wives can have the same narrow attitude. Not every one likes carpentry, and some people even have more to their lifestyle than their stereo system.

Everyone, however, does face the problem of interaction between their listening room and their speakers. No matter how carefully speakers are placed, and no matter how large and solid the listening room, rear- and side-wall reflections color and distort the sound. If the room is small, and the speakers are too close to the rear and/or side wall, the result can be considerable smearing of the sound and a serious loss of transparency.

The Watkins Echo-Muffs respond to this need and do a very good job of it. They are placed 4" behind normal speakers (4-8" behind a dipole speaker) and are roughly equivalent to 100 square feet of acoustic absorbent material placed on the wall. They also are extremely light and portable. They fit neatly into a closet and can be set up in seconds.

The Echo-Muffs also aren't all that bad looking, although I suspect they will need to come in more colors to meet both the family needs of those couch-potato audiophiles who won't move anything but 100 lb amplifiers, and WAF standards! I'm told by my official WAF Standards Center that brown and beige are totally out this year, along with white. Oh well, I'd suggest beige, off-white, and light grey, as well as the current brown.

Depending upon the speaker, the Echo-
Muffs produce significant sonic benefits. They produced a cleaner midrange and highs with my Thiel CS3.5s in their best position, and better centerfill and imaging. The differences weren't dramatic, but they were audible and became steadily more audible with every improvement in the source material. The same proved true with the Fuselier 5s, Vandersteen 2Cs, and every other reasonably sized non-dipole radiator I tried in my own and four other listening rooms.

The Echo-Muffs also produced strikingly better results the moment the speakers were placed too near a rear or side wall. The result was a significant improvement in the smoothness of the frequency response above 200Hz or so, much better imaging and depth, and more transparency. The Half Muffs also did a great deal for a pair of bookshelf speakers, although scarcely enough to justify wall mounting. Further, they sharply reduced common-wall vibration—something of real importance to apartment dwellers.

These sonic results were more problematic with dipoles. The Echo-Muffs made the Apogee Duetts IIs sound muffled (no pun intended). In fact, they almost made the Duettas sound like Martin Colloms' review said they did. With proper room placement, the Quad ESL-63s improved in transparency, but the spectral balance became warm and the soundstage closed down more than I would like. With the Quads too close to the rear wall, however, the Echo-Muffs were a vital treatment. They made the Quads sounds quite acceptable under conditions in which they would otherwise have been impossible.

The Echo-Muffs, therefore, must be used with care. They may or may not help with dipoles. They also don't deal with problems in the deep bass, and their effect is only fully apparent from the upper bass and lower midrange upwards. They may make some speakers sound a bit dull—perhaps because these speakers were designed with room reflections in mind—and will have uncertain effects with any omnidirectional or with quasi-dipole speakers that have a rear-firing tweeter or two.

Such niggles aside, the Watkins Echo-Muffs are a minor breakthrough in home audio. They are an affordable and livable solution to a lot of real-world listening-room problems. They will be of value to most audiophiles, and a real boon to those with small or problem rooms, apartments, and decor problems. They are also reasonably priced—a major breakthrough in a distinctly overpriced part of the audio accessories market.

An Additional Opinion from JA

Although I am in agreement with AHC concerning the improvement in imaging effected by a pair of Echo-Muffs, I feel more should be made of the fact that the Echo-Muffs are effectively acoustically transparent below 200Hz. This, of course, is the region where rooms have their most severe resonance problems, and my trials with the Echo-Muffs proved more complicated than AHC's. I certainly agree that the Echo-Muffs work as claimed. But while the cutting-down of the amplitude of early reflections did prove beneficial in improving image definition in the depth plane, at the same time, lowering the general energy in the room from the lower midrange upward left low-frequency room problems more exposed. In my own case, room modes at 66 and 84Hz, which, sans Muffs, blended somewhat into the generally "live" room sound, became more obvious when a pair of the large Echo-Muffs was positioned closely behind my Celestion SL600s.

In the short term, positioning the Muffs involved a delicate compromise between rendering the midrange sound too dead, thus emphasizing the room's bass problems, and keeping the liveness of the room sound but losing the imaging benefits conferred by the Muffs. In the longer term, getting the best of both worlds involved placing a set of the larger 16"-diameter Tube Traps in the room corners to clean up the room's LF problems, allowing the Echo-Muffs to be then optimally positioned for both imaging and evenness of room sound.

I am not saying that purchase of Echo-Muffs leads inexorably to purchase of Tube Traps; that just happened to be what was required in my situation. Rather, as so often happens with hi-fi, working a desirable improvement in one specific area of performance doesn't necessarily result in an overall system improvement without more work elsewhere.

Stereophile
**FOLLOW-UP**

**Magnum/dynalab FT-101 FM Tuner**

Stereophile's "Recommended Components" list in Vol.9 No.7 included a remark under the Canadian Magnum/dynalab FT-101 FM tuner entry that there had been some unit-to-unit variation. I had based this statement on examination of four samples of the tuner on dealer's shelves compared with the original review sample (which I subsequently purchased). Following publication of Vol.9 No.7, I received a phone call from company representative Mary Southcott, assuring me that Magnum/dynalab has rectified every known complaint received concerning the tuner, a task made easier by the fact that they own their own US distribution office and don't have to rely on a third-party importer.

Either to put up or shut up seemed to be in order here, so I requested a sample from the latest production run for reevaluation. In addition, I scrutinized two additional units at a dealer in Niantic, CT. From my examination of these three samples, it would appear that Magnum *does* now have satisfactory quality control, and I see no reason to downgrade the FT-101 from Class A. Recent versions of the tuner sport three finishes, lower distortion, better power supply regulation, two-level audio outputs, and an optional remote control. Product information is available from Magnum/dynalab, 1971 Abbot Road, Lackawanna, NY 14218. Tel: 1-800 448-8490. A lower-cost version of the FT-101 was launched at the WCES in January.

Please note that in the same tuner listings, McIntosh, Quad, and Sansui were also chastised for unit-to-unit inconsistencies; I do not feel that this Canadian manufacturer was unduly singled out for QC problems. In fact, I would estimate that 35% of all RF equipment received for review has either a minor or a major defect of some kind.

—DS

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Implicit in every Stereophile equipment review is the assumption that the reader is aware of the reviewer's likes and dislikes in both hardware and music. The forgotten factor in audio—the state of the reviewer's listening room—will also have a significant effect on his value judgments. Writers can only hope that the reader can adjust a review's conclusions to allow for his own room and tastes. The information to make this possible, however, is very often missing from reviews, so we are presenting thumbnail sketches of our reviewers' musical tastes, the evolution of their systems, and how they manage to extract basically good sound from the rooms they use for serious listening. In Vol.10 Nos.1 & 2, AHC, BS, AG, JGH, DO, ST, KK, CB and JA told it like it was; in this issue, with an acknowledgement to The Absolute Sound (who first published such a feature), we have:
Martin Colloms

As editors know only too well, a simple request for one's musical tastes, record collection, listening room, and equipment/components is quite a tall order. However, it should serve as an introduction to the author concerned and help reveal the bases of his opinion.

Taking the points in order as requested by John Atkinson, the first concerns musical tastes and their evolution. As a member of the Dylan/Beatles generation, my pop tastes began with them, and expanded, via Joni Mitchell, Ry Cooder, and Little Feat, into the broad rock arena. There is little I will not try, though I continue to find a paucity of enduring quality. Some jazz manages to creep in here and there, Mingus, Brubeck, Davis, and Jarrett for example.

My lasting musical interest is in classical material, ranging from Gregorian chant to Stravinsky, but stopping a little short of Schoenberg and Stockhausen. I am a sucker for the great romantics, and am currently expanding my Rachmaninov collection. Among other favorites, I include Bach, Beethoven, Prokofiev, Bruckner, Mahler, and Sibelius and, when in a more contemplative mood, I find Glass and Reich rewarding.

At present I possess almost no tapes, my collection being approximately two-thirds LP and one-third CD. I use CD a lot—for convenience's sake, and also for much broad listening-test work. However, for more critical analysis and top-level listening pleasure, I find that vinyl still wins the day. Regarding exposure to live music, I attend as many classical concerts as I can, as well as visits to recording sessions. Rock concerts number two or three a year, at which I generally use ear defenders!

My daughter Catherine plays flute and piano, and is willing to try most instruments. She now plays with a local amateur orchestra.

My main listening room sounded pretty good from the start, even with no carpets or furnishing. The proportions and high ceiling favor a classical sound balance; the main steps taken to maximize its performance were balancing the distribution of bookcases and the side-wall absorption/reflectivity such that a uniform reverberation characteristic was maintained over a wide frequency range, measured from 100Hz to 12kHz.

I work downrange, seated fairly close to the far wall, with translucent fabric blinds drawn over the adjacent windows. The speakers are generally free-space types, located 0.5m from the floor, 0.9m from the side walls, and 1.4m from the rear. This gives the most uniform low-end response, with sharp stereo focus and good depth.
The room's dry, neutral character ruthlessly reveals loudspeaker coloration but may not be ambient or airy enough for some tastes. When reviewing, I generally make some allowance for listeners' own rooms, which will have more typical acoustics.

Concerning equipment, most of my 1986 listening was done using two favorites: the Audio Research SP-11 preamplifier and M100 mono power amplifier. Offering a consistent reference standard, these have provided continued listening pleasure and a valuable resource for general reviewing. The LP source comprised an LP12/SME V/van den Hul MC10/MC One. My first reference CD was the Sony two-box unit with DAS-702 decoder, supplanted through 1986 by the Cambridge Audio CD1, as yet unvanquished at my location. The loudspeaker choice is less well defined, however, and includes, according to requirements and other review equipment, the Magneplanar MGIIIa, Spendor SP1, and Quad ESL-63. More recently, a custom bi-wired version of the Celestion SL-600 has been brought into service.

With some 200 reviews in progress each year, I have a wide opportunity to sample the market: there is not enough space here to mention even a few of the more memorable items. My personal listening system represents a considerable investment, and I try not to change it too often. Furthermore, a stable reference system, regardless of absolute quality, becomes a useful yardstick for other review comparisons.

In 1987 I anticipate the purchase of a Cello Audio Suite, Premium Series, modular preamplifier, not only for its fine sound, but also for its balanced input/output potential. Its stable performance, calibrated to very high precision, makes it most useful for long-term reviewing. I have also found the loan of a Cello Palette equalizer most rewarding, and will add this to the system with the aim of exploiting it for such additional uses as speaker frequency-balance analysis and speaker voicing, as well as for correcting older analog recordings with a view to remastering.

