Symphonic Variations on a Theme from “Pierre Lunaire” Op. 14

Grossefuguen for Pink Noise, Op. 32

Crepitations, Op. 55

Introduction, Allegro and Divers Finales (Without Coda) for Unaccompanied Kazoo

Te Di um for Sine Wave and Cloves, Op. 84

Silence IV (from “Rests” Op. 27)

“A rather interesting record”....Fop magazine

Full Reports On: SAE Mk I preamp; Stax UA-70 & Rabco SL-8E tone arms; Harman-Kardon CAD-5 cassette recorder; Crown D-40 power amplifier.
As We See It...

The Silent Minority

Until about nine months ago, FM radio station WFLN, Philadelphia, was just another one of that dying breed: the classical FM station. Like its counterparts in the few remaining classical-radio cities, it provides the major part of the high-fidelity listener's radio diet, and also like most similar classical stations, its fidelity was nothing to brag about.

This was not because of indifference or lack of funds for better equipment, but because WFLN had been following one of radio's traditions which happen to be detrimental to audio quality. They were "reaching."

Radio advertisers, like all advertisers, think in terms of audience. The larger the station's listenership, the more people will be reached by the advertiser's message and the more the station can charge for airing it. A classical-music station has a limited potential audience to begin with, simply because the vast majority of Americans, for various reasons, feel that listening to classical music is something one does for cultural enrichment rather than for enjoyment. But the classical-station listener often has expensive tastes in the products he buys, and the people who sell such products find that they get a better return on their advertising dollars from a classical-music station than from one with a wider audience. But the station must still reach as much of its potential audience as possible, and this is best done (within their legal limit of transmitting power) by keeping the signal loud.

Unfortunately, classical music, unlike pops and background music, is quiet most of the time. Crescen-
dos comprise but a small fraction of most classical works, and quiet passages don't have the "reach" that is needed to push the signal out to the fringes of reception. So, WFLN was doing what everyone else is doing: using peak clippers and volume compressors to hold the average signal level close to the permissible maximum and prevent the quiet parts from getting too quiet. Since all volume compressors have audible distortion, and dynamic range is an essential part of classical music anyway, the result was not one to gladden the audiophile's heart. The sound was tolerably clean most of the time, but every crescendo stirred up the mud in the limiting and compressing devices. And whenever a protracted quiet passage came along, the volume (and the background noise) would creep up, up, up until the next crescendo choked the sound back to normal.

Finally, someone at the station got fed up and "did something" to their compressors. There was no public announcement, no claim to "improved fidelity." One day, their signal quality was mediocre, the next day it was clean, transparent, and for all intents and purposes completely uncompressed.

Then the station's management sat back to wait for the anticipated listener reaction. And waited. And waited. For two weeks nothing happened. Then, within a couple of days, there were two calls to congratulate them for their new sound. WFLN program director Jim Keeler identified one caller as Eugene Coggins, of Paoli High Fidelity Consultants. The other was Ye Editor & Publisher of Stereophile.

Six weeks later, the grand total of calls commenting about the improved sound stood at five, despite the fact that we had phoned several critical-listener-type friends, urging them to listen to the new WFLN sound and register their approval if they liked it. They all said they liked it. Only one of them bothered to let the station know he liked it.

This miserable display of human inertia was by no means unusual. Every two years, it accounts for the election of corrupt politicians all over the country, and more often than not, it is a source of discouragement for some FM station or recording company that improves its sound quality in the hope that someone will notice and appreciate.

It is a truism, and not a happy one for man's self-image, that people are much more likely to make their voices heard when they dislike something than when they like it. But when it comes to the quality of the program material made available for reproduction through our thousand-dollar hi-fi systems, it seems that hi-fi enthusiasts are incapable of getting off their fat asses even to register a protest, let alone a vote of approval.

Maybe we, as a group, just don't expect better sound from FM and recordings than we're getting now. But dammit, when it happens, the least we can do is give the responsible parties a pat on the back. Critical hi-fi listeners are a tiny minority of the general public as it is. If we remain steadfastly silent on matters of concern to us, we don't deserve any consideration by the people who decide what kind of fi we get to listen to.

**Late Again!**

Anyone comparing our cover date with a calendar may be excused for wondering if we aren't a little behind schedule again. We are, mainly because Ye Editor took on a free-lance job last summer that turned out to be three times as much work as he thought it would be. I apologize. We may be late again, some time in the future, but I can assure readers it won't be for the same reason. Once burned.... J.C.H.
Mr. X Speaks Out on the Classical Record Crisis

In recent months the American record industry has been doing considerable soul-searching about the future of classical recording. Total sales of classics continue to grow steadily as the population grows, but sales of other kinds of music have been mushrooming to the point where the so-called classical market now constitutes an insignificant percentage of the total, while production costs for classical recordings made in the U.S. have soared to as much as twenty times the per-album cost of pop releases. Admittedly, classics have not paid their own way for many years. The classical divisions of the major record companies have been subsidized by the sale of recordings with more mass appeal, but the classics have persisted more or less as a prestige line. Lately, it appears that this is no longer adequate justification for their cost to the record companies, hence the talk of a "crisis" in classical-music recording, and the rumors of an incipient retrenchment.

In connection with this, the Stereophile was privileged to buttonhole the Assistant Vice President in Charge of Classical Sales at Redundancy records, who was willing to answer our questions about this important issue. Since some of his answers were controversial, he did not wish to be identified, so we shall refer to him only as Mr. X.

Stereophile: We have been reading a lot these days about a crisis in classical recording in America. In your opinion, Mr. X., is there any truth to this canard?

Mr. X. Oh, yes. There is no doubt about it.

S. To what do you attribute this crisis, Mr. X?

X. Well, I can think of a number of contributing factors, but I believe the fundamental reason is that nobody is buying classical recordings these days.

S. I bought a classical recording last week. Does that make me a nobody?

X. Now don't misunderstand me. When I said Nobody, I did not of course mean nobody at all, I meant practically nobody. Are you aware that classical record sales have shrunken to a miniscule five percent of the total record market? If that isn't practically nobody, then what is?

S. You said it has shrunken to five percent. What percent was it before it shrunk?

X. Well, I read somewhere recently that in the year 1910, classical record sales were eighty-five percent of the total market.

S. But in 1910, classical records were about the only kind of records you could buy.

X. That's beside the point! We have to gauge the success of the products we make on the basis of their share of the total market, and the fact is, classics just aren't selling. Why, just last year, we issued the world-premier recording of Fritz Karliklanger's Etudes for Phase Shift and Deranged Par-
tials, and do you know how many of them we sold?

S. No. How many?

X. Eight! That's how many. We pressed five hundred thousand copies of that, and eight of your precious music lovers bought them! That's the classical music crisis in a nutshell! We give 'em good stuff and they won't buy it.

S. But Karlkangen's, er, music is pretty far out, don't you think? I mean, what about the more traditional classics? Bach, Beethoven, that kind of thing?

X. That doesn't sell either. We've issued fourteen of the finest Beethoven Fifths currently available in high-fidelity stereo, and they don't sell. Remember our landmark album of Bach's Best-Loved Music, the one with six different renditions of the Hallelujah Chorus on it?

S. And the bare-breasted girl on the jacket cover? I remember. I think the title was Handel's Best-Loved Music.

X. Yeah. Well, it bombed. Bombed! Only sold five thousand copies the first week.

S. Isn't that pretty good?

X. Peanuts! The Gonads' third album, came out the same week, sold a quarter million. To kids. That's where the record money is these days. They're loaded with the stuff, and so anxious to spend it they'll buy bulldust in a burlap bag if you paint it psychedelic puce and promote it properly. But not your smarty-pants classical nuts with their hoity-toity Haydn. Your so-called classical record buyer, he's not worth the effort. We've got the highest-powered promotion department in the business. Some of the most creative packagers you ever saw. But do the classical nuts care? Hell, no. Give 'em the most dynamic collection of world-famous finales, with a jacket design by the most In pop artist of the day, and do they buy it? No, they turn around and buy some tedious symphony on a Kraut recording with a photo of Dmitri Yesvetski and his cello on the cover. That's why there's a classical recording crisis. Those crumbums don't appreciate the modern approach to anything.

S. But isn't most classical music something less than modern? I mean, wouldn't it be more appropriate to match the packaging to the music?

X. Appropriate? What are you anyway? One of them? You jerks are all the same. That music is old, don't you understand? It has whiskers. If it can't stand a little jazzing up to make it relevant to this age of Aquarius, then it doesn't belong.

S. Well, do you feel it does belong?

X. On the basis of our sales figures for fiscal 1970, it is my considered judgement that I don't know.

S. Well, to put it another way, what are Redundancy Records' feelings about the future of classical recording in America?

X. Redundancy will continue to uphold its traditional leadership in bringing to America's discriminating record buyers the finest recordings and most inspired performances of the enduring masterworks of the Great composers.

S. Oh come now, do you really believe that?

X. Well, strictly off the record, I think it's hogwash. The classical record business has had it, we've had it, and if we're still releasing any classics five years from now I'll be surprised. But for God's sake, don't quote me on that. You promise?

S. Trust me.
Subjective Testing (Part 4)

The ideal sound reproduction, like the ideal photographic reproduction, should provide a perfectly clear, sharply focused "window" through which we may feel we are perceiving the original sound or scene. Since neither reproducing medium is perfect, though, the reproductions will exhibit certain deficiencies which can be used to describe them. And since most of us are more visually than aurally oriented, it is convenient to describe most of the imperfections in reproduced sound in terms of visual perceptions.

Transparency

Transparency is a positive quality that, quite simply, implies the sensation of hearing through the system back to the sound source, as though there were no reproducing equipment present at all. A single drop of dew, a sparklingly clean crystal goblet, and a perfectly exposed and grainless photograph will give the same impression.

Any electrical distortion in the sound-reproducing system will cause a loss of transparency and imbue the reproduction with some degree of texture. Texture is the quality of structure, and gives the feeling that the sound image is comprised of particles rather than a discreet whole. It is analogous to grain in a photograph, and to carry the analogy further, the coarser the texture (grain), the more rough the reproduction becomes.

In sound reproduction, very small amounts of certain kinds of distortion will seem to erect a subtle veil between the listener and the sound source. This is the equivalent of the photograph whose grain size is just large enough to perceive but is not quite coarse enough to resolve itself into visible particles. This slight an imperfection is usually not perceptible by the average person unless he is given the opportunity to compare the veiled sound with a reproduction having more transparency, but to a listener who is accustomed to hearing very transparent sound, it is veiling tendencies of this small magnitude which account for much of the audible difference between a pair of seemingly top-class components.

As distortion rises, the "grains" will become audible as a "grainy" or "gray" or "dry" (as opposed to liquidly transparent) quality, and further distortion increases will make the sound increasingly coarse until, at levels above about 0.01% IM, it becomes ragged or shattery.