The ARC M100 sounds best on its 4-ohm tap (though with reduced output), and with bi-wired systems I have had notable success connecting one frequency band to the 0.4-ohm tapping and the second to the 4-16 ohm tapping, thus bi-wiring the output transformer, in a manner of speaking. While the M100 sounds delicious, for some time now I have been looking for an amplifier with (nearly) comparable midrange tonality and depth, but with greater dynamic headroom as well as an ability to drive some of the worst test-loudspeaker loadings. I believe that I have at last found what I need in the Mk.11 Krell KMA-100.

Trials with the KMA-100 showed that at the same volume level, the Krell was a mite less dynamic and open than the ARC M100, with less depth resolution, but offered a slightly faster, tighter bass. However, using a calibrated volume control, it proved possible to drive the system 7dB louder with the KMAs. About 2dB was sufficient to make up subjectively for the absolute sonic shortfall, while the remaining 5dB of headroom ultimately and decisively provided an overall improvement.

Thus, after several years of valve amplification, both on the preamp side—Counterpoint SA7, Audio Research SP8 II, SP11—and on the power amp side—Audio Research D70 II, D115 II, and M100—1987 sees the return of solid-state. I have no fixed ideas about either technology—I have simply taken the product as it comes and assessed it on the grounds of performance, with sound quality as the first consideration.

On the turntable front, my player has recently been changed to a new-series Pink Triangle, their Model "T00" with electronic power supply. This partners the SME V, delivering a neutral, revealing sound, full of unexaggerated detail. We shall have to wait and see how the Triangle company, presently operating on a small scale after financial problems, develops from this promising renaissance.

Cables include Siltech and van den Hul MC Silver and MC Gold, including those for the speakers. I also take speaker stands very seriously, using heavy, nonresonant structures of small acoustic profile, firmly planted to the floor. Recent tests with spikes or small cones beneath the speaker have proved most promising.

In the future I wish to investigate the continuing disparity between the ultimate standard of vinyl and CD replay, as well as see what factors could be implicated. At present, it is
suggested that CD players are, as yet, simply not good enough; conversely, many digital recording engineers claim that the best domestic CD replay is superior to that from their studio decoders. So how good are the encoders? Why does early and middle '60s vinyl so often beat CD in the subtleties of music reproduction?

Components I hope to audition through '87 include the ARC M300, the Cello Performance, and the Motif power amps. ClearAudio, Koetsu Red Signature, and Madrigal’s Carnegie are all contenders in the cartridge area, while the ARC SP-9 preamp could well set the cat among the pigeons!

**Don Scott**

The Tube: In third grade, I used to sneak off the school grounds to visit a TV store, fascinated by the latest 10" Fada TVs using the newly developed RCA 630 chassis. At age 14, I started working in a TV shop as a bench technician. In 1956, I attended the first Motorola training schools on color TV repair in Newark, New Jersey.

Live Sound: Some say I was born with a musical background—behind a piano in a bar. Anyhow, I can remember my mother toting me along at age three to hear *The Thunderstorm* played on the organ at the Ocean Grove (NJ) Convention Hall. Other organ listening included a large Wurlitzer in Asbury Park (NJ), the magnificent organ in the Atlantic City Convention Hall, and the one in Radio City Music Hall. In my teens I heard the organs at the West Point Chapel, several large churches in NYC, and attended Virgil Fox concerts.

The first real exposure to live vs recorded sound was at age 14, when I worked in a small radio station doing engineering for remote broadcasts from ball games, parades, and the like. Around the same time I attended concerts at Carnegie Hall and the *New York Times* auditorium. In later life, I served as chief engineer for two FM and two AM stations.

I attended Harry Reizes' pioneer hi-fi shows in NYC in the early '50s, and was there for the first demonstration of FM stereo, put on in person by H H Scott and radio station WDHA, Dover, NJ, in September 1962.

During my West Virginia college days, I attended many authentic bluegrass festivals and developed an appreciation for the human voice and stringed instruments. When I hear the human voice reproduced accurately today I do not get goose bumps, but I do shed soft tears of auditory pleasure.

The latest check on my live memory-reference occurred last summer in Salt Lake City, listening to the Mormon Tabernacle Organ. Upon returning home, I was able to satisfactorily reproduce the sound of that organ in my listening room using Philips CD 412 217-2. My success was confirmed by two organ techni-
icians, one the CEO of a major organ company, the other a tonal finisher for 24 years and an expert on harmonic structure. Both men have worked on the Tabernacle organ, and are well acquainted with its sound. They were convinced I had brought a part of Utah to Connecticut!

My listening room is 12x15', with a 12' ceiling. The concrete floor has two layers of rubberized carpeting. The left-hand wall has a 6x8' sliding-glass window. There are doors at the center-rear and right-rear wall. The rear and right side-walls are broken up with several shelves (up to the 6') level.

Speaker systems are usually placed two feet out from the front and side walls. Obstructions include a picnic table used as a desk under the window, and a low table placed between the speakers to support electronics. During serious listening, the room is cleared of anything containing a resonant mass (such as other speakers). The best listening point is seated on a carpeted three-step landing leading to the right rear door. The room sounds neither live nor dead—just a trifle small.

My FM listening situation is less cramped and more ideal. There are 110 FM stations I can usually receive, and I'm not restricted to three or four goodies in the New York metro area; there are 20 high-quality FM signals available.

My home/listening post is only 80 feet above sea level, and is almost completely blocked by an 800-foot hill to the southwest, which contributes to lots of multipath. There is a 13kV power line on my street that leaks at times, obliterating all but the strongest stations: several 10mV signals from Hartford, CT, transmitters five miles away, and two local stations one mile away. In addition, there is an abundance of weak and strong signals from all of New England, Long Island, western New York, NYC, and occasionally Canada. I feel I have the bases covered for duplicating any type of receiving environment likely to be encountered by a Stereophile reader and potential tuner buyer.

Lately I have been using a borrowed Motorola 2000R digitally synthesized frequency monitor/generator, and spectrum/distortion analyzer, because of its spectral purity, for checking both my references (a modified Sansui TU-9900, a Kenwood KT-8300, and a Magnum/dynalab FT-101) and new tuners coming in for review. For FM reception, I use both simple indoor antennas and stacked Radio Shack 10-element Yagis.

Audio equipment that most frequently visits my listening room consists of either Bozak DMS-6000s or my own 11-driver systems (both have the same full-range clarity and sound). Amplifiers consist of either a home-brew transistorized class-A design, a tubed version I have been perfecting for 20 years, an excellent Akai AM-A90 integrated, a Yamaha CA-410 II integrated used mostly for its similarity to the C2 preamp, and best of all, two sweet-sounding Marantz triode-connected Model 5 amps which use 6550 output tubes. If I had an economic choice in the matter, I would have retained a recently tested Boulder 500 as the only reference amp besides the Marantz. The Boulder has ultra-low harmonic distortion, and the triode connections on the Marantzes contribute to unusually good bass from tubed amps. However, the Akai is a becoming increasingly smooth with age, and has a very nice treble control that can shelf, without boosting noise, in the
7kHz range.

Most sound is routed through a Coustic 7009A graphic equalizer because it is the only graphic I could find that was additive to the sound 90% of the time. While you may question this, find me two FM stations that have the same EQ and I will take it out. In addition, I find that most CDs need some tonal correction.

Other input sources include a stock Magnavox FD1040 CD player with 150k ohm resistors shunted by 130pF in each "hot" output lead. This adds air, treble boost, tightens bass, and makes the player among the best I've heard. Also, I use a newly purchased Sharp DX-620 player which, despite its low cost, has proven to have excellent dynamic range and lacks high-frequency grunde common to many players, thanks both to well-designed analog and digital filtering. The cassette deck is a Teac V-300. Again, despite its low price, it has served well, making clean tapes, with exceptional dynamic range using BASF Chrom II. The turntable, which I use about three times a year, is a Garrard 770 fitted with an excellent Acetex 310 MM cartridge; interconnects are RG-6f coax (similar to Monster CD cable), and 1m Apatures. The RG-6 is more transparent, and the Apatures tend to hide some of high-frequency grunde from FM and CD. Speaker cables are #12 twisted pair and #10 Romex. Ultimate stereo separation is judged through exquisite Leslie W4 headphones (made by Koss?).

I spend most of my time listening to FM and short-wave. The fidelity of short-wave is becoming better because of a trend to upgrade AM. In fact, there are a few stations experimenting with stereo. I do find that short wave is a good source to hear a variety of musical and cultural programs. I own only six CDs and borrow all those I can from public libraries, along with their video tapes. Basically, I listen to all types of music except jazz.

Future plans include more TV audio and visual evaluations because I like what I hear on six stations in the area, investigating other sources of digital audio besides CD, and always looking for that MAGIC FM TUNER.

**Thomas J. Norton**

My taste in music has, from the first, been eclectic but hardly daring. Classical and popular share my turntable and CD player in a rough 60/40 mix. The classics lean toward the 19th- and early 20th-century romantic orchestral works, including a limited selection of opera from that period; the "popular" music most likely to find its way through my loudspeakers is heavily influenced by folk
and soft rock (it's not surprising that Opus 3 is one of my favorite labels). It's probably easier to list those things to which I seldom listen: Jazz—almost never; Big Band the same; I can suffer electric guitar, but if it's processed through a fuzz box, keep away; Country—rarely, though my collection does contain the Judds' first album (*mea culpa*).

I developed an early interest in the Broadway musical (through frequent pre-teen and teen exposure to the real thing), but in recent years fascination has declined along with the general quality of the art form itself. Its influence upon my musical taste has lingered, however, probably accounting for the fact that I still listen to a great deal of vocal music of various types. Along with my interest in classical music, this influence is very likely responsible for the development of my interest (though a modest one) in opera. As a film buff, I also have an ongoing love of film music. It takes up a small but important corner of my record collection, despite the often mediocre sound quality of most soundtrack albums.

But somewhere along the line, my musical development must have been arrested—I never cared for, nor purchased any records by, the Beatles, Frank Sinatra, Elvis Presley, the Rolling Stones, Devo, and couldn't care less if Frankie Went to Hollywood or stayed home.

In my present location, my live-music exposure is limited to chamber concerts and the rare local orchestra performance. Los Angeles is a five-hour drive; listening opportunities there are more substantial. I lived there from 1979 to 1982, and was able to take considerable advantage of the local live-music opportunities. From 1982 to 1984 I lived in West Germany and managed to sample the European music scene in London, Amsterdam, Vienna, and at the 1984 Lucerne Festival. Amsterdam and Vienna were one-time visits, unfortunately, but both were fascinating. Standing room to hear *Turandot* at the Vienna State Opera cost just over $1, the reward for a four-hour wait in line. (A guided tour of the opera house itself earlier in the day cost more!) My last-minute seating at the Concertgebouw was behind the orchestra. I really can't claim to have heard the famed Concertgebouw acoustics from the audience's normal perspective, but you haven't really lived until you've sat five feet from the percussion section!