An advanced case of texturing can almost literally be felt by the listener, and can be described in terms of comparable tactile sensations, such as "gritty," "glassy" (like shards of broken glass), "wooly" (fluffy), and "piercing" (or, like having your ears cut off flush with the head).

Veiling can be caused either by phase shift or certain varieties of
IM distortion. Comparably small amounts (less than 0.1%) of harmonic distortion, on the other hand, will seem to have the opposite effect on the sound. Instead of a veil, the sound will take on a subtle hardness which, while seemingly improving the reproduction of so-called “hard” transients like the impact sounds of percussion instruments, will also tend to harden the softer transients of instruments like violins, making gut strings sound as if they are steel. The visual analogy here is not as obvious as in the case of veiling, but the hardness can be likened to a photograph in which a combination of harsh lighting and poor printing have combined to over-define the outlines of the subject.

With increasing harmonic distortion, hardness will increase to the point where it adds a conspicuous spurious brilliance to the sound, and may in some cases give the impression of a sharply exaggerated treble frequency response. And as IM distortion tends to come up along with harmonic distortion, the hard-sounding component will usually also sound rather coarse-grained.

It is not possible to cite accurate figures for how much or how little distortion is acceptable or perceptible. Some components whose distortion is so low as to be completely unmeasurable on state-of-the-art analyzers will nonetheless sound slightly different in ways that can only be attributed to distortion of some kind. In addition, the texture of an amplifier’s sound will depend on the distribution of the spurious tones it adds — whether they are mostly second-harmonic tones or sixth-harmonic tones, and whether the predominant distortion is harmonic or intermodulation.

Because of this distribution of harmonics, solid-state components having a certain amount of measured harmonic distortion will tend to sound much harder than tubed components having the same measured distortion, while the tubed units will tend to sound more veiled. It was this difference which so conspicuously distinguished early solid-state amplifiers from their tubed competition, and gave rise to the expression "solid-state sound." The "sound" was, simply, high-order harmonic distortion.

If one kind of distortion causes veiling and another causes hardness, can’t they compensate for one another to produce the original sound? The answer is no, which should be obvious when we remember that both are due to the addition of spurious signals to the program. They can appear

Reference Standards

The following components, some of them on loan from the manufacturers, are in current use by us for testing and evaluating the equipment written up in the reports section. Ones that are asterisked are, in our opinion, state-of-the-art equipment.

Decca 4RC*, Stanton 681A*, Goldring G-800 pickups.
Rabco SL8E*, Decca International and SME/Shure 3009-II tone arms.

Thorens TD-125* and TD-150 turntables.
Audio Research SP-2C* and Dyna PAT-4 preamps.
Crown DC-300*, Audio Research Dual 50D*, Harman-Kardon Citation 12 and Dyna Stereo 120 power amps.
KLH Nine*, Infinity 2000A and Dyna A-25 loudspeakers
Revox A-77* and Ampex F-44 tape recorders.
Sound Craftsmen multi-band equalizer.*
to compensate for one another, but no such reproducing system can do equal justice to hard and soft transients. It will favor one kind of sound to the detriment of the other.

**Detail**

This is analogous to focus or "resolving power" in photography. Detail is the ability to reproduce subtle aspects of the program material, like the differences between low-register violins and high-register violas, the resinous, gutty sheen of massed violins, and the individuality of myriads of tiny bubbles in a recording of a glass of soda pop.

Since detail in the program is represented by steep wavefronts, its reproduction can be marred either by smearing of the sound (due to wavefront interference from phasing problems, ringing resonances or IM distortion), or by poor reproduction of the frequency range above 10,000 Hz.

Detail is a major contributing factor to the "snap" or "alive" quality that gives reproduced sound a "you-are-there" vitality. Like transparency, it is a quality that cannot be appreciated, or missed in its absence, until one has grown accustomed to hearing it. And few systems can provide that opportunity.

**Weight**

Somehow, it seems natural for us to think of bass as being heavy and treble as being light. Thus, it makes sense to describe as "heavy" a sound in which lows seem to predominate, and to call a bass-shy sound "light" or "thin." The weight of a sound is not however just a matter of restricted bass range or a low-end rise; it is determined by the response characteristics through the major part of the audio range -- the so-called response profile.

Judgments about weight or "balance" involve mental comparisons between the relative intensities of frequencies above and below what we think of as the musical mid-range.

The ideal frequency response -- the response which sounds perfectly balanced to us -- would be graphed as a horizontal line between the deep bass and high treble limits of the reproducer. As long as the middle range, from about 250 to 2000 Hz, is generally horizontal, response deviations above or below this range will be perceived merely as changes in treble or bass response. The over-all balance or weight will not be substantially changed. But if this mid-range's frequency response is tilted, so its output rises or falls with increasing frequency, the over-all weight of the sound will be markedly affected, almost regardless of what goes on outside of the middle range.

It is rare, though, for a system's response to be tilted one way through the middle range and have its upper and lower ranges flat or tilted the other way. It is also unlikely that there will be a really severe response deviation at either end of the range without this encroaching on the middle range, so a sound that is noticeably weighted in either direction is usually that way because of a response deviation affecting considerably more than a third of the total audio range.

Preamplifiers and power amplifiers can be made to respond to within plus or minus a few tenths of a dB from 20 to 20,000 Hz, and other transducers -- microphones, disc cutters and pickups can span a 30- to 15,000-Hz range within ±1 dB. This sounds impressive until we remember that 1 dB of response deviation over a wide frequency range is audible, and that ±1 dB allows for a total deviation of 2 dB, which is quite audible. The best available loudspeakers are not capable of better than ±2 dB of smoothness through most of their range, and since no two speakers deviate from perfection in exactly the same manner, it is not surprising that each should have its own distinctive flavor or "color." We'll pin some labels to these colors in the next issue.
SAE Mark I
Preamplifier


Several years ago, we tested the first product from a new West-Coast firm called SAE, and rated their Mark II power amplifier above anything else available at the time. It is still one of the best amps in its power class, which is why we have been waiting impatiently to test one of SAE's long-promised preamps. After a few unsuccessful efforts to borrow one from SAE, we finally gave up and called on our readers for the loan of one. Our thanks to Transaudio Corporation, of Woodside, Long Island (N.Y.) for their cooperation.

The SAE Mark I is the only preamp we've ever seen that used switches for every single control function, including balance adjustment. This may sound rather outrageous, but all we can say is, after one has used switches for all the usual preamp-type controls, they sort of spoil you for anything else. They feel lovely to use, and there is something reassuring about the knowledge that you can return at a later time to exactly the same combination of control settings that you determined previously as being best for a certain recording.

Another feature that is, to our knowledge, unique to the SAE Mark I is the so-called Dubbing provision. Like several other preamps, this has two sets of tape outputs and inputs, with monitoring facilities for each. Unlike the others, though, the SAE has additional switching to allow either tape recorder's output to be connected directly into the other's input, for tape-to-tape copying. Why nobody else ever thought of this before is a mystery to us, but the value of it should be obvious to anyone who owns two tape recorders.

Another unusual feature of the SAE Mark I is its tone controls, but these we are not nearly so enthusiastic about. Each channel has its own bass and treble controls, which is nothing new. What is new is a third pair of controls which select the frequency ranges which are affected by the tone controls. The controlled ranges are about 1-1/5 octave wide, and the available center frequencies are 60, 120, 220 or 320 Hz via the bass selector, and 2.5 kHz, 5 kHz, 10 kHz or 15 kHz via the treble selector. The main tone controls provide up to 15 db of boost or cut within the controlled ranges.

Thus, the action of the Mark I's "tone controls" is quite similar to that of the equalizers used on professional recording consoles, which would seem to be an attractive feature. Unfortunately, though, it did not turn out to be as versatile as we thought it would. The 60-Hz bass mode didn't have enough effect on the deep-bass range (around 40 Hz), and many of the other aberrations that afflict program material -- heaviness or thinness or excessive brightness -- involve a much wider range of frequencies than the 1-1/5 octave that can be controlled at any given time by the Mark I. As a result, its tone controls are less effective in coping with such aberrations than are the simpler broadband bass and treble controls found on most other preamps. The ultimate in frequency-response control is of course the multi-band equalizer such as the Advent "Frequency Balance Control" and the costlier (and more effective) device of the same type made by SAE, both of which provide simultaneous adjustment of up to nine or ten octave-wide frequency bands.

In terms of objective performance, it is hard to see how the Mark I could be bettered. Frequency response (with equalizers out), noise and distortion were better than the measuring capabilities of our instru-
ments (which are not, after all, state-of-the-art models), and all controls worked smoothly and noiselessly. Sonically, the Mark I was excellent too, although we did not feel it to be significantly better than the $130 Dynaco PAT-4. And both could be better than they are. For example, the Audio Research SP-2 (all more transparent-sounding phono preamp section, and the Citation 11 has a high-level section that more closely approaches the ideal of the "straight wire with gain."

The Mark I's price tag puts it in the no-holds-barred class of preamplifiers, and there is no arguing about its superb construction, but the unit we tested (which was admittedly an early-production sample), could stand some improvement in the sonics department.

(Manufacturer's Comment on Page 27)

Stax UA-70 Tone Arm

Price: $95.00. Importer: Transaudio Corp., 32-46 69th St., Woodside, N. Y., 11377

If you think the SME is an impressive-looking piece of hardware, wait until you get your first look at the Stax! This is without a doubt the most beautifully-made and superbly-finished arm we've ever seen.

It's easier to mount than the SME, and since tangency adjustments are in the plug-in head shells rather than the tone arm base, cartridge changes can be made without adjusting tangency each time.

The bias compensation system is odd, to say the least, since the compensation is removed each time the arm swings outwards to follow a disc eccentricity, which is precisely the time when more compensation is required, but this arrangement is probably no less effective than the SME's slightly frictional weight-and-thread system.

In terms of performance, the two are completely indistinguishable; both sound exactly the same, and neither makes a cartridge sound quite as good as a Decca International (if you can mount one) or the RABCO SL8E.

(No Manufacturer's Comment)

Harman-Kardon CAD-5 Cassette Recorder

Before some of our perfectionist readers blow their gaskets about the length of this report on a mere cassette recorder, we shall explain why it is so long.

(1) The cassette medium has improved to the point where it is worth consideration by the serious listener, (2) The CAD-5 is the first cassette recorder we have ever written up, and (3) Many of our observations about this particular unit are applicable to the cassette medium in general.

Type: AC-powered record/play deck.

Harman-Kardon calls their CAD-5 a "professional stereo tape cassette deck with Dolby noise reduction system." The Dolby we will gladly grant it, but to apply the term "professional" to this or any other 1-7/8-ips cassette recorder is ridiculous. It may, under ideal conditions (precise adjustment, etc.), be able to produce what some listeners would judge to
be professional performance, in comparison with some of the less refined machines in professional use. But the professional tape recordist demands ruggedness, ease of adjustment, and ease of service, and we do not know of any 1-7/8-ips cassette machine that meets these requirements. So let's just forget about the claim to professionalism and consider the CAD5 for what it is really intended to be: a top-notch cassette recorder for the critical audiophile.

The CAD-5 was the first cassette machine to be made available with a built-in Dolby B noise-reduction system. (Advent and Fisher followed, in that order.) We believe the later-model CAD-5's were also the first to combine the Dolby B with additional switchable circuitry to accommodate the new Crolyn (chromium dioxide) cassettes. As one of the ground-breakers in the Crolyn hardware field (Advent was working on their Model 200's Crolyn provisions during the same period), Harman-Kardon was in the position of having no existing standards for the use of the tape, and was thus offered some choices.

Crolyn differs basically from iron-oxide tape coatings in that it requires somewhat higher bias current and (at optimum bias) it can store significantly more high-frequency signal information. Iron oxide coatings need a substantial amount of treble boost (applied during the Record mode) in order to yield flat high end in playback. A Crolyn cassette, recorded with the same amount of treble boost, will give a markedly rising high end in playback, so some adjustment must be made for this in any recorder intended for use with Crolyn.

There are two ways of going about this: Reduce the amount of treble boost during the record mode, so the resulting Crolyn tape will play back flat under the same conditions that will yield flat high end from other tapes, or correct for the Crolyn's rising top during the Play mode, via a slight high-end rolloff. Each approach has arguable merits. If the correction is made while recording, Crolyn and iron-oxide cassettes will both play back properly with the same playback equalization, thus achieving a degree of compatibility. On the other hand, if the Crolyn's "hot" high end is rolled back to flat during playback, the rolloff will further reduce hiss from the tape, but compatibility will go out the window; Crolyn and iron oxide will require different playback equalization curves. Harman-Kardon opted for compatibility and Advent for a few db less noise, and while we're all for keeping noise down, we are inclined to feel that compatible playback is perhaps rather more important than the amount of extra s/n ratio that Advent's approach gained them.

The Deck

The mechanical deck and main circuit board in the CAD-5 are made by (and largely designed by) Japan's Nakamichi Research, Inc. Exactly the same basic elements are used in the Advent 200 recorder and several other current machines, so between our two sample CAD-5's and one Advent 200, we were able to work with three samples of the Nakamichi deck. Generally, it did an eminently satisfactory job, but we also gained the impression that it was working on the thin edge of malfunction. Perhaps the cassette medium itself demands more precision of tape movement than can be expected of mass-production manufacturing, but of the three decks we tried, one became inoperative after a few hours of use (the auto shutoff kept shutting off when it shouldn't have), one (the Advent) seemed prone to intermittent but long-lasting periods of severe speed variation (only temporarily eliminated by capstan cleaning), and all three were rather vulnerable to dropouts and speed variation due to problems in the cassettes themselves.
When everything was going smoothly, which was most of the time, the speed regulation on all three samples was very good. With a good cassette, previously rewound to distribute the tape evenly on the reel, and with the drive system properly clean, both wow and flutter were low enough that it would take a very critical ear to detect either on most program material. Recording and then reproducing a 3,000-Hz tone -- the most critical listening test for speed regulation -- revealed slight amounts of wow and a moderately slow flutter (at the capstan-rotation rate), and the amount of flutter seemed to vary slightly from one moment to the next. In fact, we have encountered relatively few open-reel recorders that are notably better than this. But one of the Nakamichi decks -- on the single Advent 200 we received for testing -- did not always do this well. Despite frequent cleanings, it would occasionally develop wow that was bad enough to ruin a recording. And without off-the-tape monitoring facilities (which no cassette deck has), there was no way of telling that a recording had failed without rewinding and playing it back. This may not indicate an inherent weakness in the Nakamichi deck -- that one sample may have been a rare defective one. But since wow has been one of the major weaknesses of most cassette recorders to date, that one defective sample could suggest that the wow problem is still with us, if only to a lesser degree. It could also suggest that Harman-Kardon's inspection procedures for deck performance are better than Advent's, but again, one sample out of three is no evidence of a pattern.*

Some of the trouble was obviously the fault of the cassettes, as evidenced by the fact that some rather conspicuous speed irregularities would sometimes occur in short bursts or as momentary fluctuations, while some cases of persistent, severe wow could be eliminated by high-speeding the cassette in both directions before starting to record. Even with "premium" cassettes, though (TDK, Advocate, BASF), pre-shuttling did not completely eliminate the possibility of bad speed fluctuations somewhere during a long taping pass. And with no provision for monitoring from the tape while recording, there was no way of knowing whether or not a recording would be satisfactory until it was played back.

Drop-outs -- momentary losses of signal level -- proved to be more frequent and more severe from even the best cassettes than from average open-reel tapes. With premium cassettes, fairly severe dropouts were common during the first few seconds of each cassette, and usually diminished to just an occasional barely-perceptible fluctuation after that. Starting a cassette with the digital counter at 000, recordings begun after the reading has passed 005 should be satisfactorily free from dropouts, although frequent high-speed shuttles of short duration can introduce dropouts throughout the tape at any time afterwards.

As a matter of fact, severity and frequency of dropouts proved to be one of the major differences between the premium cassettes and the cheaper varieties. Some of the 2-for-$3 "bargain" cassettes had so many dropouts they sounded as if they never did establish good tape-to-head contact from start to finish.

Electronics

The main differences between the various recorders that use the Nakamichi deck are in the associated electronics.

*Despite access to the appropriate service manual, we were unable to eliminate that one deck's intermittent wow ourselves. We subse-

quently returned the machine to the manufacturer for replacement with another, which had not arrived at the time of this writing.
electronics and adjustment and switching facilities. In the CAD-5, there are separate and independent bias current adjustments for regular tape and for Crolyn tape, and a single pair of record equalization adjustments for both kinds of tape. A rear-panel switch selects the bias current for the tape you'll be using, and subtracts the appropriate amount of high-end when in the CRO2 position. Also at the rear of the unit are two pairs of adjustments needed for proper functioning of the Dolby: one pair (L & R) for setting the correct playback level from a standard test tape (not supplied, as this should never need readjusting), the other pair for adjusting the recording level so that it coincides precisely with the playback level. This matching of input and output levels is essential if the Dolby's mirror-imaging is to provide playback characteristics that precisely complement its recording characteristics, for the amount of signal "stretching" in playback depends on the playback being exactly as loud as was the signal fed to the tape while recording.

In the CAD-5, the single pair of recording level adjustments serves for both regular and Crolyn tapes. Unfortunately, the correct setting for Crolyn is not the correct setting for some iron-oxide tapes, and although the difference is slight in most cases, the disparity was enough with some otherwise-satisfactory iron-oxide tapes to cause audible malfunction of the Dolby; the recording played back with somewhat less brilliance than the original sound.

Purists may be dismayed to note also that the CAD-5's recording equalization adjustments affect both the iron oxide and Crolyn modes, with the rear-panel switch providing only a fixed ratio of change. This, however, is nothing to be concerned about. At 1-7/8 ips running speed, bias current has such a profound effect on high-frequency response that it can be adjusted for precisely flat high end from any good tape without in any way affecting noise or distortion. Thus, the CAD-5's separate bias controls can be used to flatten the high-end response of both Crolyn and just about any other iron-oxide tape you might choose to use. But because bias current is so critical at this speed, don't expect the proper adjustment for one kind of iron-oxide tape to be right for any other.

Unfortunately, Harman-Kardon's service manual for the CAD-5 does not acknowledge this extreme sensitivity of treble to bias current. Their instructions advise adjusting bias for peak-level playback at 400 Hz, and make no mention of high-end response. Since that peak-level point spans a wide range of bias adjustment, it is not surprising that the resulting high-end characteristic should be more a matter of chance than anything else. The fact that both of our samples showed considerably better-than-chance high-end adjustment suggests that H-K does do their factory setup by biasing for high-end linearity, but if our samples were typical, the precision of their factory setups could stand some improvement, for the service manual would not lead anyone to do an even passably accurate adjustment in the field.

The first sample CAD-5 that we tested had one channel 3 db down below the other at 8 kHz and 2 db above the other at 400 Hz, using the recommended iron-oxide tape. This relatively small difference between channels might have been tolerable were it not for its effect on the Dolby, which effectively doubled the difference. The Crolyn setup on that CAD-5 was more accurate but was still not on the nose, and again, the Dolby responded by producing a noticeable difference in brilliance between the two channels.

The second sample CAD-5 was in substantially better adjustment than the first, and the over-all curves
that we ran on this are shown below. None of these would be considered satisfactory by the average serious audiophile who expects a piece of equipment to be within plus/minus 1 db throughout most of the audio range.

Also shown below are the curves that we got from the CAD-5 after having painstakingly done our own complete setup on the machine, following H-K's service manual except for the biasing, where we balanced the tape's 10-kHz output against its 400-Hz output. These curves show what the CAD-5 can really do, given the opportunity. It can, in other words, meet the demands of all but the most hypercritical perfectionist. In fact, the only difference between the frequency response of a carefully-adjusted CAD-5 and a top-flight professional recorder was at the low end, where the cassette's response rolls off below about 50 or 60 Hz.

This low-end loss, which is audible on some program material, is not peculiar to the CAD-5. Practically all cassette machines have it, evidently as a direct result of conforming to the equalization standard established by the European Philips company that licenses all other manufacturers of cassette hardware and software. This standard calls for playback equalization to cease at or around 100 Hz (presumably to minimize hum and other low-frequency noise), and the medium is not capable of handling any corrective bass boost during the record phase. As long as this equalization standard exists and is followed by manufacturers, deep-bass loss will continue to be a characteristic weakness of the cassette medium.

Tape hiss from the CAD-5 depends of course on the kind of tape used and whether or not the Dolby is switched in. With good, low-noise tape, hiss from the non-Dolbyed CAD-5 was about 10 db higher than that from a 7½-ips 4-track machine with the equivalent tape (and also without Dolbying). This is a substantial difference; hiss from the un-Dolbyed cassettes was very plainly audible at high listening levels. With the Dolby working, the difference vanished; the cassettes had almost exactly the same amount of hiss as the open-reel tapes, which is to say it was audible but defin-
itely in the background when listen-
ing at high levels. With Dolbyiza-
tion, then, cassettes are just as quiet as open-reel tapes, although an add-on Dolby for an open-reel machine will once again give it the 8- to 10-dB advantage over the Dolbyed cassette.

These figures, incidentally, hold true for pre-recorded tapes. A pre-
recorded cassette is about 10 dB hissier than a pre-recorded open-
reel tape unless the latter has also been pre-Dolbyed for Dolby playback, in which case hiss levels are com-
parable. Both, however, are likely to be about 10 dB noisier than tapes you make yourself.