My listening room, like that of most audiophiles, is hardly the Concertgebouw. Though generous in size, it is a bit awkward for listening. It started out, despite the wall-to-wall carpeting, as excessively live and reverberant, with pronounced flutter echoes. Wall treatment, including shelving and a few acoustic panels, has eliminated the flutter echo, but the room remains moderately live. As reviewers are seldom more satisfied with their listening spaces than other audiophiles, future tweaking is planned. The listening position is closer to the wall behind it than I would like, but the alternatives involve other compromises that, at present, I prefer not to make.

Most reviewers' systems tend to be in a state of flux (more so than even the most fickle audiophile). More or less constant in my system are:

ProAc Studio 3s: My samples of these medium-sized, three-way loudspeakers from England may not be typical of current production, but I don't believe that they have been significantly updated. They have a tight, well-controlled low end that doesn't extend particularly deep (perhaps to 40Hz), a gutsy, somewhat forward, but very uncolored and dynamic midrange, a problematic treble (simply too much output in the highest octave), and fine imaging and depth. They'll play louder, without any sign of distress, than any rational person ought to require.

Klyne SK-5 Preamp: There are several fine preamps in this price range; the deciding factor for me was the Klyne's ability to provide optimum cartridge loading and compensate for the typical MC HF rise. I can only reiterate *Stereophile's* review comments on its superb sound quality.

Luxman PD-300, Monster Alpha Two, Emineent Technology 2: The Luxman is the senior member of this matchup and will likely be replaced soon. Its vacuum feature is not used; a Sumiko hard mat and Michell clamp are. My sample of the Alpha Two (low output) has the high-end rise criticized in these pages and will soon go back to the Monster shop for inspection to see if it's a typical sample. Fortunately, the Klyne permits me to tune the problem out but I'd rather not have to. The ET 2 has too high a lateral moving-mass for a
Although unfamiliar to some audiophiles, Orpheus has been designing and manufacturing loudspeakers since 1978. A great deal of our research has been devoted to phase and time analysis and its relationship to cabinet/crossover designs, driver interaction, distortion, diffraction effects, and most importantly, imaging and soundstaging. The 808 is the culmination of this research, and the knowledge gathered from our previous loudspeakers—the S505 mini and the model 8. Using the finest components and materials, each 808 is hand-built to achieve a higher level of performance and quality. Experience it.

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few pickups; it's always in the way, even when at rest; and is a bit fiddly to use. But with most modern moving-coils it sounds superb, and its rapid cartridge interchange capabilities and total adjustability are a boon in cartridge evaluations.

Yamaha CD-2: CD is here to stay and will probably replace the analog LP eventually. I don't relish that prospect, but I'm hoping to make the best of it and am rooting hard for rapid and significant advance in CD players. We seem to be on the verge of that happening now, what with vacuum-tube machines, new 16-bit, four-times oversampling schemes, and the hesitant entry into the field by high-end companies. This second generation Yamaha is hardly state-of-the-art, but provides good performance while the dust settles a bit.

Amplifier: The Yamaha B2X. Good depth and imaging, a clean, deep (if not overly taut) bass, and a sweet, lucid midrange. It's detailed but just subtly etched in the highs, though not objectionably so. Its rear-panel socketry is unique, and a pain in the neck for a reviewer. An Adcom GFA-555 has been recently acquired to provide a broader perspective to loudspeaker reviews, and to provide something of a familiar quantity.

Video: A Sony 25" Profeel monitor, JVC VHS Hi-Fi VCR, and Pioneer Laser Disc player form the heart of the video system; sound is fed into the main audio system after first passing through a dBX 1BX expander (used only for video sources where it provides a subtle enhancement to generally compressed feature-film soundtracks). ProAc Tablets are used for surround sound in a simple Dynaquad setup (again, only with video sources); they are a good match for the Studio 3s in front. The video system is used infrequently; the monitor is generally rolled out of the way when listening critically to audio-only sources. My video collection of about 30 Laser Discs (mainly feature films) will never approach in quantity my 850 LP, 100+ CD audio library.

Miscellaneous: Cassette deck and open-reel (both used infrequently) by Nakamichi and Revox, respectively; interconnects by Monster; speaker leads by Esoteric (among others); record cleaner by Nitty Gritty; bricks by VPI; T tíños by Mod Squad; equipment racks by CWD, body by Fisher.

As with all audiophiles, my search continues for the perfect straight wire with gain for $39.95. I know it doesn't exist, nor will it ever, and that realization helps keep things in perspective. But I remain fascinated by the search.

George M. Graves II
I can't really say when I first became interested in audio—I just sort of drifted into it. I didn't come from a family where music was ever considered really important. Oh, we did have the big Zenith console radio in the living room; it was usually on, and the popular music of the day flowed unabated into the room. I'm told that when I was two years old, I drove everyone to distraction singing "Open the door, Richard!" and a year later it was the same scene with "Cruising Down the River." (Now you know how old I am.)

About 1950, my Dad bought me one of those little RCA Victor 45rpm record changers, the black and gold one with a red top to the big 45rpm spindle. This little Bakelite and stamped-steel device connected to the back of the Zenith and a front-panel switch on the radio activated the amplifier section for the record player. Along with this player came such pieces as the Walt Disney Cinderella album, Mel Blanc's immortal "I 'Tought I Taw a Puddy Tat" (backed with the equally thought-provoking "Yosemite Sam"), and the ever-popular "The Thing," by the inimitable Phil Harris. My love of serious music was off to a roaring start.

Roughly about this time, two events occurred which were to have a profound effect upon my later kid-dom and my eventual festering adolescence. The first seemed innocent enough: my father, who worked for the power company, had recently been promoted; to prepare himself for the new job, he took a correspondence course in Radio/Electronics. The second event was more sinister: Dad bought our first television. It so captivated everyone's attention that the thought of merely listening to the radio was just too silly and old-fashioned to contemplate. Father studied his correspondence course in the attic and, being a fairly normal seven-year-old male kid, I became fascinated—"You touch that gear an'yer really gonna get it!" Naturally, I got it, but it didn't stop me. By the time I was nine,
I had built a Knight Kit “Space Spanner” two-band regenerative radio receiver. This came with a metal front panel but no cabinet. It also lacked a power transformer, which meant that when you plugged it in you had a 50/50 chance of connecting it so that the chassis was “hot,” thus electrocuting yourself. I plugged it in wrong 97.5% of the time. By age 10, I had a healthy fear of electricity.

When I was 12, Dad decided to build a 12W audio amplifier from scratch, installing it in a cabinet with a 8” Knight coaxial speaker. Placing the RCA turntable on top, he presented it to me; “I thought you might like to have a nice record player,” said he.

Well, that did it. A year later, at Christmas, I asked for (and received) an 18W mono Knight Kit amplifier, a BSR “Monarch” record changer, and one of the new Pickering “Stereo Fluxvalve” magnetic cartridges. I was hooked. While my classmates were playing touch football, I was rewiring the Monarch for stereo. While the kid across the street was building his first hot rod, I was building my first stereo amplifier. While my peers were asking girls to the prom, I was trying (to no avail) to get an early FM stereo decoder to work with my EICO HFT-90 FM tuner.

College meant a hiatus in all this audio mania until, armed with disposable income from a real job, I plunged back into the fray in the late ’60s. I was proud of my first real High-Power stereo system, the core of which comprised a Dynaco PAT-4 (Yeah, I actually chose that over a PAT-3, my college professor having convinced me that tubes were obsolete and that transistors were the wave of the future), a Dynaco Stereo-120 power amplifier, and a pair of Dynaco A-25 loudspeakers.

To these I added an Empire 398 turntable/arm, a Stanton cartridge, and a Pioneer FM tuner. (It’s enough to turn your stomach, isn’t it?) I was happy with this system for a while, then Quadraphony struck. Being single, and having more money than sense, I jumped in with all (four?) feet. Since none of the early quad stuff worked, however, I became pretty frustrated. I tried SQ (no separation), QS (ditto), and CD-4 (what is that awful distortion?).

About this time, I happened to stumble into a new stereo store which had just opened. It was a strange place, with people running around in suits and with signs all around giving prospective customers instructions on how to obtain an appointment for access to the listening room. Huh? Appointments? What kinda joint was this? The “listening room” seemed deserted so I walked in: funny stuff I had never heard of, most of it sporting tubes. Tubes? This was 1974; people just didn’t have tubes in their stereo systems any more. The speakers were even more peculiar—big screens, about 1” thick, producing some of the most anemic sound I had ever heard, with no bass, few highs, and no ability to play.
louder than a whisper. "Magneplanar," I read, on the label on the back, after crawling behind them on my hands and knees. "What the devil is a Magneplanar?"

"Oh sir, you'll have to leave the listening room. I have a demonstration and the customer has arrived. If you would like an appointment, see Miss Sampson at the front desk and she will be happy to set one up for you."

"Some stereo shop!" I grumbled to myself and left.

Then I started to hear about something called "High-End" Audio. The devotees of this new audio discipline have some strange ideas. Amplifiers had a sound of their own, all sounding different to one another. Tubes sounded better than transistors. ("Funny," I thought, "they don't measure as well.") And most peculiar of all, stereo had depth! Not just right-to-left but front-to-back as well. Stereo Review and High Fidelity had never mentioned any of this. Humbug!

My friends and I spent the next couple of years laughing at high-end audio, generally debunking the whole thing, but then I met a fellow who forced me to change my mind. This guy was (and still is) a real fanatic, and literally rubbed my nose in the difference between high-end audio and what he called "mid-fi" (which is what I owned). I was converted and, like all converts, proselytized to anyone who would listen. This led me, first as a reader and eventually as a writer, to Stereophile.

When I was in college, I had an idea that I wanted to be a recording engineer. The problem was, however, that at that time no courses in the art and science of recording existed, and the college counselors had no idea as to how I should proceed. Eventually I ended up in the semiconductor business—well it's close, isn't it? Both technologies make use of electrons—but I never lost my interest in recording. After assembling mikes, mixer, and tape deck, I set about freelance recording. You know the stuff: church choirs, civic bands and symphonies, amateur musicians who wanted a tape made, etc. This led me to the local symphony, a professional, high-quality, ensemble where I was the recording engineer for five seasons. The tapes I made weren't produced for commercial reasons, but to give the conductor the chance to study the performances away from the pressure of the podium. This experience was invaluable, because it allowed me freedoms that a professional cannot afford. It gave me an unparalleled opportunity to experiment with tape types, noise reduction systems, microphones, and—most importantly—mike placement. I still have the 15ips, half-track tapes, and often use them for equipment evaluation. I have since done location recording for National Public Radio's "Jazz Alive" series of such talents as Dizzy Gillespie, Hubert Laws, and Stephan Grappelli.