Despite the very slow running speed, the cassette playbacks were remarkably transparent, and were in fact comparable in this respect to 4-track open-reel recordings, par-
ticularly when using the new Crolyn cassettes. Indeed, this seemed to be the major difference between the Crolyn and the iron-oxide tapes. The Crolyn was measurably somewhat better at the high end, but not enough so to make a crucial difference in detail. Its main advantage appeared to be its lower sideband noise, result-
ing in tapes with less of a "veil" over the sound.

Finally, a note about microphones. The CAD-5, like many solid-state recorders, is intended for use with low-impedance microphones instead of the high-impedance types that were usually required with (unmodified) tubed recorders. Since Harman-Kardon reasoned, correctly, that most users will be working fairly close to fairly inexpensive microphones, they designed their mike preamps to take rather high input levels, and this necessitated some compromise at the other end of the scale. Thus, when using low-output mikes (such as good ribbon types) at distances of more than a couple of feet, it may not be possible to get full recording level on the CAD-5. So choose your mikes with an eye to their anticipated use, and make sure their output is appropriate to the use.

Summing up, then, we would judge the CAD-5 to be potentially as good as some moderately-priced open-reel machines and better than a few of them. And the fact that it may well be delivered to the customer in a state of imperfect adjustment does not distinguish it from them either. Very few recorders are ever properly set up at the factory. But whereas most open-reel recorders are now being sold to serious audiophiles who can learn to do their own re-
corder setups, the cassette medium is rather aimed at the non-technical user who does not want to get in-
volved in the decibels and Hertz'es of audio. Since this does not neces-
sarily mean he is uncritical of re-
produced sound, it would seem to us that precision of adjustment, as purchased, is of more importance in a cassette recorder than an open-
reel machine if its potential as a recorder/reproducer is ever to be realized. On the basis of its poten-
tial, we would happily rate the CAD-5 in our Recommended Components (Page 20) class C, along with some of the better medium-priced open-
reel machines. But until Harman-Kardon can find a way of getting CAD-5's to consumers in optimum adjustment, it must get a class D rating. But it is recommended.

(Manufacturer's Comment on Page 27)

Crown D-40 Power Amplifier


It is surprising that two power amplifiers made by the same company would sound wholly dissimilar, but that is the case with the Crown D-40 and DC-300.
Whereas the DC-300 has a beautifully smooth, open and lucid high end, the D-40 has a somewhat "hot-sounding" high end as though the frequency response were slightly tipped up (which in fact it is not). And whereas the DC-300 has a very tight low end (tending to overdamp some loudspeakers), the D-40 has more of the low-end fatness we have observed from most other good solid-state power amps of comparable power.

The D-40 is a shade more transparent than the Dynaco Stereo 120, has virtually identical low end, and is noticeably less sweet at the top. The Stereo 120 is a better buy with twice the power at the same price (or less if you build the kit), but the slightly better transparency of the D-40 makes it a worthy contender for equal over-all standing. Our preference would be the Stereo 120, but a personal choice is in order here.

Note: The D-40 has 25,000-ohm input impedance to each channel. Check to make sure the associated preamp will match it.

(No Manufacturer's Comment)

**Rabco SL-8E Tone Arm**

**Type:** Servo-driven radial. **Dimensions:** 14 in. long; over-all; 8 in. from platter spindle to front of traverse frame; approx. 9¼ in. from front to rear of arm; 6½ in. high w/ arm lifted. **Weight:** Approx. 3 lb. **Price:** $169.00. **Mfr:** Rabco, 11933 Tech Rd., Silver Spring, Md. 20904.

To be truthful, we must admit that we have always been a bit skeptical about the advantages to be gained from a radial-type tone arm. True, a conventional pivoted arm does cause tracking error throughout most of its traversal range, but since groove breakup is rarely a problem anywhere on the disc except in inner grooves, it always seemed to us that all that was necessary was to set the arm's tangency adjustment to give zero tracking error in the troublesome inner grooves. As far as actual breakup was concerned, this seemed to be a valid approach; the best pivoted arms we have tested -- the Decca International (which has other problems) and the now-discontinued Audio and Design -- are no less clean in inner grooves than is the Rabco. But both of the other arms are viscous-damped types, and the Rabco is not. And the Rabco is without question the cleanest-tracking non-damped arm we have ever encountered. What, then, is the secret of the radial arm's success? We suspect it is the zero-error tangency plus the total lack of side-thrust force, which is always present to some extent in pivoted arms despite their use of bias compensators.

The Rabco arm that we tested is the model SL8E, which differs from the original SL8 in that both the lowering and lifting of the arm are done by a second servo motor. The early model had motorized lift at the end of the disc side, but both the lowering and any manual lifting was done via finger controls, which did not always do the job very gently. In fact, some Rabco owners reported having blown loudspeakers because of a tendency for the lift to scrape the stylus over one or two grooves on the way up. The new motorized arrangement is slow-moving but generally quiet and very effective. Only at very high listening levels can the lift motor be heard through the speakers as a faint bubbling noise, and this usually comes to an end before the first notes of music begin. The main servo, that moves the arm across the disc, can be heard as a faint whisper if you turn down the listening level or sit close to the turntable, but we have yet to hear it reproduced through the loudspeakers, even at high listening levels.

As received from the factory, our sample seemed to have rather a large amount of play in its arm bearings.
There should of course be a certain amount of this to ensure friction-free movement, but ours seemed a bit too much, although we did not hear or measure anything that suggested pivot problems. If the pivot play bothers you, this can be adjusted by the user who knows what he's doing, but it is rather a chore. We adjusted ours, but as we said, it didn't seem to make any difference.

Other equipment reviewers have reported that it was possible to get clean tracking from a given pickup at lower forces in the Rabco than "other" arms, which generally meant the Shure/SME. We also found this to be the case, but must add that the same was true of the two viscous-damped arms we mentioned previously. However, since very small amounts of mistracking can do much more harm to modulated disc grooves than a moderate amount of static force (tracking force), we would be inclined to advise against taking too much advantage of the Rabco's apparent excellence at very low tracking forces. Our inclination would be to use something around the middle of the pickup manufacturer's recommended force range until experience with a wide variety of discs indicates that the pickup is really "comfortable" with them. Then the force might be reduced a bit, but only if this doesn't cause some discs to start breaking up.

In view of its apparently total lack of damping, it is reasonable to assume that the Rabco might be more susceptible to acoustic feedback than a damped arm, when a potential feedback condition is present. This is however balanced off to some extent by the fact that the entire arm's substantial weight (about 3 pounds) adds so much additional inertial mass to a turntable's suspended platform that the shock suspension becomes considerably more effective than it would be with an arm of the usual weight. If the 'table's suspension is inadequate, though, or hits bottom due to the added weight of the arm, severe feedback problems are a possible if not a likely result. We encountered no problems mounting the SLAE on a Thorens TD-125 (which looks as if it was made to go with it) and, with Rabco's adapter kit, on an Acoustic Research 'table, but we would advise checking with your dealer before partnering the arm with other turntables he may be selling.

A word about output cables. The Rabco is supplied with 3-foot cables that plug into a pair of phono receptacles on the arm base and thence into the preamp. The total output capacitance per channel is around 130 pF when using the cables supplied, which is low enough to avoid resonant high-end peaking with any cartridge we know of. The plug-in cables, though, might suggest to some users the possibility of running really long wires from the turntable to the control center. You can do this if you wish, but check first to make sure the total capacitance per channel won't resonate within the audio range against the inductance of your pickup. If it does, you'll get horrible "tracking distortion." For purposes of calculation you can ignore the capacitance between the cartridge and the arm's phono sockets; this amounts to only about 12 pF.

Summing up, then, we would say that, while there are a couple of other arms that can make discs sound as good as the Rabco SLAE, we have not found any that perform any better than the Rabco. It may be that the state of the art (?) of cartridge design is the limiting factor these days, rather than the tone arm. And we see no reason why the Rabco could not elicit maximum performance from tomorrow's crop of improved cartridges. In short, we don't expect to see this arm obsoleted for some years to come, and have adopted it as our new standard for subjective testing of universal-type cartridges. For measuring, we'll stick with our SME, though;

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a thumb and forefinger are still the best lifting device for spotting test-record bands. But for listening, Rabco's motorized lift is awfully convenient.

A beautifully designed and constructed arm to gladden the heart of any audio perfectionist.

(No Manufacturer's Comment)

**Quickies**

Short reports on other items of interest, some of which will be reported in detail in future issues.

**Infinity 2000A Speaker System**

First reaction, after several hours of listening: Excellent overall sound, quite similar to that of Infinity SS-I but somewhat less open and less transparent than the SS-I and the KLH Nine full-range electrostatic.

Rather inefficient, about average for compact systems. Sound judged best with fairly high-powered, high-damping-factor driving amplifier: Clean, tight bass subjectively flat to a bit below 40, useful to around 35, audible at 30. Drivers well-integrated. Very good stereo imaging. Sound slightly forward, very detailed, extremely smooth and extended top. Subtle coloration rhymes with "huh."

Full report will appear in next issue.

(No Manufacturer's Comment)

**Bose 901 Speaker System**

After many months of waiting, we finally received our 901 system a few days ahead of deadline. Our reaction to date: Astoundingly spacious sound, excellent center fill, superb but slightly unspecific stereo imaging. Listening area for good stereo performance was larger than that of any other system ever tested.

Over-all sound judged rather heavy, with larger-than-life low-end. Frequency response somewhat humped at around 200 Hz, deep-bass range largely a function of room dimensions -- system excites all major standing waves in room. Some audible harmonic content below 40 Hz. Bass detail fair. Mid & highs smooth, slightly forward. Treble response depends on reflection from wall behind speakers, judged to be quite soft under typical conditions (with plaster wall). Softness reduces surface noise and tracking distortion as well as detail and focus. Over-all sound an unusual combination of intimacy and veiling. Markedly less transparent than KLH Nine.

Mid-range efficiency substantially higher than typical acoustical-suspension system, but built-in bass equalization demands a high-powered amplifier for high-volume listening to material containing deep bass.

With adequate power, system will reproduce cleanly at very high listening levels.

The design of this system deserves detailed discussion, which it will get in the next Stereophile.

(Manufacturer's Comment on Page 27)

**Advent 100 and Advocate 101 Dolby B Devices**

Identical in performance, these differ only in features. The 100 has four Dolby boards, for simultaneous record processing and playback deprocessing (for monitoring from a three-head recorder), and includes mike inputs and mike/line mixing facilities. The 101 has only one pair of Dolby boards, for record processing or playback deprocessing, and has line inputs only.

Both units provide an effective 10-dB increase in the signal/noise ratio of virtually any tape recorder, although the improvement is most dramatic with narrow-track recorders operating at slow speeds.
Over-all frequency response (with our test samples) was not changed by more than $\frac{1}{2}$ dB, and the change was completely inaudible, as was the action of the Dolby circuits. In other words, the only audible effect of either device was noise reduction, which is as it should be.

Despite the manufacturer's recommendation, we strongly advise using input matching transformers with the Model 100 when recording "live" with most low-impedance mikes, in order to avoid substantial amounts of hum interference.

Full reports on both of these units will appear in the next issue.

Audio Research SP-2C Preamp and Dual-50D Power Amp

Unquestionably the finest-sounding preamplifier we have tested to date, this is the next best thing to the ideal "straight wire with gain." Sound is extremely lucid and detailed, but without a trace of the hardness or graininess that characterizes most other preamps. Control and switching facilities less versatile than on some competitively-priced preamps. Phono equalization accurate to within 1/2 dB.

Sonically, the power amplifier is in the same class, and is the best thing we've found for driving electrostatic speakers. Relatively low damping factor may cause some low-end heaviness and looseness with some dynamic speakers.

Both are very high-priced ($550 and $495 respectively) and, would you believe, both are all-tubed components. That is, no solid state.

Few dealers carry the line, but you can contact the manufacturer directly at Audio Research Corp., 2843 Twenty-Sixth Ave. South, Minneapolis, Minn. 55406.

Full reports on both of these are scheduled for the next issue.

(No Manufacturer's Comment)
Recommended Components

These are listings of components which we feel to be the best available in each of four quality categories, based upon all the information available to us at the time of publication.

Components are selected for listing on the basis of our own tests as well as reports in other magazines and from users.

Component evaluations which lead to inclusion in or exclusion from this list are biased to an extent by our feeling that things added to reproduced sound -- flutter, distortion, various forms of coloration -- are of more concern to the musically-oriented listener than things subtracted from the sound, such as a certain amount of deep-bass or extreme-treble range. On the other hand, components which are markedly deficient in one or more respects are down-rated according to the extent to which we feel their deficiencies interfere with the full realization of the program material that is likely to be fed to them.

Some of the items listed hereunder are officially discontinued models. They are listed because they are still excellent components and frequently available used at substantial reductions in price.

Component categories are as follows:

Class A: Price-no-object, best possible sound. Class B: Sound comparable to that of Class A, but lower in cost and generally lacking some of their refinements. Loudspeakers listed in this category span a wide price range and offer a wide selection of "flavors." Class C: Somewhat lower-fi sound but far better than average home hi-fi. Class D: Good, musical sound but significantly less fidelity than the best available.

The order in which components are listed within each category has nothing whatsoever to do with the relative quality of items in that category.

Components which are judged to rank near the bottom of one category and the top of a lower category are listed in both groups.

Some component categories show no listing in the D group. This is because we have yet to find one that is that much better than its competition in all (or even most) respects to warrant singling out.

The following changes have been made in the listings since the last issue:

- Audio Research SP-2 preamp superseded by superior SP-2C in Group A.
- Rabco ST-4 record player added to Group B.
- Soundcraftsman 20-12 multi-band equalizer added to Group A (Misc. Devices).
- Crown DC-300 power amplifier dropped from Group A to B because of many reports of variability.
- Infinity 2000A speaker system added to Group B.
- Advent 101 Dolby B device dropped to Group C because of excessive noise and impaired frequency response when used with some microphones.
- Advent Frequency Balance Control dropped to Group C because of reader complaints about noise in many samples.
- Discontinued Advent 200 cassette recorder superseded in Group C by Advent 201.
- Audio Research Dual-50B power amplifier superseded in Group A by Dual-50D.
- Koss PRO-4a headphones superseded by PRO-4aa in Group B.

Tone Arms
(A) Rabco SL-8E, Decca International (US import version)
(B) Shure/SME 3009
(C) ADC

Turntables
(A) Thorens TD-125, Sony TTS-3000
(B) Thorens TD-124-II, TD-150, Rabco ST-4 player
(C) Dual 1019 changer, Acoustic Research TA or XA player
(D) Bogen B-52 player

Pickups
(A) Stanton 681A (2), Decca 4RC (1)
(B) Stanton 681EE (2), Decca Mark II (2,3,4)
(C) Goldring G-800

Tape Recorders
(A) Revox A-77-II
(B) Tandberg 6000X
(C) Sony 352D, Sony 155 (playback only), Advent 201 cassette deck w/ Crolyn tape
(D) Sony 250A, Harman-Kardon CAD-5 cassette deck

Microphones
(A) Sony C-37FET, Neumann U-67
(B) B&O 100, Sony C-22FET, PML DC-20/21
(C) B&O 53

Tuners
(A) Marantz 10B
(B) McIntosh MR-71 (MI-3 'scope optional), Heath AJ-15
(C) Dynaco FM-3
(D) EICO 3200, Heath AJ-14

Preamps
(A) Audio Research SP-2C, Infinity
(B) Citation 11
(C) Sony TA-2000, Dynaco PAT-4
(D) Dynaco PAS-3x

Amplifiers
(A) Audio Research Dual-50D, SAE Mark IIIA
(B) Crown DC-300, Quad 303, Citation 12
(C) Dynaco Stereo 120, Stereo 80, SCA-80 (5)
(D) Dynaco Stereo 70

Receiver
(B) Heath AR-15 (May be superseded by new model)

Headphones
(A) Koss E-9, Stax SR-3
(B) Koss PRO-4aa, Beyer DT-48S w/ round cushions
(C) Sharpe Mk II, Beyer DT-480
(D) Beyer DT-90

Speaker Systems
(A) Two KLH Nines (4 panels), Infinity SS-I, Hartley Concertmaster
(B) Advent (No model number), Jan-szen Z-600, Quad ESL (6), Hartley 220MS/Holton, KLH Nine (two panels), Infinity 2000A
(C) Dynaco A-25, Advent
(D) Acoustic Research AR-4x, ADC 404

Miscellaneous Devices
(A) Soundcraftsmen 20-12 multi-band equalizer
(B) Advent 101 Dolby device
(C) Advent 100 Dolby device
(D) Century General "Mini-Gen" oscillator

Footnotes: (1) Incompatible with Thorens TD-150 and early TD-125 'tables. (2) Incompatible with Decca International arm. (3) Incompatible with AR and Bogen arms. (4) Usable only in SAE arm, with suitable adapter. (5) Integrated preamp/amplifier. (6) Use with Quad 303 amplifier.
Readers' questions that are felt to be of general interest are answered in this department. We cannot undertake to provide detailed replies to individuals, but we can and will answer to the best of our ability questions from individuals that are (1) answerable in a few brief words, like yes or no, and (2) are accompanied by a self-addressed return envelope.

Bias Confusion

After having read everything I could lay my hands on on the subject, I am now utterly confused about this whole business of bias compensation. I've measured the amount of side thrust applied by about five different tone arms when set for the manufacturer's recommended bias force, and all five were different. I tried using the anti-skate band on Shure's "Trackability" test record, and my pickup started skipping grooves outward, so my suspicions about that test were confirmed by something else I read that said bias adjustments had to be made with the stylus in a groove rather than on a blank disc.

Can you shed some light on the subject. My SME arm has a bias adjustment, and I would like to be able to set it and forget about it.

Paul Ryder
Kenosha, Wi.

We have given up trying to dope out all the conflicting recommendations for setting bias compensation, and suggest that it be done empirically, as follows.

First, make sure the tone arm is set up for precisely correct tangency at a point about 2½ inches from the platter spindle, and adjust the tracking force to about 3/4 of the recommended maximum for your pickup. Set the preamp for Stereo Phono, and play the inner grooves of a hard-to-track monophonic disc at moderate but not high level.

Determine which channel is putting out the most distortion, and adjust the bias compensation until both channels are equally distorted. If distortion disappears entirely in both channels, try to find another mono disc that does distort, and repeat the adjustment for equal distortion in both channels. Finally, try some heavily-cut stereo discs. If none of these distort, reduce the stylus force about 1/4 gram at a time until some distortion occurs, readjust the bias compensation until distortion is equal in both channels, then raise the tracking force by 1/4 gram and leave it there.

If some discs continue to distort through both channels, raise the tracking force by 1/4-gram increments until all discs sound clean or until you reach the pickup's maximum recommended force, whichever occurs first. If distortion is still unequal, readjust the bias compensation.

If it is not possible to eliminate all distortion from a majority of discs, even at the maximum safe tracking force, the pickup or tone arm may be defective or just plain inadequate, you may have excessive electronic distortion in the system, or your tweeters may be peaky.

Disappearing Rumble

I have heard that there were elements of magic involved in high
fidelity, but I think I have one "for the book." I have a case of disappearing rumble.

My Thorens TD-124 has always been rather rumbly, but I have managed to put up with it because it has never been loud enough to bother me all that much, except when I listen at high levels, which I can rarely do in my apartment building. Late last year, though, I bought a used Ampex F-44 tape recorder, and took to taping some of my frequently-played discs.

As might be expected, the slight low-end rise in the F-44 made the rumble somewhat worse, until one time I did some taping late at night and had the system's playback volume set very low while I was taping. Subsequently, I re-listened to those tapes at the usual moderate listening level, and was dumbfounded to note that there was practically no rumble at all from them. All the musical bass was still there. It was just the rumble that had diminished almost to the vanishing point.

Subsequent experiments showed that the taped rumble is indeed related to the volume at which I listen to the loudspeakers while I am making the tape. At very high listening volume, the taped rumble becomes almost as loud as the program material. When I listen at very low levels while taping, the rumble seems to disappear.

This makes no sense at all. My ears tell me that the tape is not losing bass -- in fact, it is obviously boosting bass slightly. But what is happening to the rumble? Do I have a poltergeist in the apartment?

Henry Pollack
Phoenix, Ariz.

Poltergeists, no; feedback, yes.

Acoustic feedback, like electrical resonance, is a condition whereby signal energy is stored up at some point in the circuit, instead of dissipating itself the instant that the input signal is removed. If the stored energy is not able to dissipate itself as rapidly as it is being stored, it builds up in intensity until it drives the system to its maximum capability; the system goes into sustained oscillation.

If however the energy that is being stored dissipates itself just a little more rapidly than it is building up, we get a condition of damped oscillation, where the system will tend to oscillate but will not be self-sustaining. In this state, the momentarily-stored energy will manifest itself as a mild resonance at some frequency, and the result will be a clumping of energy drawn from any source of vibration at or near the resonant frequency.

Every turntable has a certain irreducible amount of rumble, but with most good 'tables, this is normally low enough to be totally inaudible at all but very high volume. But if acoustic feedback is causing a condition of damped oscillation, the resulting resonance can exaggerate the turntable's rumble out of all proportion to its actual intensity. This is evidently what is happening with your TD-124, and is also, incidentally, why some other turntables -- notably the AR unit -- seem so dramatically rumble-free by comparison. The AR has less tendency to cause acoustic feedback problems than any other 'table we know of, so feedback-augmentation of 'table vibrations does not occur to anywheres near the extent that it does with, say, the Thorens TD-series turntables.