As with most reviewers, my system changes quite often. At the time of writing, it is based on the following components: Maplenoll Artemis air-bearing table and arm; AudioQuest B-100ML MC and Audio Technica AT-160 MM cartridges; NYAL Minuet in A preamplifier; NYAL Moscode 600 power amplifier for midrange and top, and modified Hafler DH-220 from 20Hz to 120Hz; and Magneplanar Tympani Ill loudspeakers with a homebrewed passive/active crossover. Other components include the Mission PCM7000 CD player, an Aiwa AD-F770 cassette deck, and Pioneer F90 tuner. My open-reel machine is a Sony 850 (half-track record/replay, quarter-track replay, 15ips top speed).

One end of my 18x14ft. listening room is entirely taken up by the Maggies, which sit about four feet into the room away from the rear wall. The speaker end of the room opens into the dining area, which el’s off to the left. Equipment cabinets line the long wall behind the speakers, which extends about 30 feet into the dining room. My listening chair at the other end of the room is backed by the front-door foyer, giving me space behind the listening position so that wall reflections do not confuse things. The video system's audio (four-channel for Dolby surround) also couples into this system.

I have a much more modest system in the 12ft.2 library, which doubles as the computer room. At present, this system consists of a Luxman Brid LV-105 integrated amplifier, Sony CD-P520ES CD player, Kinetics FM tuner, and Magneplanar SMGa loudspeakers.

Regarding my musical tastes, I feel that there are only two kinds of music: good and bad. My taste is therefore somewhat eclectic,
but I must point out that very little modern popular music falls into the "good" category. For reviewing, I like to use classical music for the following reasons: it contains the entire frequency range of recorded music; the individual orchestral voices make the judgment of how well a component handles the different portions of the musical range much easier to make than with other kinds of music; and, finally, orchestral recordings can tell you everything you need to know about the soundstage.

I use a lot of Mercury "Living Presence" recordings, as well as some of the Louis Layton RCA Red Seals, such as the Strauss Ein Heldenleben recorded by Fritz Reiner with the Chicago Symphony in 1954. For the all-important midrange, I like to use both male and female voice. Folk music, such as that recorded by Joan Baez and Ian & Sylvia in the early '60s for Vanguard, is good for this, as is the new Reference Recordings disc of Marnie Nixon singing Gershwin, backed by Lincoln Mayorga on piano. Some jazz recordings—Jack Sheldon's Playing it Straight on MK Realtime, for example—are also good review material.

Audio has been my avocation for most of my life. I hope to continue to watch the evolution of digital and I really believe that its shortcomings can be overcome. I also feel that there is a good bit of life left in the old black vinyl record, and do not predict, as do some of my colleagues, its imminent demise. Today's record players are better than ever, with each new year providing us with turntables, arms, and cartridges to glean more and more musical detail from the grooves.

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Television scheduling has allowed British viewers to see once more the powerfully edited World at War documentary series, with Lord Olivier as narrator. The Russian campaign provided newsreel footage which still dilates the imagination—the miles of straggling German prisoners (few of whom survived internment in that bitter climate) no less moving than the devastation of Leningrad itself.

But it is curious that, during all that pounding, the Soviets offered the seclusion of a Composers' House at Ivanovo to Prokofiev. There, he completed his Opus 100, the Fifth Symphony in B-flat. The composer had been jotting down themes in his notebooks for some time and he finished the symphony in July and August 1944—working to a daily pattern, composition in the morning, lunch with fellow musicians, then a walk after checking through his score, and most evenings a game or two of chess. Directing the Moscow premiere on 13th January 1945 (and appearing as conductor for the last time), Prokofiev had to wait until a victory salvo was sounded outside the Conservatory, marking the crossing of the Vistula river by Soviet troops.

Prokofiev had met Koussevitzky in Paris between the wars; the emigre Russian conductor had, with his wife's support, founded a publishing Edition for modern works, and he gave the American premiere of the Symphony with his Boston Orchestra, on 9th November 1945. These artists recorded the score the following February and, as RCA's mono LP transfer from 1976 (VL 12021) demonstrated, if you have that version, you hardly need look elsewhere. Even sonically, it was quite a remarkable job: clearly revealing the musical qualities of the orchestra then (string colors, attack), for all the "screaminess" of the dubbing.

A big work, of some 42 minutes' duration, and with large orchestra including pianoforte,
extra percussion, winds, and brass, it makes a good “travelling piece”—in London I’ve heard Karajan and the Berliners, Bernstein with the NYPO, and David Oistrakh and the Moscow Philharmonic. Some commentators have traced a parallel with the form of Beethoven’s Ninth, even to such details (Richard Freed, in notes to the Slatkin/St. Louis recording) as percussion equivalents to the “Turkish” music at the end of the Chorale and a reminiscence of “An die Freude” in the second subject of the finale. There you have Prokofiev quoting his own first movement, an Andante with a sombre, grinding gait relieved by lyrical and affirmative writing for violins. The recorded extremes of timing for this movement are Ashkenazy (12m 52s) and, in his later Israel Philharmonic performance, Bernstein (18m 37s)—and there’s no question of missing exposition repeats! Both Bernstein and Eugene Ormandy developed a heavier reading of this movement and, though I was initially impressed by the more sumptuous Philadelphia sound on Ormandy’s 1977 RCA version, I must say I find the leaner, more fluid, character of his 1967 CBS rather more persuasive.

The demands of the B-flat Symphony made it something of a recording challenge for the virtuoso American orchestras of the 1960s: the Dorati, Szell, Ormandy, and Bernstein were typical. By contrast, European catalogs offered the elderly Tuxen/Danish Radio Orchestra mono; the uncompetitive Horenstein/Vox and Martinon/RCA readings; in 1964 came Kletzki’s lacklustre Philharmonia version, then Ansermet’s oddly ballethic Decca, with a meager-sounding Suisse Romande—small-scaled in the entrancing Adagio, and surprisingly poorly held together.

In the later Ormandy recording, the strings flirt dangerously with high-register slides. Working in Powell Hall, the same production team—Saks/Goodman—won a 1985 engineering award: Slatkin’s St. Louis recording (RCA RL 85035, CD: RD 85035) also won the Grammy for orchestral performance. Slatkin’s direction is meticulous; in the Adagio he is swifter, and offers a more varied palette of colors, than Ormandy. His tempo suits the string writing very well, giving it a certain urgency of expression. His is the exact opposite of Bernstein’s approach: ploddingly deliberate at the beginning, in his 1967 NY (CBS) recording, and giving the high-lying strings parts a Shostakovichian bitterness. In the digital remake with the Israel PO, at least he reconciles these two elements, but I still find his opening movement too lumbering. One of the better modern recommendations, Neeme Jarvi on Chandos (ABRD 1160, CD: CHAN 8450), at 12m 23s for the Andante, arouses great expectancy in the opening wind parts; he lets the music unfold at an uncontrived speed, and with the Scottish National Orchestra, hardly renowned for luxuriant strings, hints early on at the shattering volume of full climaxes. It is as if he has no preoccupations with “imposing” an interpretation—and you could even say that for Karajan, on DG (but not Bernstein, or Slatkin, who sounds very slow at his 13m 33s timing).

But what is this symphony all about? When a conductor received a death-threatening phone call, at Salt Lake City in 1951, the composer was prompted by the incident to publish a letter asking whether the caller would wish suppressed “a hymn to the freedom of the human spirit.” (The full text of his Moscow statement must be related both to the Iron Curtain period, and the facts of his own difficult position with the authorities. It must also be remembered that the Soviet people suffered casualties in World War II on a scale unimaginable in the geographically advantaged US.) Reviewing the new Ashkenazy/Concertgebouw Fifth (Decca/London 417 314-1, CD: 417 314-2) in March’s Hi-Fi News & Record Review, Edward Seckerson writes of the work “dripping with a peculiarly Westernized or—let’s be more specific—‘American’ kind of decadence (scherzo trio).” It’s not a concept I can accept: apart from its anachronism—he goes on to suggest Prokofiev’s “cynical view of the automated consumer society” —surely the quacking figures that herald the return of the Allegro marcato and the scurrying motions of the main movement are more easily related to early cinematographic images of bustling crowds than anything else? Should it not be seen as, if not avowedly programmatic, then at least indicative of some hope that total freedom from German oppression was not far away? Vladimir Ashkenazy has said of the Eighth Piano Sonata, also finished at
the wise thing of some Ivanovo in 1944, "the presence of war became part of Prokofiev's life and everything was influenced by and connected with the war."

In particular, Rozhdestvensky (in an otherwise non-revelatory 1966 Melodiya recording of the Fifth with the Moscow Radio SO) brings a great sense of menace and mechanistic threat to the trio/scherzo transition. No one quite matches the monstrous images of some unstoppable war-machine he presents: Walter Weller comes close, in a 1977 Decca production with the London Symphony Orchestra, but in the end they are too "neat." In another Decca Fifth, also produced by James Mallinson just one year later, Lorin Maazel coaxed silky string playing from the Cleveland Orchestra. Wonderfully balanced by the conductor, but rather smooth and calculated in overall effect, this would certainly be worth acquiring as a cutout (London 7099).

Ashkenazy himself makes the trio rather melancholic; in the transition back he brings out the great range of color in the instrumentation, and in the main tempo he, too, gets a silky string sound from his Dutch players. The final crescendo becomes, if anything, one of exuberance—in the Koussevitzky mold.

Ashkenazy's approach is essentially respectful of form. His refusal to deviate from speed at the end of the Scherzo confirms his slightness, between the lengthier expositions of (i), (iii). But if you don't want your finale all lightness and fantasy, you'll avoid this Concertgebouw version. For all its elegance and precision, I find it less satisfying than the Slatkin, or the Jarvi. The Karajan analog recording now sounds less good in the DG Signature pressing than it did as 139 040; his smooth-polished reading and virtuosic stance put this Berlin Philharmonic disc into the "complementary" category, rather than "central"—but it is very compelling.

At the very end, the hall resonances on Chandos, and the rather distant placement of the orchestra, reduce the full impact of Jarvi's obviously spirited direction. Far ruder in timbres, Rozhdestvensky's final pages were resoundingly effective, but in this crazy moto perpetuo conclusion, with its steamy whistles, whizzes, and bangs, Slatkin's St. Louis Orchestra is superb. This RCA is my choice.

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Mission PCM7000 CD player
Editor:
It was gratifying for all us Mission-aries to read George Graves’ enthusiastic review of our PCM7000 CD player in Vol.10 No.2. While many companies are staying with the older 14-bit system, Mission’s designer, Henry Azima, decided to pursue the higher-technology 16-bit, 4x oversampling DACs. Understanding the production problems Philips were encountering, Mr. Azima worked with Philips to produce a “top percentage” of DACs with ultra-high resolution and linearity. The results are apparent from the first listening.