By now, you can probably guess why some of your taped discs were rumble-free. At your "normal" listening level, the feedback is apparently not quite strong enough to cause the kind of energy buildup that culminates in an overpowering roar of feedback, but is enough to cause a damped resonance in the system, which raises rumble to the point of audibility. At higher levels, as you pointed out, the
rumble is further exaggerated, and if your neighbors would allow you to open your system up, you might have found out for yourself that a further increase in level would cause self-sustaining feedback.

At very low listening levels, though, there is not enough transfer of feedback energy from the speakers to the turntable to cause perceptible feedback, so the rumble falls to the level that is "normal" for that turntable, which is below audibility in most instances.

Since the feedback, when it occurs, goes in a vicious circle through the whole system (including the "gap" from the speaker back to the input), the exaggerated rumble signal will be present at that point in the circuit where you connect your tape recorder, so the tape will record the enhanced rumble along with the desired material. And if the rumble is not being exaggerated, the tape will then record it at its "normal" level.

When playing the tape, however, the acoustic feedback can't occur, because the tape head doesn't respond to mechanical vibrations of that magnitude. Consequently, the tapes with the "normal" amount of rumble on them will not be subject to rumble exaggeration, and will be quiet, almost regardless of how loudly you play them.

There is an easy way of telling whether any case of excessive turntable rumble is the fault of the turntable or is stemming from marginal acoustic feedback. Set the volume control to its usual position, place the pickup on a stationary disc, and gently tap the panel that the arm is mounted on with your fingertip. Each tap should elicit a very sharp thud. If there is any hint of a boom, or any impression that the thud is not ceasing abruptly, some feedback is occurring. If still in doubt, advance the volume control some more and try again. If it is pos-
sible to get booms instead of thuds at any volume-control setting that you could conceivably use for listening (practically any system will feed back if you give it enough gain), it is more than likely that marginal feedback is exaggerating your turntable rumble.

The question then becomes: what to do about it? In some instances, the use of a damped tone arm will be enough to hold the feedback well below the troublesome level. In most instances, though, it is necessary to interrupt or modify the vibration path between the loudspeakers and the turntable. The best way to go about this will depend on the nature of the feedback path.

Loudspeaker vibrations can reach the turntable either through the floor of the listening room or directly through the air. As a quick and easy check, repeat the previous feedback test (with the tapping finger) while pressing the tone arm mounting panel firmly downward, to bottom the spring suspension and thus eliminate the acoustic isolation. If the feedback increases, it is floor-borne; if it decreases, it is airborne.

In the case of floorborne feedback, corrective measures might include placing foam-plastic pads under the loudspeakers, the turntable base, or both, and replacing the 'table-suspension springs with ones that are slightly less stiff than the originals. The foam plastic pads should be 1½ to 2 inches thick (uncompressed), and should be completely sandwiched between the speaker or turntable they are supporting and the underlying surface. Thus, if the turntable has little rubber feet under it, there should be a sheet of Masonite or thin plywood between the feet and the foam plastic, to distribute the 'table's weight over the entire surface of the plastic pad, and to allow for ventilation under the bottom of the 'table base.
A further reduction in floor-borne feedback can often be effected by simply moving the phono unit to another part of the room, where the natural frequency of the vibrating path is different enough to avoid the system's critical feedback frequency.

If the feedback happens to be airborne, which is usually the case with Thorens TD-series turntables, additional vibration isolation won't help. It will, in fact, make matters worse. Here, the answer is to eliminate any suspension springs and attempt to fasten the entire turntable assembly as firmly as possible to its base. This will tend to add the mass of the base to that of the turntable assembly, thus dropping the natural resonance to a lower frequency where the 'table assembly will be less efficient in responding to air vibrations.

To do this, remove the 'table's isolating springs and replace them with blocks of wood, to maintain the original height of the motor board, then place large flat washers and suitable nuts on the screws that originally passed through the springs, and tighten these to draw the 'table firmly against the mounting board. If necessary, put some small shims under the outrider panel (that mounts the arm) to make sure this is pressed firmly against the surface beneath it.

There is of course an obvious risk in abolishing a turntable's vibration isolation: It will become much more sensitive to floorborne vibrations, and may groove-skip when you walk across the floor, if it doesn't start to feed back at a lower frequency due to floorborne speaker vibrations. If either happens, a foam-plastic pad (with supporting panel) under the whole 'table assembly may clear up the problem without regaining the original one. Otherwise, you will have to resort to more drastic measures.

One approach which has worked in many instances, but takes rather a bit of time and money, involves fastening the turntable assembly to a sub-panel of 1/8-inch-thick aluminum with a liberal coating of automobile undercoating mastic on its underside. The aluminum must be cut out to the same shape as the wooden panel that would normally support the 'table on its standard wooden base, and the 'table's usual isolating springs are used to suspend it and its aluminum sub-panel. Replacing these springs with more flexible (i.e., less stiff) ones will often be beneficial if the unit shows floor-vibration proclivities.

Really extreme cases of acoustic feedback, where the rumble builds up to a shattering roar or room-shaking shudder at listening levels only slightly higher than normal, usually indicate a component malfunction of some kind. A power amplifier that is marginally unstable at low frequencies can cause this, as can a speaker with a pronounced low-end resonance or an arm and cartridge that tend to resonate at the same frequency as the speakers or the turntable assembly. In this case, simply eliminating the cause of the resonance, or changing its frequency, will often be enough to cure the feedback. Using a lighter tone arm or a cartridge with a different compliance may be the answer, and occasionally all that will be necessary will be the addition of a few grams of weight to the pick-up shell and rebalancing of the arm.
to restore the original tracking force. Unfortunately, acoustic feedback is nearly always a factor to some degree in high-volume disc listening, but it is generally possible to reduce the tendency to the point where it doesn't interfere with the fidelity of the sound.

Why Tone Arm?

Maybe you can't answer this, but then maybe you can. Why are tone arms called tone arms?

Damon Hill
Smyrna, Ga.

We don't know exactly why the term originated, but we do know that it was first applied to the arms of acoustical phonographs, which were actually the narrow end of an amplifying horn. As part of the acoustical system, the arm influenced the ultimate sound quality or "tone" of the reproducer, which is probably why it was called a "tone arm."

Displaced Signal

I recently purchased a fairly good system from your recommended list, but I think I may have some problem with it. With the balance control set at the center, the sound is noticeably displaced to the left. In order to center it, I have to run the balance control almost all the way to one extreme of rotation.

Evidently, something in the system has a lot less gain in one channel than the other, but what could it be. Any suggestions?

Anton Pierce
Denver, Colo.

It could be anything, but a few simple checks will allow you to locate the source of the imbalance.

Set your Mode switch to full blend (MONO A+B), play a monophonic disc, and adjust for proper stereo balance. Then flip the Mode switch to Stereo. If the serious imbalance appears then, the pickup outputs are not equal, and there's your culprit.

Next, interchange the loudspeaker connections, left for right (with the system shut off), and recheck balance. If it has changed significantly, the amp or preamp is the trouble-maker.

If the electronics are exonerated, restore the original speaker connections but interchange the speakers themselves, right for left. If the balance changes now, the speakers aren't matched, and adjustment of tweeter level controls should remedy matters. If the balance is still correct, with the balance control 'way over to one side, the problem is acoustical, and one speaker is simply delivering more mid-range or treble to your seating location than the other. This is frequently the case when one side wall of the listening room is acoustically absorptive and the other is reflective.

Class B Speakers
(from page 19)

KLH Nine A liquidly transparent "window" on the sound, this is potentially one of the most accurate reproducers available when used in a four-panel array (two per side). Two panels are more difficult to place in most rooms for optimum frequency response and stereo imaging. With panels separated, for adequate stereo spread, bass rolls off rapidly below 60 to 70 Hz. With suitable room placement and good program material, sound is rich, rather "polite," somewhat distant (Row M), lacking in deep bass, but exceedingly tight and detailed through useful bass range. Treble highly directional, should be aimed to sides of listening area. Stereo imaging good, but listening area somewhat restricted. Very spacious "ambience," like Quad ESL, due to reflections from rear
wall of room. Requires extremely stable, low-distortion amplifier. Rather inefficient and limited in maximum-output capability. Not recommended for high-level listening.


Manufacturers' Comments On Equipment Reports In This Issue

SAE Mark I Preamp
We have indeed made a number of changes in the Mark I since it went into production, and many of the changes effected a distinct improvement in the unit's sound. We feel the current-production Mark I's are sonically equal to or better than any preamp available, and the precision of performance obtainable through the use of switched functions surpasses that of any other preamplifier we know of.

Harman-Kardon CAD-5 Deck
Over nine months ago, we set up more stringent test procedures for setting the CAD-5's adjustments. This means an extra hour of production time, but the machines are now much closer to ideal adjustment than before. We are now adjusting for low-noise tape in the "Standard" operating mode. Previous machines were adjusted for conventional iron-oxide tape.

Bose 901 Speaker
We suggest that Stereophile's readers audition the 901 and decide for themselves whether they agree with Mr. Holt or with the more than 15 other reviewers all over the world who were highly enthusiastic about the system.

Audio Research Amp and Preamp
The output regulation of the Dual 150 from 16 ohms load to open circuit is approximately 1/2 dB at 30 Hz. It will also handle single tone bursts at 30 Hz at rated power without waveform deformation. These components are not entirely tube-type. There are 11 semiconductors in the Dual 50 and 39 in the SP-2C, all of which are used for power supply regulation and isolation. Vacuum tubes are however exclusively used for signal amplification.

Profiler Discs
On page 21 of the Winter issue, you mentioned a list in *Hi-Fi News* of discs that contain low end down to "as low as 26 Hz." What page of that issue was that list on?

J. Ross Robinson
Windsor, Ontario
Canada

It was on page 869 of the June 1970 issue. (For readers who haven't heard of the magazine, *Hi-Fi News* is published from Link House, Dingwall Ave., Croydon CR9 2TA, England, and we recommend it highly.)

Outdated Reports
Although I much appreciate your efforts on behalf of the hi-fi hobbyist, I find that the Stereophile offers very little assistance in the selection of audio gear. The audio perfectionist does not want to settle for last year's best unless this year's best is not as good. The Stereophile does not report on this year's best; only on
last year's best. Yes, I enjoy reading about equipment that has been on the market for a year or so, but when I buy new equipment I want to be able to make a sensible choice from what is available now. And it takes you a year to get around to reporting on it. Is that the best you can do?

J. D. Griggs
Manhattan Beach, Ca.

We have found that it is pointless to test most components within the first several months of their release on the market. Every shortcoming we find is greeted by the manufacturer with "Oh yes, of course, but that was just in our early models. Current production is much better." Which then leaves us the choice of publishing a report on something that is no longer available, or of doing a retest on a current model. We prefer to wait until the later model comes out, and do our first report on that.