The volume control is one of the most advanced and sonically transparent available. We feel audiophiles will want such high-quality features and extensive programming abilities, if they are up to the standard which you and they themselves set. Mission’s control uses its own regulated power supply with a series of stepped resistors for total accuracy, resulting in an electronic volume control that is linear to within 0.01dB from 0 to -63dB in 0.1dB decrements. It has been reviewed favorably in Europe and the US.

The PCM7000 shows the direction Mission Electronics are taking in the digital arena.

Peter Dyroff
Mission, Mississauga, Ontario, Canada

Denon DCD-1500 CD player
Editor:
Thank you for the review of our DCD-1500 CD player in Vol.10 No.2. We believe that Denon really is a specialty company, as virtually every aspect of our company is dedicated to either the production or reproduction of music. We do not make computers, elevators, motorcycles, or tennis rackets. Our major businesses are records, audio equipment (consumer and professional), blank tape, keyboard instruments, and, of course, compact disc production. As a record and hardware manufacturer, we have the ability to “go back to the source” in evaluating the performance of our playback devices.

Our corporate philosophy (for the 77 years we’ve been in business) is to encourage perfection and value. We consider that perfection not only encompasses sonics; a Denon product should also have lasting value and encourage pride of ownership. In our advertising we discuss “Design Integrity.” A major part of this is that, when we determine that a given technology is valid (usually from our pro-audio products), we adapt the technology into all of our products.

A splendid example of “Design Integrity” is the “Super Linear Converter” 16-bit DACs we use in all of our CD players (including our car CD player). Our recording technology group, is headed by Dr. Anazawa, designer of the first digital recorder intended for music recording in 1969. His group determined that conversion errors in the A/D (recording) process greatly contributed to the “harshness” or “edginess” that plagued early digital recordings. When we built our first totally Denon-designed player, the DN-3000 broadcast player, we found that DAC errors contributed the same sort of nastiness encountered in the development of our recorders (which were well regarded at the time, and have of course been improved over the years.)

In a perfect world, the solution would be simply to specify DACs with tighter specs, and presumably much of this distortion would disappear. In spite of our high standards and our close association with our DAC supplier (Burr-Brown builds our proprietary DACs), the current state of the manufacturing art does not allow this to be possible. We therefore, measure each and every DAC (rejecting many in the process), and hand-calibrate/correct each unit for the least possible error at the Most Significant Bit (MSB). (Readers may also be interested in reading a paper regarding AD/DA transfer distortion delivered at the November ’86 AES by NHG Gilchrist of the BBC on this subject, AES preprint #2394.)

Isn’t it logical that, assuming proper pick-
up of the digital information from the disc, any errors in the D/A conversion process will be far more significant and will relegate any other niceties of the design of the player to a subordinate role? We’re sorry that our service department was not able to explain the operation of the circuit; apparently they’re better at repairing than communicating. The effects of vibration, not only of the disc but of all the components in the player, and especially the disc transport, has long been a concern of ours. The DCD-1500 uses (like our other players) a magnetic clamp to damp vibrations of the disc. Aftermarket damping devices will not operate properly on our machines, and are superfluous. The laser mechanism is mounted on a separate subassembly and is suspended from the main chassis for reduction of air- and surface-borne vibration effects. The disc drive motor also plays an extremely important role in the reduction of vibration. Our experience in direct-drive turntable motors for the last five decades has been useful in development of the proper low-vibration drive motors for CD players.

JGH commented on the “surprisingly light weight” of the player and surmised that it was due to a small power supply. The weight of the player is a result of the use of a molded chassis, not economies in the power supply. The power supply’s adequacy is borne out by his own observation of the player’s “tight low end,” “controlled midbass,” and “punchy” low end. We are strong believers in the separation of digital and analog power supplies—even our least expensive players have at least two. The isolation of power supplies is, in our opinion, even more important than optical isolation. Optical isolation does have merits, but the sonic improvement is less significant than separation at the power supplies.

The audio section (which we agree is at least as important as the digital portion) is, in fact, DC-coupled. The remote control, for the omission of which we apologize, controls the variable line-output level. The headphone level control only varies output to the headphone.

The DCD-1500 was submitted for review largely because we thought it might be interesting to see how a Denon player would do in comparison with many of the more ex-
pensive "kludged" players you have recently reviewed, and it has apparently comported itself well. It is not, however, our "flagship." The 1500 ($650) has been joined by two more expensive brothers, the DCD-1700 ($850) and DCD-3300 ($1600). Both of these new units use 4x oversampled, 16-bit DACs (of our own design) and further the causes of vibration reduction and separation of digital and analog stages. The DCD-3300 does use optical isolation.

Ken Furst
Denon America, Inc.

Magnum DYNALAB tuner

Editor:
For those reading Don Scott's follow-up review who are wondering what "new colors" the fascias of our FT-101 tuners are "sporting," they are gold and silver. Black is still available in 19" rack and non-rack models. Also, there is a new 17" non-rack version in black. The price of the FT-101 is now $629.

The new FM tuner launched at the January CES was our model FT-11. Although it shares some of the FT-101's RF technology and has exciting sound characteristics, it is certainly not to be classified as a "lower-cost version of the FT-101." Delivery of the FT-11 to our dealers will begin around the end of March. The price point is planned to be less than $400.

As for the remote control DAS mentioned, a distinction must be made here. This (the FT-R) is an analog, "Remote Tune" module, whose function is to provide six pushbutton station presets, with a seventh button to switch between manual tuning and the presets; that's all. Recent FT-101 production will have a receptacle on the rear panel marked "Remote Tune," into which the remote tune module's cable can be plugged. Earlier FT-101 production can be factory-modified at nominal cost, to accept the FT-R module. Check with your dealer, or call Magnum DYNALAB at 800-448-8490 (in New York, 716-822-5346).

MC (Marv) Southcott
Magnum Dynalab

CompuSonics

Editor:
I can understand Mr. Fox's reluctance to believe there is any fire behind our considerable...
smoke output over the past three years. Much of the promotion of our technology, and the prototypes of our products, was aimed at gaining financial support for CompuSonics. Fortunately for Stereophile's readers, a discourse upon the difficulties of capital formation these days is not the purpose of this letter. Rather, I would simply like to set the record straight on what we have developed and marketed.

CompuSonics invented the "Personal Audio Computer," as we now refer to it, in 1983. This is a computer designed from the earth up to record, process, store, and play audio data. From the outset we had two versions in mind: a professional unit suitable for record or disc production work, and a consumer unit for home recording and editing. The first sale of our DSP 2002 pro model occurred in September 1984 to Vitello Productions in Hollywood, California. Numerous film and video audio tracks have been produced with this machine since its delivery in November 1984. More than a dozen units have been delivered since that time, at an average price of about $45,000. Note that we were the first to commercialize this technology. CompuSonics is flattered to have spawned such eminent competition as that by NED, EMT, AMS, and Lexicon.

Our consumer personal audio computer, the DSP 1000, started out with a floppy-disk drive as its nonvolatile memory, and emerged from development with a write-once optical disk drive. Each disk holds 233 Megabytes per side, and stores about one hour per side in stereo. Its audio quality has been favorably compared, by professional audio engineers, to an Ampex half-inch tape mastering deck running at 30ips. Since the first shipment on December 17, 1986, 20 units have been delivered to dealers, as of this writing (January 20). Incidentally, these shipments make CompuSonics the world's largest producer of disk-based audio computers.

The floppy-disk version of the DSP 1000 prototype metamorphosed into the DSP 1500, a Bernoulli floppy-cartridge-based computer that will begin shipping in February 1987. On its 30Mb it records about ten minutes of stereo, and will be marketed exclusively to the broadcast industry.

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Stereophile, Vol. 9, No. 4

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Mr. Fox seems to have so thoroughly missed grasping the fundamental concepts of the signal processing software intrinsic to our computers that I hesitate to begin any deconvolvement of his comments on that topic. David Ranada's *Stereo Review* piece (SR, December '84) is probably still the best layman's introduction to the theory of CSX signal processing. Certainly the early versions of the software demonstrated in our floppy-disk prototypes were less than satisfactory to us, and we never released any to production. Anyone interested in the sonic quality of the products we are presently manufacturing can audition them at their nearest dealer.

With regard to CompuSonics Video's DVR-1 prototype digital video recorder/editor, that prototype had progressed to become a prototype of the PC/Moviemaker. When released into manufacturing, later this year or perhaps in 1988, it will be the equal in audio/video quality to any VCR. We never have, and never will, inflict prototypes on the end user. On the other hand, at industry trade shows that are closed to the public, we proudly display every stage of the technology we are developing. The feedback we receive from our critics and our peers is well worth the occasional rabid review.

David M. Schwartz
Palo Alto, CA

The Linn Axis turntable

Editor:

It was a pleasure to see Alvin Gold's favorable comments on the Linn Axis turntable appear in Vol.10 No.1. (January). This came as a particularly pleasant surprise because Alvin's views have generally been very different from ours when it came to evaluating the performance of any given component.

Overall, we think that his evaluation was reasonably accurate and that the small points where we differ with him can easily be explained by our somewhat divergent ideas regarding the relative importance of various "hi-fi" parameters and their relationship (or lack thereof) to real music.

There are two areas covered in the article that we think need a little elaboration, just so your readers are not left with any misconceptions. Mr. Gold labels the Linn LVX arm as the limiting factor in the performance of the Axis
turntable. It should be pointed out that, since early this year, the Axis has been supplied with the Linn Basik Plus arm rather than the LVX. The Plus features upgraded bearings and a fixed headshell, offering a considerable performance improvement over the LVX.

The other point that needs to be covered is Mr. Gold's very brief remark about the relative success of the introduction of the Axis vs the "disastrous reception" that the Index and amplifier received. We can't really disagree with that remark (although "disastrous" is a bit stronger than we would choose). However, he is talking about problems that happened a year or two ago and have long since been rectified. Lest any of your readers be left with the wrong impression I would like to point out that, since that time, the Index Loudspeaker has gone through a series of improvements and refinements that finally resulted in the introduction of the Index Plus (Series 2.0) last fall. While this is a bit more expensive than the original Index it offers a considerable improvement in performance, and is being received, in some circles, as one of the best speakers in its price range.

In the case of the amplifier, the original thermal problems (and the associated deterioration in performance) were covered in some detail in "Manufacturers' Comments" Vol.9 No.3, as was Linn's recall and repair of the amplifiers. It should be noted that Linn upgraded all the amplifiers in the field free of charge, regardless of whether or not the fault had shown up with the particular amp. Since that time, over 4000 amplifiers have been delivered worldwide; the LK1 and LK2 have certainly exceeded our wildest dreams, in terms of both absolute performance and performance-per-dollar.