Obviously, the buyer who can't bring himself to wait until a new product has been de-bugged before buying it runs the same risk of getting stuck with a sample that is not only a lemon but is also going to be obsolete three months later. The latest is not always the best, for this reason if for no other. If you can't wait for our report on something new, go ahead and buy it. But don't expect the manufacturer to notify you and volunteer to modify your purchase if he improves it in later production. A very few manufacturers will, but the vast majority won't.

Ad Quotes

Even though you don't accept commercial advertisements, aren't you (or shouldn't you be) concerned about being quoted in ads? Consumer Reports doesn't allow it, and for good reason I think.

Charles Lindeman
New Brunswick, N. J.

We disagree with Consumer's Union about this. When a manufacturer makes an excellent product, we think he deserves to sell enough of them to make it worth his while manufacturing it. If quoting from our report helps him to do this, then we're pleased to let him do it. We do not allow quoting without our permission, though, and try to prevent publication of quotes that misrepresent what we reported.

We also require that manufacturers quoting from our reports footnote the quote with Stereophile's address, to help compensate for the embarrassed silence which the other hi-fi publications have maintained about our existence. Thus, the quotes also help to ensure our perpetuation.

Sand-In-Mouth

Poor J. Gordon. Dr. Bose won't cough up a complimentary 901. It appears that independent son-of-a-gun doesn't need a J. Gordon review. Well, two can play that game! What's that, J. Gordon? Oh, you can't reply. You say it's hard to talk with your mouth full of sand. Independence, yes -- but at whose expense?

William Y. Clark III
N. Linthicum, Md.

Better sand than my foot! Dr. Bose promised some time ago that he would loan us a 901, and it arrived here several days ago. (See Page 18)

It was Paul Klipsch, not Amar Bose, who politely but firmly declined our offer to test a pair of his speaker systems.

Unrecommend Components

Your "Recommended Components" list is an admirable feature, but what does it really mean to the reader? If a component is not listed, it could mean either:

(1) It was tested, reported in a now unavailable back issue, and did not come up to snuff. Or,

(2) It was only heard casually, but was confidently disliked. Or,
(3) It was pretty good, it was listed for a while, but it has been superseded by a later model. Or,
(4) It is not bad, but we don't have a category for it. Or,
(5) The manufacturer has not sent us one yet. Or,
(6) The manufacturer does not like us and is not going to send one. Or,
(7) We don't know anything about the component. Or,
(8) We have tested some of that manufacturer's products and are not interested in testing any more of them.

A simple listing of all items tested to date would help, but not enough. Why not also a list of items you decided not to test on the basis of a short listen (in a store, for instance)? And a list of items that you've heard nice things about but won't be testing yourself for various reasons? And a list of ones you've never auditioned but have heard nasty things about? It wouldn't be necessary to put all of these lists in every issue, but why not one list per issue for a while?

Charles E. Novitski
Pasadena, Ca.

If we were listing people we had found to have 20/20 vision, would you expect us to list, in any way, all the people whose vision we have never tested?

The best we can do with the "Recommended Components" department is list those components we have found to be as good as or better than any others that we know of. There could well be others that are better for the same amount of money or are as good for less money, but if we don't know of them it is obvious that we can't list them.

There is one thing to consider, though. The Stereophile, and its very high standards for judging components, are known by most equipment manufacturers, so those who honestly feel their components are better than most of the competition are usually eager to have us test and report on their products, and submit them to us even when we don't solicit them. So although there are exceptions to the rule, it is generally true that we do get to test and to compare most of the products that audio perfectionists are curious about. The ones that don't make the "Recommended Components" list will appear on our listing of components that were tested, which will appear in the upcoming issue.

Miscellany

Dolbyed Cassettes

A recent press release from Dolby Labs listed all the companies that were currently releasing pre-Dolbyed cassettes. All the old familiar names were there, with but a couple of outstanding exceptions. Deutsche Grammophone was missing from the list, as was RCA. Come on, fellas, are your cassettes all that quiet? Or are there some corporate heads under the sand?

Speaking of Dolbyed cassettes, our award for Firstest-With-the-Mostest goes to Vox, who were first under the wire with two Dolbyed cassettes, both of which set quality standards that other cassette manufacturers are only just starting to equal now.

Maintenance Cassette

Anyone owning a cassette recorder should take note of the latest device from Ampex: a combination head cleaner and degausser that needs no outside power source.

Degaussing must be done with a gradually diminishing alternating field, usually from the AC line or an oscillator via an external DC supply. Ampex uses a wheel-shaped permanent magnet driven by the cleaning tape. At the start of the tape, the wheel lies close to the head, and its rotations scan the head with alternate north- and south-pole magnetic fields, while the winding tape lifts it progressively farther from
the head until the scanning fields, and the head's magnetism, have dropped to zero. It's simple, and it works. Price is $4.95.

Advent 200 Phased Out

The Advent 200 cassette recorder, many samples of which had some rather serious mechanical problems, has evidently been superseded by the new Model 201, which looks like (and sounds like) a substantially better unit. A detailed report on the 201 will appear in a future issue, probably the issue after the next.

Short Cables

The relatively cool operation of solid-state preamps and tuners will often allow these to be "stacked" one above the other in a typical installation (the coolest should be at the bottom). This intimate relationship does however raise the question of what to do with the extra 2 feet or so of the 3-foot cables normally supplied with these components.

In an adequately high cabinet, you can simply let the excess hang down at the rear, but this is not an attractive solution when the equipment is on open shelves. In this case, there are two alternatives: Winding the excess cable into a compact loop or bundle, or using cables that are short enough to span the necessary distance without leaving much excess.

New equipment is invariably supplied with its AC cable bundled, and it is easy to unwind from this just the amount that is needed to reach the appropriate outlet on the preamp. You can also use this AC-cord bundle as a model for doing the same thing with your output cables. Or, you may be able to find some of those little plastic wire shorteners at the dime store.

The neatest solution, though, is short cables. If you can use a soldering iron, you can make these up yourself for about 50 cents apiece. If you're not, you can buy pre-wired 12-inch shielded cables from Dynaco for $1.25 each. These have right-angle plugs on them, so they can be rotated in their receptacles so that any slight excess length is neatly looped out to the side where it won't be visible over the top of the upper chassis.

Audio Research Speaker

Audio Research Corporation, which set a few new standards with their 50D power amp and SP-2C preamp, is preparing to unveil a new variety of loudspeaker system, perhaps by the end of October. Described as a "magnetic system that behaves like an electrostatic," the Audio Research speaker uses large-area ultra-lightweight Mylar sheets as radiators, and the working principle is supposed to be more like that of a ribbon system than anything else. People who have heard it were extremely enthusiastic, reporting that it sounded as if there were simply no loudspeaker there at all.

Audio Research president Bill Johnson's previous standard of comparison was a four-panel KLH Nine setup, which we have long felt to be one of the best reproducing systems available. Mr. Johnson now says he can no longer enjoy listening to the Nines. Could his new speakers be all that good? We'll wait and see.

Incompatible Pair

Several users have reported what appears to be a serious problem of incompatibility. The Citation 12 power amplifier has a tendency to emit a slight subsonic pulse during the initial turn-on period when its output capacitors are being charged. The Marantz 7T preamp evidently does the same thing, in the same manner. Neither is serious by itself, but a combination of the two has been known to burn out loudspeaker voice coils. This is a marriage we would not recommend.

Death of a Preamp

We were sorry to hear that Infinity Systems, Inc. has decided to
ditch their preamplifier unit be-
cause "it was costing too much to
build."

Originally priced at a bit over
$500, its final $650 price tag still
wasn't enough to cover rising pro-
duction costs, and the 10% surcharge
on imported items (many of the
preamp's parts were imported) was
the straw that did the trick.

A pity! Indications were that it
was the best solid-state preamp
available at any price. Oh, well....

Transparency Test

Researchers at the DuPont company
claim to have come up with an objec-
tive measurement that correlates
with the subjective quality of
transparency in tape reproduction.

The measurement involves re-
cording a single tone on the tape,
then playing back with the tone
filtered out and measuring the energy
appearing within a narrow band of
frequencies on both sides of where
the original had been. The measuring
band is narrow enough to exclude the
sum-and-difference tones, and thus
covers only those caused by "scrape
flutter."

DuPont's interest in transparency
was prompted by observations (some
in Stereophile) that Crolyn cassettes
sound more transparent than others.

Coming Up

In the next issue: Reports on the
Bose 901, Infinity 2000A, KLH 33 and
Dyna A-50 speakers, the Elektra Amp-
idayne Research loudspeaker equal-
izer, the Advent 100 and Advocate 101
Dolby units, the Koss E-9, Stanton
570 and Stax SR-3 electrostatic
headphones, and the Citation 11
preamp and Citation 12 power amp.

Other items on hand for testing
include the Audio Research 50D power
amp and SP-2C preamp, the IMF Studio
speakers, the Dyna SCA-80 integrated
amplifier, the Advent 201 cassette
recorder, the Sound Craftsmen octave
equalizer, the Ampex ASR 100 receiver
and three moderately-priced Beyer
headphones.

Go the Disc Route

Building a music library? Our ad-
vice is to buy discs rather than
tapes. No disc has been rendered ob-
solate since 1948. Every tape medium
has been obsoleted to date, and tape
has never caught up with discs for
potential sound quality. Nuff said?
Time Up?
If your address label (on back of this issue) bears the number code 2-69 or 3-1, your subscription expires with this issue. We will have our belated Autumn issue out sooner than you have reason to think, and we don't overprint substantially, so get your renewal off to us soon to ensure getting your next issue.

Record Reviews
Early pre-recorded cassettes were so shockingly variable that reviews of their sound would have served no purpose. Some later ones are remarkably good, though, and will be reviewed in the next issue.

From the Top of the Pile
Some recordings that we have found to combine excellent performances and superb recordings.


Elgar Pomp & Circumstance 1 to 5; Bliss Things to Come; Welcome the Queen. London Symph., Bliss. London STS-15112


Schubert Symphony No. 4 ("Tragic") & Symphony No. 5. Kertesz, Vienna Philharmonic. London disc CS-6682 or Ampex Dolby B cassette M-10242

Ravel Daphnis & Chloe (2nd Suite); Mother Goose Suite; La Valse. Mehta, Los Angeles Philharmonic. London disc 6698 or Ampex Dolby B cassette M-10239

Ruggles Sun Treader; Ives Three Places in New England. Boston Symph., Thomas. DGG 2530048

Most of the recordings listed above are available from stock from: Stereophile Record Service, 1121 Lancaster Ave., Rosemont, Pa. 19010. All current discs guaranteed factory-fresh, others as described. Write for details.
Audio Mart

We regret that, in view of its recent growth to staggering proportions, we must start charging a modest rate for Audio Mart listings.