Thanks again for the favorable comments, and for this chance to clear up a few possible misconceptions.

Gary Warzin
Audiophile Systems, Ltd.

Quad 306 amplifier
Editor:
I am glad that the Audio Cheapskate liked the 306. It seems to be gaining a good reputation for itself in many quarters. We have not changed our position regarding competently
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Hear VMPS at the dealers listed below, or write for brochures, reviews and test reports. Other models include the MiniTower II ($329ea kit, $439ea assem); Tower II ($439ea kit, $559ea assem); Super Tower /R ($699ea kit, $959ea assem); our three Subwoofers (Smaller, $229ea kit, $299ea assem; Original, $259ea kit, $375ea assem; Larger, $439ea kit, $549ea assem), the TPC-1 Electronic Crossover ($449) and the QSO Series of bookshelf loudspeakers. All prices include free shipping in USA and kits are supplied with fully assembled cabinets.

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These days we prefer to state the case the other way round. Existing knowledge is sufficient to explain the performance of amplifiers; hence, if we use our existing knowledge correctly we can produce an amplifier with any sound characteristic that you like. At Quad, we choose to design amplifiers whose output is a larger facsimile of the input. We are reasonably confident that this is the case. There will be perfectly straightforward reasons why there should be a real perceived difference between the 306 and the 405-2 under a particular set of circumstances. Their bandwidths are dissimilar, one is phase inverting, their overload recovery will not be identical, etc., etc. Whatever the circumstances, there will be a perfectly rational explanation.

Ross Walker
Quad Electronics, Ltd.

Celestion System 6000

Editor:

Our objective was to design an extension to the low frequency performance of the SL600 that enhanced it, without any detriment. Martin Colloms in Vol.10 No.2 clearly demonstrated that this objective has been achieved. By choosing a double dipole configuration for the bass system, we have been able to generate low frequencies that not only are free from cabinet resonances, but also the directional properties of the array mean we can rotate the system to tune its performance to individual listening rooms.

Although Colloms looks forward with interest to the results other reviewers get in other rooms, he needn't be concerned. A low frequency source which is directional right down to 20Hz gives a level of adjustment for room matching that is a league ahead of monopole bass radiators, and as such gives a system that is much more tolerant of rooms than a monopole could ever be.

Graham Bank
Celestion International, Celestion Industries, Inc.
Monster Cable M-1000 interconnect

Editor:

The purple heart goes to Dick Olsher for venturing to cable comparison "shoot-out" reviews in Vol.10 No.2. It's risky territory (we should know), full of potholes and traps. And, no matter what you do, there's always someone who says you did it wrong.

Which brings me to our sonic goals when designing cables, and a caution for your readers when selecting them. It is extremely difficult to design a cable that is accurate in all aspects of music reproduction. It's not difficult to design for more bass, more highs, or more whatever. Nor is it difficult to "inject" phase distortions which will add what many audiophiles perceive as depth and soundstage, but at the expense of imaging and localization. Nor should cables be the panacea for other ills in one's system, as some reviewers recommend. One should always strive for cables to be as accurate as possible, the "perfect" connecting link between "imperfect" components.

Does it make any sense to change all your cables just because you changed your preamplifier, amplifier, cartridge, or other components in your system? All of our cables were designed with that concept in mind. They are thoroughly tested with a wide variety of components and program material to be as neutral as possible with the greatest range of products. Which brings me to my second point.

Only the Monster and MIT cables are phase compensated, to provide audiophiles with the accurate reproduction of all the phase-related qualities of music: soundstage, imaging, reproduction of the third dimension, instrumental placement, transient response, extended frequency reproduction (especially in the bass), and harmonic and tonal structure. As good as pure copper and silver are, their sonic influences are minimal compared to construction and dielectrics. Believe me, we've tried them all!

I am therefore in disagreement with Dick's findings that any non-time-compensated cable is able to provide a balance of all the

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sonic parameters that audiophiles appreciate, especially over long-term listening. Cables, like other critical audio components, have to be lived with in order to appreciate the delicate balances I’m talking about. May I suggest that Stereophile readers listen for themselves, and that Dick considers doing a "100 hour" followup report to see if he still comes to the same conclusions. I’m not saying that one has to listen to cables for 100 hours to appreciate the difference, only that those differences become more apparent. You could say it’s like listening to digital.

Anyway, I’m thrilled that, even though it’s a dirty job, someone is doing it. Thank you, Dick!

Noel Lee, The Head Monster
Monster Cable

Kinergetics KCD-20A CD player

Editor:
Thank you very much for Martin Colloms’ fine and very favorable review of our product, the KCD-20A. As Mr Colloms took the trouble to point out (not once, but twice, in the course of his article), the KCD-20A has also received strongly favorable reviews in other publications.

We are pleased to see that Mr Colloms’ very detailed measurements showed the high level of technical merit our product has, as compared even to units much more expensive. We are also pleased by his recommendation that the reader audition the KCD-20A for its clarity, dynamics, and “aliveness.” Mr Colloms is not the first to appreciate the fact that, in terms of stereo imaging, width, and depth, the performance of the KCD-20A is “above the norm.” We are, in fact, very proud of its truly remarkable soundstaging and outstanding sense of spatiality and “air.”

One thing Mr Colloms unfortunately did not seem to understand was the nature and function of our compensation circuitry. The principal function of this is [not] to correct for defects or errors in the recording process (Lord knows how many shabby recordings there are out there, or what it might take to make them sound decent); instead, it is to compensate for basic problems inherent in the IC upon which most CD players are based. Nobody in high-end audio uses ICs, simply because they sound so bad. Every IC is an agglomeration of as many as thousands of resistors, capacitors, transistors, contacts, etc, none of which is even marginally up to high-end standards. Ours is the only player which, with its patented circuitry, is able to correct problems caused within the ICs, primarily in the DAC chip (which cannot simply be removed and replaced by better-sounding components).

Overall, we thought it was a fine review by a fine reviewer, and well in line with your publication’s reputation for quality and fairness.

Anthony DiChiro
Kinergetics, Tarzana CA

TSC Symphony 1 Speaker

Editor:
We regret that Mr Olsher can find nothing of merit about our Symphony 1 loudspeaker system. We never imagined our speakers would please everyone. We at Tennessee Sound Company have found that those listeners who are not sensitive to distortion are unlikely to be fond of our speakers. We also find that people who are prejudiced against new technologies also don’t appreciate our loudspeakers. Fortunately for TSC, people who want reproduced music to sound like live music have been very enthusiastic about our Symphony 1.

It is our general view that Mr Olsher missed the boat completely in his attempt to evaluate this new technology. As Mr Archibald pointed out to me in a phone conversation, it is not uncommon for reviewers and manufacturers, or even two reviewers, to have completely opposite points of view concerning a product’s sound or design. I think we can safely say our views, and those of many customers, dealers, musicians, and more than several professionals in the recording and hi-fi industries, are quite different from those of Mr Olsher.

We also regret that Mr Olsher had to rearrange his dining room in order to find a wall against which to evaluate our speakers. Fortunately for us, this lack of wall space is not universal in most listening rooms, at home or in dealer showrooms.

We suspect that what Mr Olsher heard does not faithfully represent the sound quality available from our system, though we have no way to confirm this. His comments about
the poor image and lack of depth verify for us that something must have been amiss in the set-up or evaluation procedure.

As Tennessee Sound Company continues to grow we are able to improve our development and production techniques, thus our products. Perhaps at some future time our products can be re-evaluated by the staff of Stereophile. Until then please assure Mr. Olsher that these insects don't bite.

John W. Robbins
Tennessee Sound Company, Bristol TN

The Eminent Technology Speaker

Editor:
Our thanks to Tony Cordesman and Stereophile for reviewing the first Eminent Technology loudspeaker. We feel that the review conveys an accurate picture of the LFT-3's strengths and limitations, as well as providing some good insights into the issues of amplifier compatibility and room placement.

In light of some early feedback from Tony (which we gratefully acknowledge), as well as suggestions from some of our dealers, we have concluded that our original choice of a relatively high impedance was a mistake. Henceforth, all LFT-3s shipped will be 4-ohm versions of the same product Tony reviewed. Amplifier compatibility and overall efficiency are thus improved, with no diminution of the speaker's positive characteristics. Tony will have received a pair of the 4-ohm LFT-3s by the time this reaches print, and so may update his findings if he sees fit.

I originally became intrigued by the idea of creating a true push-pull dynamic speaker in 1968, long before the introduction of our first commercial product, the Model One tonearm. The loudspeaker project has accounted for at least a portion of my attention during the ensuing years, and I'm happy to be in a position to finally realize this goal—for which thanks must also go to David Collie, Eminent Technology's R&D Engineer and an important contributor to the speaker's final design.

Thanks again for rewarding us with such a fair and professional review.

F. Bruce Thigpen
Eminent Technology, Tallahassee FL

The Mod Squad Line Drive

Editor:
Our thanks to AHC for his concise and careful review of the Line Drive. He has done a good job of pointing out the considerable strengths of using a passive control system, as well as its inherent limitations. We, while selling the first several hundred units, accumulated extensive experience in their use, and from that vantage point would like to address the important issues raised by AHC.

First of all, not all passive systems are created equal. A great deal of research went into optimizing the Line Drive's circuit design, wiring layout, and parts selection, in order to provide the best possible performance with the widest variety of equipment. While some preamps offer a line bypass switch, they are not truly designed for passive operation, and you can hear the difference. We invite comparative listening of the Line Drive and these preamps, or any other preamp, regardless of price.

Many audiophiles have chosen the Line Drive because they want the best possible performance from their line-level sources (CD player, tuner, tape deck, video sound, etc.), but analog certainly is not dead and the Line Drive does not necessarily obsolete an existing preamp. A substantial number of Line Drive owners use their preamp as a phono stage and feed it into one of the Line Drive's five inputs. This substantially extends the input and switching flexibility of their systems—an increasingly important feature in these days of sophisticated home entertainment centers. We often hear from these audiophiles that their records now sound better than ever because they are bypassing the line stage of their preamp.

AHC questions how well passive systems can deal with problems of impedance and gain matching. We cannot speak for other products, but the Line Drive has been carefully designed to minimize impedance interaction problems and we, in fact, find them to be rare. Very few components are incapable of driving an amplifier directly through an appropriate volume control. The one impedance-related phenomenon you must consider with all passive control systems involves the length of the interconnect running to your power amp. AHC correctly points out that this should not exceed two meters (about six feet) in most
cases. We find that this figure actually is conservative for most equipment but, for the best results, shorter is better.