Ads already received, but too late to make this issue, will be run free of charge in the next issue. All others received in future must be accompanied by a remittance calculated on the basis of 10¢ per word for private individuals or 20¢ per word for dealer ads. Discounts are available for 4-time insertions in consecutive issues.

FOR SALE

Bozak spkr syst consisting B-199 woofer & two B-200Y tweeters, xover, in natrl birch 3/4-in. ply cabnt, 36 by 24 by 18 in., heavily braced & damped. (Cabinet needs refinishing.) $100 as-is or for 3 spkrs only plus shippg, or trade 2 AR-4a's. J. Thomas Beck, 4110 E. St. Joseph Way, Phoenix, Ar. 85018.

MacIntosh C-20 prmp, immac condtn, just checked by Mac as perfect, $160 wth case; Marantz model 7, exc condtn, $170. Dyna FM-3 as new, $65. Bill Hagra, 425 E. Balboa Dr., Tempe, Ariz. 85261.

Thorens TD-124-I t'btl w/ base, xtra arm-stg board, Empire 98 arm std, $35; Empire 980 arm w/ stg board for above t'btl, $15; Dyna FM-3 tnr w/ wood case, 1 yr old, factory aligned, $70. Stanley Nelson, 180 Island Ave., East Moline, Ill. 61244 (309) 755-1938.

Marantz 18 recvr in oild whit case, $600; pr AR-3a's, sold oild, $360; Koss ESP-6 electatr spkrs, $65. All exc condtn, shippd in faccts cartons, postage pp'd. Scott J. Kirby, 4101 E. Wyoming Circle, Loring AFP, Mo. 04790.

TEAC A-6010U, 6 mo., in facy shippng carton, best offer. C. L. Mosely, 4532 Swann Ave., Tampa, Fl. 33609.

Sell or will consider attractive trades on: SAB W-1 prmp, Phase-Linear amp, Marantz 20B trnr, Bose 901 syst, AR2AX syst, Sansui 8 recvr. Dual 1219 w/ base & cover, Shure V-15-II-Imp, Sony 850-4 deck, Advent 100 Dolby, Koess PRO-4a phones, Koss ESP-9 phones, Bose spkr switch. All new, sell to highest bidder, or swap for what have you? C. A. Adams, 417 Dogwood La., Tuscaloosa, Ala. 35401.

Color TV, professnl boast components: Setchell-Carlson 9MC903A monitor, orig cost $795; Conrac AV12E/20213 recvr, orig cost $400. Pr-top quality color TV receptr or, w/any videotape recdr or camera, for record/play or surveillance. Mint condtn, used 100 hrs. Best cash offer. Bob Myers, 1522 Owassa, Ft. Worth, Tx. 76107.

Marantz 22 recvr, new in unopnd carton, $369; Marantz 15 prwr amp, exc condtn, 8 mo use, $315; Kenwood KR-7070, new in unopnd carton, $549; Revco A-77 w/ wood cabnt, exc condtn, 100 hrs use, $459. Will prepay shippg. Dr. W. S. Owens, 1326 Vista Rd., Eilbunenses, Wa. 98906 (509) 925-3323.

For Dyna Stereo 120's, $125 each; pr Dyna PAT-4 prmps, $75 each; pr Scott LS-112B FM tnrns, $125 each; pr Knight 615MC 15" spkrs (same as EV-15TRX) in base-reflx cabnts, $60 each; pr EV SP122 spkrs in-E V Marquis cabnts, $60 each; pr E-V X-36 xovers, $5 each; new, factory warranty Scott 299F amp, $125; new, factory warranty Sony 560 reversg tape deck, $225; new, factory warranty Sony TC-125 cassette deck, $85. John W. Schuerman, 123 N. 34th St., Apt 148, Richmond, Ind. 47374 (317) 962-6561 Ext 228 by day, (317) 962-2060 by night.

Pr JansZen Z-600 spkr systs, $120 or best offer. Z. Sharpe, 6 Kings Beach Terr., Swampscott, Ma. 01907 (617) 598-6392.

Crown D-40 prwr amp, $160; Teacord 2000 tape recdr, $275; Citation XII amp, facy wired, $205.50; KLH Sixteen integrad amp in wint case, $175; Sony 1120A integrad amp, $205. All exc condtn. Will prepay shippg. Dr. W. B. Owens, 1308 Vista Rd., Ellensburg, Wa. 98926 (509) 925-3323.

Sell or trade: Stanton 601A pckp, used 3 hr.; JansZen 65 electatr twtra; Rectilinear III spkrs; TEAC HI-Z headphones. All pr perf condtn. Want Shure V-15-II (or improved), stylus condtn unimportant; Stax SR-3 headphons; Advent spkrs, or? N. Aaron, 27D Janet Dr., Foughkeepsie, N. Y. 12063 (914) 452-2732.

AmpeX 602 transport eqppd w/ AmpeX 1/4-tr heads. Ush less than 10 hrs. As-new condtn; $300. Citation B prwr amp, exc condtn, $170. Robert J. Farroch, P. O. Box 5732, Arlington, Tx. 76011.


Dyna Stereo 70, $60; Dyna PAT-4 and Stereo 120, 1 yr old, $200; Del Minard, 424 4th Ave., Baraboo, Wi. 53913 (608) 356-6567.

Heath audio analyzer, $45; audio signal generatr, $35; electronic xover, $12. All good condtn. W. B. DeMond, 3240 N.E. 131st Ave., Portland, Or. 97230.

33
Pair Klipschorn woofer sects, wlt, brand new, $600 for pair. Two each of: JBL 375 w/ 537-509 horn lens, $595; Ortofon SL-157 $29; Ortofon SL-157 $159; Acoustical Will car (warranty) $159; Sony 560-D tape recdr (auto reverse) $159. Some new w/ warranty card, all others as-new. R. E. Harding, 1312 Sunset Cyn Dr., Albuquerque, N. M. 87104

Marantz 10B tnr, McIntosh C-22 prep, McIntosh 250 amp, all as new. Best offers. R. N. O'Neill, 776 Detroit, Denver, Co. 80206

Special prices on fancy seconds: eccentric discs, 5/8-inch-wide extra-play Mylar tape, cracked & broken tubes (collector's items), precision 0-ohm resistors (± 1/2%), 2-color (yellow, magenta) Super-8 movie film, other goodies. Don't write for list, we can't sell through the mail. Schlock's Flea Market, c/o Stereophile.

KLH 41 recdr w/ built-in Dolby B, set up for 3-M 203 tape, $285; Robox 4404 deck, $285; Marantz 9amps, $285; Marantz 10B tnr, $285; Bozar B4000 spkr, $285. All perf condtn. FOB Olof Henderson, P.O. Box 167, Hartford City, In. 47348

Mixing console, new, write for info. Decca Mk II & matchg 78-rpm head, both used couple hours, like new. Decca SC48, new & perf. Best offer for each. Jerry M. Hyde, 301 Springdale Ave., Wintersville, Oh. 43952

Used: Dyna Stereo 120 amp, CM Labs prep, $300 for both. New (warranty): Fisher 5000T, $485; Rectilinear spkrs, $485/pr; Crown DC-300 and Phase-Linear pwr amp, $735 each. D. Austin, Box 295, 417 Pine St., Gerson, Ont. Canada

Dyna St 120 amp, exc condtn, $90. Vincent Maggavero, 45-14 51st Rd., Woodside, N. Y., 11377 (212) 446-5918
EICO 3440 color organ $40; KLH Seventeen spa's, 1 yr old, pr for $100; Accord 10 Mk II pckp, base, cover, $75; pr Bosak B-305 speaker sys in custom 15 cu ft enclosures, $600 for both. David L. Gray, 21122 Red Jacket Circle, Huntington Beach, Ca. 92646 (714) 962-0267

WANTED

Eight issues of Stereophile prior to current issue. Ray Marion, 406 St. Thomas La., Cahokia, Ill. 62206

KLH Fourteen speakers, either style, cabot condtn not important but speakers must be in new condtn. Thos J. Norton, 25991 20th St, Apt A, San Bernardino, Ca. 92494

Exc-quality tube amps for driving P.A. systems. Wm H. Wilson, Box 1073, Carbondale, Ill. 62901

Acrosound or Realistic 60 or 120 amp, Stephens P-30, 625H, 214 speakers. Paul S. Montgomery, Box 1016, Church St. Stn., New York, N. Y. 10038. (201) 566-9374

Pair of high-quality capacitor mikes. State type, condtn and price. Burkard J. Schlott, 4471 Mapleton Rd, Lockport, N. Y. 14094

All back issues of Stereophile exc. 4-68, 6-68, 1-68. Willing to pay $1.50 per issue. Louis Balutesoa, 12879 Montfort Dr., Dallas, Tx. 75230

Will consider any A or B-rated components or equiy in exc condtn. Charles E. Novitaki, 110 S. Michigan Ave., Apt 9, Pasadena, Ca. 91106

Stereophiles interested in correspondence exchange on subject of top-quality components for specific requirements. Charles Novitaki, 110 S. Michigan Ave., Apt 9, Pasadena, Ca. 91106

Jazz collector wishes transcriptions, air-shots, unreleased takes, etc. of swing-era material, esp Roy Eldridge, Coleman Hawkins, etc. Intersted in all matrl not genly avail. Willing to trade. Jeff Lowenthal, 2026 N. Kenmore, Chicago, Il. 60614

Want to buy or dup 2-tr stereo pre-recorded tapes of classical matrl. Send offers to Clark Johnson, 30 Eugene Rd., Burlington, Mass. 01803

Wanted dubbing of 1949 78-rpm album (3 10-inch discs) by Alfred Newman entitled something like "Sweetheart Music." Included were "How Green Was My Valley," "None But the Lonely Heart," "Beau Soir," and "Street Scene." Also seeking Billy May recods from early '50's or dubblings of same. Also: Morton Gould's discontinued "Goodnight Sweetheart" album, esp for selecto "I can't Get Started with You." Would be happy to pay, or trade something. Charles Krueger, 1045 N. Hill Ave., Pasadena, Ca. 91104

Wish to hear from Big Band and String Orchestra lovers. Esp want to hear from people who like Dick Jurgens and the Ricky-Tick artists like Teddy Martin, Griff Williams, ad nauseum. Hank Steele, Marcellus, N. Y. 13108

The following persons are interested in exchanging with private collectors copies of their personal recordings:

Nick Panale, 1700 Hillside Ave., Windber, Pa. 15963 (Operas, recitals)

David M. Barnett, 91331 Derbyshire Rd., Richmond, Va. 23229 (Symphonic, stereo)

Mel Madorsky, 23241 Berkshire Rd., Oak Park, Mi. 48237 (Classical, stereo, off-the-air)