Gain matching relates to system volume and involves several parameters, including listener preference, amplifier input sensitivity (not power), speaker efficiency, and source output level. The only way to be certain the Line Drive works satisfactorily in a given system is to try it; we encourage you to do so. You can get an idea of its appropriateness, however, by using a CD player, tuner, or cassette deck that has a volume control. Just plug it directly into your power amp and see if the gain is sufficient for you.

We have been pleasantly surprised to find that a substantial majority of those who try the Line Drive have no trouble achieving the desired sound level. There is a psychological hurdle to be crossed: the volume control will typically be at a much higher setting than on a conventional preamp. This is a desirable circumstance because volume controls sound better at higher settings.

Finally, I would like to add a personal comment. I have lived with the Line Drive for over a year; its superb clarity and lack of distortion make it an invaluable tool for developing other products, like our CD player and Phono Drive. During that time I have found it increasingly difficult to put up with preamp colorations obscuring my music.

Steven McCormack
The Mod Squad, Leucadia CA

Angstrom Reflexion speaker
Editor:
Thank you for the opportunity to respond to Mr. Sommerwerck's review of the Angstrom Reflexion loudspeakers. We would like to thank him for his careful and perceptive analysis and to expand on some of the points he raised.

It is interesting to note Mr. Sommerwerck's discussion of the way in which the speaker integrates styling with functional design. By letting the styling take its form from the acoustic considerations of cabinet design and construction, sound quality and value-for-money were enhanced, not compromised.

On a more technical note, we were very pleased that Mr. Sommerwerck noted Reflex-
Spectrum 410 speaker

Editor:
Thank you for Bill Sommerwerck’s excellent review of the Spectrum Model 410 speaker system. To know that other audiophiles have validated our own listening experiences is extremely gratifying.

Also, we appreciate BS’s comments on the myth of the “classical vs pop” speaker. All Spectrum systems are designed to provide maximum accuracy at their respective price ranges, and to reproduce all types of music equally well.

One item I feel I must qualify, however, is the evaluation of the 410’s bass. The effects noted were symptomatic of some early production woofers that had insufficient flux density in the gap. This not only reduced efficiency slightly, but also shifted the bass parameters considerably, producing the lack of impact and slight ringing that was noted. We have since eliminated the problem by changing parts sources and tightening production tolerances to ±0.25dB. The new woofers have been in production starting with Serial #4100246 and can be recognized by a larger (3 1/2") dust cap.

Comments on the new prototypes’ bass, at both the Las Vegas and Chicago shows, were extremely favorable. Some of the industry’s other well-respected “golden ears” noted similarities to the sound of much more expensive sub-woofer systems—and the new woofers are even more impressive than the prototypes!

Again, thanks for recognizing the 410 as the “breakthrough” design that it truly is. The many man-years that went into its development have finally paid off.

Eric Johanson
Spectrum Loudspeakers, Inc.

Carver M-1.0t Amplifier

Editor:
John Atkinson was adding up the score sheet: One; two; three; four. Four out of five correct for J. Gordon Holt. As the results sank in, as I realized that Gordon Holt—not I—had won the amplifier challenge, my head began to spin around and my arms grew numb. My feet and legs felt like lead and my throat went dry. I was rendered absolutely immobile, and when I tried to speak, all that came out was a happy croak. I had lost. How could this be?

“Heaven and Earth are not humane. They regard all things as straw dogs.” —Lao Tzu, 600 B.C.

Apparently, so does Stereophile. Upon first reading, you appear to have soundly put me and my upstart technology in its place. The day is won for the forces of expensive, esoteric ampdom! The collective year and a half of egg which accreted on your face, from our original challenge, has been removed! Bob Carver can’t produce production amplifiers which sound like his prototypes!

However, closer scrutiny shows you avoided the true issue entirely, proving nothing except that 1) vacuum tubes age, 2) logical comparison and inquiry appear to be out of vogue in the Southwest.

Larry, you and your staff have been tantalizing Stereophile readers for many issues about how you were going to follow up with a true inquiry into whether or not my production M-1.0ts do or do not sound like the original
hand-tweaked prototype which was judged indistinguishable from a vacuum tube reference amp 18 months ago.

This makes sense. You can't have this upstart from the Rain Forest advertising within your very pages about sonic identity between amplifier designs if those claims do not extend to the production models available to your readers.

But instead, Larry, you crafted a wonderful straw dog—then ripped it to shreds, totally ignoring the real issue. You cheated your readers of a definitive answer to an important question and wasted your time and mine, ultimately coming up with a totally untested and untrue assertion.

John, you concluded that I failed to produce production M-1.0ts which sound the same as the hand-built prototype used in the original challenge. And yet you never bothered to compare them! Why you didn't, I'll never know. Do you possess mystical powers that allow you to compare amplifiers without ever listening to them? Or would the truth have led to the earth-shattering revelation that yes, M-1.0ts do sound like the prototype but not like a reference amp with aging tubes. (This would not have sold magazines, that's for sure.)

Bear with me, readers, while I recount the events leading up to the Great Re-Challenge; I think even you will agree that instead of "winning back the marbles," Stereophile only manufactured and pocketed some shiny new ones.

In preparation for the latest showdown at the Santa Fe corral, I had made certain that my production model M-1.0ts nulled perfectly with the hand-tweaked prototype I had built more than a year ago during the first "challenge." In careful, rigorous, long-term and short-term listening sessions, my hand-picked listening panel and I were unable to detect any differences at all. But I didn't expect we would, for the prototype and the production units nulled to almost 70dB, or about three parts difference per ten thousand.

I dispatched the prototype to Santa Fe for use by Stereophile. One of the essential ways, we reasoned, to determine whether production M-1.0ts indeed sounded like the original was to compare them. In retrospect, this concept appears to have either been too radical for you to consider, or too potentially laden with embarrassing consequences.

However, when Larry Archibald and his editorial staff told me they were "hearing differences" between a production M-1.0t and the reference amp, an inner voice told me that the differences were worth investigating. Larry, Gordon, and John agreed that I once again should set forth for the Southwest.

In Santa Fe, all four of us auditioned the production M-1.0t and the reference amp in John Atkinson's listening room. Upon inquiry, I learned that none of the Stereophile staff members had compared the sound of the prototype with the production model. An important procedural point, as we shall see later.

While this first session was informal, it was also informative. They were hearing differences between the production M-1.0t and the reference amplifier. Indeed, I was struck by how John would announce differences in high end, low end, and imaging almost immediately after the amplifiers were changed. I could hear only a level difference and told him so.

Naturally, I set about determining whether both amplifiers and the system were working properly. Everything was in order except the null product between the amplifiers. It averaged 28dB, not 70dB! Your tests showed this, and so did mine. Since my own research has shown that the threshold for detecting differences is about 40dB, I knew there was enough variance between the amps to be detectable by a careful listener. After carefully adjusting both amps' gains with pink and white noise, I decided to press on anyway, knowing there was a good chance that the Stereophile listeners might indeed be able to detect a difference (though no longer vast) between a production M-1.0t and a reference amp with year-and-a-half old tubes.¹

At this point, John and I performed a second series of listening tests. They were without rigor in my opinion (at one point I even lost

¹ The output characteristics of a vacuum tube amplifier change with time because the transconductance of tubes changes with age—even if the tube is not operated! As air inevitably leaks into the envelope, most but not all of it is absorbed by the "getter." This causes changes in the following characteristics (in descending order of importance): 1) output impedance; 2) frequency response; 3) phase shift at frequency extremes; 4) gain. There are other, more subtle effects, but these are the most noticeable. —BC
track of which was which), and besides (Horrors!) there was a switch in the system. In spite of it, discerning differences was a very demanding task. I watched John strain so hard it nearly exhausted me! There was no question in my mind that, even with a 28dB null, the task of distinguishing between the two amps was definitely not trivial. After two good sequences, John asked for the results. He had gotten exactly one out of two. In other words, he could have done as well by guessing.

At lunch we were joined by Larry Archibald, who was treated to our experiences so far. Based on the difficulty we both had distinguishing differences, I began to smell pay dirt. I just knew I could win the Great Stereophile Re-Challenge; I was quite cocky. (My humbling by J. Gordon Holt was still hours away.)

After lunch, as Larry and Gordon took turns trying to determine which amp was playing, storm clouds rolled in. To make a long story short, Larry and I became involved in a spirited debate about continuing the listening tests. He said I had been given more opportunity than any other manufacturer. I said that the test wasn’t over yet, because so far the differences were too small for John, Gordon, or Larry to regularly discern, and I wanted to get on with the “official” serious listening tests. I suggested he was trying to weasel out. He denied it, contending he had never promised me a blind listening test in the first place. At one point, as the decibel and adrenaline level rose, Larry retorted, “Why aren’t you concerned about the lack of a deep null? There’s only 28 dB. You told us yourself, and we tend to agree, at least 40dB is required for indistinguishability?”

I didn’t respond out loud, but my thought was, “Larry, don’t you understand that you have a good chance of winning this challenge? A 28dB null is detectable; were it 40dB, much less 70dB, it would be all over: I would win hands down. And yet you want to bail out now . . . .” My tongue still has scars from the biting it took.

At this point, just as I was on the verge of picking up my stuff and stomping out—Larry was already heading towards the door—J. Gordon Holt, with calm, grace, courage, and a mentor-like dignity, spoke up: “I’ll do it.” I could have kissed the man. I’m not sure if he was sure he was sure of the outcome, but he wasn’t afraid either.

The rest is history. J. Gordon was able to hear the difference between my M-1.0t and the reference amp in a blind listening test. An earlier test had shown Gordon’s hearing to be flawless, like that of a wee lad. I slinked back to Lynnwood with the production M-1.0T and retested it: a near-perfect amplifier; bias right on the nose; null within 6dB of the original’s 70dB figure. C’est la vie.

Now, in the cold light of a Lynnwood morning, the entire tail-chasing exercise is far clearer:

1. Stereophile tantalized its readers with promises that it would determine once and for all whether production M-1.0ts sounded like the prototype.

2. Though given ample opportunity, Stereophile never bestirred itself to make the comparison. (If they had, they would have found a 64dB null—the production model and prototype would have been sonically indistinguishable.)

3. Instead, Stereophile defaulted by comparing a production M-1.0t to the original reference amp, complete with its aging tubes. An amplifier so variable that its output shifted daily during my original attempts to match it.

4. Voila! Differences at least J. Gordon Holt could identify! Dramatic proof of something. Anything to refute the earlier challenge.

Unfortunately, proof of nothing—in light of Stereophile’s promise to its readership that it would determine whether or not my production M-1.0ts sound like my prototype. All Stereophile did was to waste my time and theirs by comparing fresh Washington apples to rather stale oranges. By their own admission, the vacuum tube reference amp changes almost every time they look at it. In 18 months, it had gone from a 70dB null to a 28dB null. While during the same time, I was busy producing M-1.0ts virtually identical to my prototype. The prototype Stereophile apparently dared not listen to, for fear it would sound just like production models.

What about the uncomplimentary things

2 Remember that apocryphal tale of when Einstein’s brain was autopsied? It looked just like that of a young man. Maybe J. Gordon’s ears will be found to be like that. His acuity at hearing and interpretation are simply incredible! —BC

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Stereophile
John Atkinson has to say about my amp? While he was lacing his pen with arsenic and cyanide in Santa Fe, another group of reviewers were evaluating a production M-1.0t north of the Border. Let's compare what The Inner Ear Report (a respected Canadian audiophile journal) and John heard from and wrote about my 1.0t:

**John Atkinson:** "Over the next few days, I became aware of shortcomings."

**The Inner Ear:** "This amplifier can become addictive and we liked it progressively better over the seven-day period."

**Stereophile:** the low frequency range was "ill defined and characterless."

**The Inner Ear:** the M-1.0t's deep bass was "powerful and well defined."

**Atkinson:** the sound was "overall... more bright, even tinkly in the presence range."

**The Inner Ear** heard "Very beautiful and sweet highs, well balanced with the upper and lower midrange."

**John:** the soundstage was "with reduced depth."

**The Inner Ear's listening panel:** "the image is awesome and focused in all directions, revealing three-dimensionality comparable with only the best amps in the business."

And so it goes, back and forth. How can two highly trained, committed, and respected reviewers come to such opposite conclusions with the same amplifier? The answer my friend, is blowin' in the wind. Subjective reviewing.

In spite of the time I wasted in Santa Fe watching that poor straw dog get riddled with large-caliber holes, I will continue to use the results of the first challenge in my advertising. Because my production amps do sound like my prototype; you chose not even to attempt to prove me wrong. Even though many readers probably expected it.

I will also continue to stake my reputation on that of my company on the indistinguishability of the original "challenge" M-1.0t and those at your nearest Carver dealer right now.

**Bob Carver** Carver Corporation

*It would be inappropriate to respond in detail to Bob Carver's charges—after all, we've already had our say (by which we stand). There are a few inaccuracies to be*

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Wouldn't it be a shame to invest thousands of dollars in a CD player and get second best? The Cambridge CD-1: rated number one by every major audio publication in Europe. Number one because Cambridge has rethought, redesigned and improved every mechanical and electronic aspect of the CD player system rather than simply redoing the analog and power supply section as with most "audiophile" CD players. Number one because 3 DACs per channel mean 19 bit linearity for better resolution of subtle detail. Number one because, after all the technical jargon, the Cambridge CD-1 sounds more like music than any other CD player.
A good listener needs to hear more than the subtle differences between high quality components.

As a salesperson, a good listener needs to hear the subtle differences between customers who are searching for the right component to complement their system.

If you need to be heard, call . . .

NEIL McPHEE - JIM LUCAS
corrected, though, and a few clarifications to be made.

It was never our stated objective to evaluate Carver's production 1.0t in comparison to the modified prototype he created in Santa Fe, nor did we make any conclusion about their identity or lack of it. We did what was recommended by Carver's advertising: "Compare the new M-1.0t against any and all competition. Including the very expensive amplifiers that have been deemed the M-1.0t's sonic equivalent." (Audio, Oct 1986 and many other issues, or Stereo Review, Feb 1987 and many other issues.) Bob is correct in stating that we had the prototype on hand, but only for a relatively short time (2-3 weeks), and at a time in the review process when neither JA nor JGH could spend time with it. LA had the opportunity, but he's notoriously unreliable at getting such things done! Interestingly, Bob could have brought the original prototype to Santa Fe (be brought five production 1.0ts), and knew we hadn't mentioned it in our write-up (parts of which had been read to him), but apparently felt it unimportant.

Regarding the "aging" of the reference amplifier's tubes, JGH and I were happy that the amplifier sounded as it had in the first series of tests. In addition, JA felt that it sounded pretty much the same as samples of the same amplifier that he had heard in the UK.

As stated in the review, the level differences in the first series of listening tests were due to Bob adjusting the volume control between presentations: far from JA having to have this pointed out to him, he was distressed by it, feeling that it threw up a methodological smokescreen.

Disregarding the morning's casual listening, JA's score in the rigorous blind testing was 1 out of 1 (omitting the test when Bob forgot which amplifier was which): perfect, but hardly a significant sample.

It was solely Bob Carver's idea to come to Santa Fe to "waste [his] time."

The Inner Ear, a "respected Canadian audiophile journal," published their first issue in September 1986; the review Carver refers to has not been published as I write this, but should be out, in their Vol.1 No.3, by the time we are in print.

And (as Peter Falk would say), just one more thing: given Bob's presentiment as to the audibility of a mere 28-dB null, why did his "head... spin around... arms [grow] numb," his "feet and legs [feel] like lead" and his "throat [go] dry"—when JGH actually detected the difference? And why did be never mention this presentiment while he was here? At least nobody ever accused Bob Carver of delivering uncolorful copy. —LA

Editor's note: though the following response to Dick Olsher's interconnect survey did appear in the appropriate issue of Stereophile, Vol.10 No.2, a line of type was inadvertently omitted. As David Salz felt that this diluted his argument somewhat, we have reprinted his letter—missing line restored—in full.

Straight Wire

Editor:

We wish to commend Dick Olsher for his efforts. His review of interconnect cables is challenging and controversial, without "pulling any punches." Secondly, we must apologize for the seemingly harsh tone of our comments on MIT Music Hose. They must be taken in the context of our knowledge (from user feedback and test results) that the LS1's benefits are usually not apparent when used in conjunction with Music Hose. This is due to a basic difference in design philosophy.

We believe the only way to accurately define the additive and subtractive effects of cables is to compare them with a direct connection. Our testing procedure involves connecting a variety of well-known reference components (eg, PS CD-1A and Stax SRM headphone amp) with phono plugs soldered back to back (no cable!); where a direct connection cannot be made, we substitute the shortest length possible of various good cables (ie, 2-3' of Monster, Distech, MIT, etc.—they sound quite similar at this length). Any sonic difference between the "test" cable and the direct connection is considered distortion. We aren't interested in producing cables that modify the signal to optimize a particular set of components; our goal is for cables to conduct music without alteration.

Mr. Olsher's review questions whether resolution and focus could be enhanced by cable colorations. We believe he answers this
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This is big news. The new Krell Reference amp and preamp sound, to our ears, dramatically more musical than any other solid state devices to date! They are so good, their appeal will not be limited to solid state aficionados, but will win converts from the tube camp, too. Find out why we have them and your dealer doesn't..... and why you should.

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Stereophon
question very well in his descriptions of the outstanding cables: "midrange forwardness that heightens the impression of midrange transparency," "startling midrange that is very addictive indeed" (what about the original midrange?), "rich and thick with recessed tonal balance" (why not the original tonal balance?). We believe that these cable colorations can be of great benefit in certain systems. Besides compensating for the harmonic and spatial anomalies in some systems, colored cables can mask annoying HF distortions.

The technical section of the review was unusually thorough but left a few points unclear. Mr. Olsher first states that geometry and inductance are more important than materials but later states "that materials, construction, and extended bandwidth would appear to outweigh such factors as geometry." We believe that design priorities should be based on the resultant audible effects. To put these parameters into perspective, one must make proper tests. The cable manufacturers utilizing special metallurgy should be glad to provide test cables which differ only in their crystalline structure. Another useful test would be to compare two cables of the same geometry and materials with differing spacing between the conductors. We have made these comparisons in several systems and noted the cables that differed in conductor spacing were easily differentiated while those that differed in metallurgy were not.

The reason for the above-noted observation is explained in the review. Changing the spacing between positive and negative conductors of a cable varies its inductance and impedance, which controls its amplitude and phase response. There is a clear correlation between the measured impedance deviations of the test cables and their sonic descriptions. The phase distortion caused by rising cable impedance tends to accentuate the frequency region at which the impedance has risen approximately 30% above its low frequency level. At the frequency region where a cable's impedance has doubled (100% increase) the sound becomes rolled-off. We will gladly provide impedance measurement data on various well known interconnects and speaker cables to those interested.

Our "statement" on the issue of cable/interconnect compatibility, as reflected in the review, needs further clarification. The vast majority of high-end components have low output impedance to minimize the adverse effects that both capacitance and inductance can have on the signal and output circuit. Some components with high impedance outputs produce significantly higher distortion as the load capacitance is increased. If the cables used to connect such a component have relatively linear impedance, the distortion is revealed. If LSI sounds "grainy or splashy" on a high source impedance compo-
The Carver M-1.0t Power Amplifier

“This amplifier can become addictive and we liked it progressively better over the period we had it.”


“Truth is generally the best vindication of slander.”

Abraham Lincoln, 1864
A truly revolutionary amplifier design is bound to stir up controversy. Especially when it only costs $499.

The Carver M-1.0t qualifies on both counts.

Good reviews abound. Like the excerpt at left from this month’s *Inner Ear Report*, a highly respected Canadian audiophile newsletter.

Then again, we’ve also attracted a few axe-grinders, too.

We expect it. After all, nothing shakes the foundations of Audiophile Tradition more than the prospect that a $499 Carver power amplifier can perform as well as—or indeed outperform—amplifiers costing as much as ten times as much.

But reviews (and reviewers) come and go.

While great amplifier designs stand the test of time.

We invite you to put the M-1.0t Magnetic Field Power Amplifier to your own personal test at a Carver dealer soon.

And we stake our reputation on a very important fact. A fact which even the most abrasive of reviewers has not been able to refute: The M-1.0t production model you audition will sound identical to the prototype which, eighteen months ago, started this whole delicious controversy.

For a free reprint of the entire M-1.0t review from the March 1987 issue of *The Inner Ear Report*, call or write us. For a reprint of Stereophile’s recent M-1.0t review, send $500 in rolled pennies via Parcel Post.
nent, we know that the component either doesn't like the load or requires some filtering of its output, regardless of the load. The review comments on the approximated (3") bypass test suggests the latter to be true in this case. It would follow that very short lengths of the outstanding cables would also sound grainy and ill-defined in the review's test system.

In conclusion, we wish to accept Mr. Olscher's cable challenge with our new top-of-the-line interconnect cable—"The Music Conductor" (available this spring). We believe that one meter of "The Music Conductor" will sound more like 2" of the MC Silver than any other cable. Finally, let the high-end cable buyer beware—the emperor's new cables may not wear well in your system.

David Salz
Straight Wire, Hollywood, FL
FOR SALE

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