the stereophile

Spring (1)

For the High-Fidelity Stereo Perfectionist

Reports on: Thorens TD-125 turntable; Frazier SEE24 environmental equalizer; Advent speaker system; Revox A-77 tape recorder; Mini-Gen audio oscillator.

the stereophile magazine 1-71 (See Page 33) Spring

Contents

On Tape, Records, and the capsule reports on Recommended Components are omitted from this issue.

Staff

J. Gordon Holt...Editor, Publisher, Staff Writer, Chief Tester & Drudge

Mary E. Holt.....Circulation Mgr., Assistant Editor, Spouse & Drudge

The Stereophile is published four times a year by J. Gordon Holt. Circulation and editorial offices at Box 49, Elwyn, Pa. 19063. Published at 900 Sussex Blvd., Broomall, Pa. 19008.

Subscription rates: $5 in U.S.; $6 (U.S. Currency) to Possessions and Canada; $7 to Other Foreign Countries. Printed in the U.S.A.

The Cover

Instruction manuals for solid-state amplifiers warn that, unless adequately ventilated, they may become warm enough to sustain damage. Our cover shows that the damage can also extend to the thing that caused the lack of adequate ventilation.

As We See It...

The Missing Spec.

In the 1952 edition of the "Radiotron Designer's Handbook," long recognized as the "bible" of the industry, the permissible level of IM distortion for a high-fidelity amplifier was given as 3%, with the alternate figure of 2% being cited as a "rather extreme" specification. We wonder what the author of that statement would think of today's solid-state amplifiers with their measured IM of 0.01% and less. And we wonder what he would think about the fact that these super-amplifiers still have audible distortion.

The Radiotron handbook was written during the heyday of the tube, but even in the latter days of that era there were people who maintained that triode output tubes sounded "better" than pentodes (or, rather, than tetrodes). Distortion measurements showed that neither was categorically better than the other, yet the triode-vs-tetrode controversy persisted until solid state laid the whole issue to rest.

It was soon observed, though, that all solid-state components had their own characteristic sound. They were sharp, crisp, and quite brittle-sounding -- fine for reproducing "hard" transients like triangles and xylophones, but not so fine for massed violins, which became annoyingly shrill. By comparison, most tube equipment was rather "sweet" and slightly veiled, which made strings sound fine but took the edge off harder sounds. After the initial infatuation with "solid state" wore off, it became obvious that the "crispness" of transistors was just as much a form of distortion as the softness of tubes, only different. So, subsequent designs aimed at lower and lower distortion

figures until these were in some cases significantly lower than in the best of the tube-type amplifiers. Yet the characteristic difference was still there: Transistors sounded harder, tubes sounded "sweeter." And the astounding thing about it was that the amount of hardness from one solid-state component to another was audibly different when measured distortion figures differed by as little as 0.002%!

The usual IM and harmonic distortion tests do not actually measure an amplifier's distortion, they measure the effects of it -- the modulation of treble by bass, the production of sum-and-difference tones, and the introduction of spurious harmonics. But the fact that such miniscule measured amounts of these effects are nonetheless audible through loudspeakers producing hundreds of times as much distortion as the amplifiers raises the question of whether there might not be a different effect occurring simultaneously, one to which the ear is more sensitive than those that we measure. We don't believe, though, that the answer is quite that abstruse.

When an amplifier is adding harmonics, they are not likely to be equally strong. For example, the strongest harmonic from a single-tube amplifying stage will be the second. The third will be weaker, the fourth weaker still, and higher-order harmonics will be weaker still until they die out. (Push-pull operation cancels most of the second harmonic, making the third one the strongest.) In transistors, however, the distribution of harmonic energy is entirely different. Here, the harmonics are likely to be of fairly equal strength all the way out to and even beyond the 10th. There is little tapering-off in the higher-order harmonics, as in a tube.

A total-harmonic-distortion test (THD) measures mainly the strongest harmonic. Thus, for a tube-type power amplifier (with push-pull outputs), the reading would be a measure of its third-harmonic distortion. The weaker higher-order harmonics would not register at all. On a solid-state power amp, though, the THD reading (which might be numerically identical to that of the tubed amp) may be that of the second, third, fourth or fifth harmonic or that of all the harmonics to out beyond the 10th. Obviously, identical THD measurements do not assure identical distortion characteristics. And since it is a proven fact that the ear is much more offended by the higher-order (fourth, fifth, etc.) harmonics than by the lower ones, it would seem equally obvious that the ear is responding to these little details that the THD measurement overlooks.

This is borne out by subjective observation. In tube equipment, a measured THD of 0.05% through most of the audio range (that is, using test frequencies of 40, 1,000 and 5,000 Hz as the fundamental) was almost an iron-clad guarantee of rich, sweet sound, although there may have been a barely perceptible "veil" over the sound due to the audibility of the lower-order second and third harmonics. Things didn't start to sound hard until THD rose to above about 0.2%. In solid-state equipment, the sound is annoyingly hard at 0.2% THD, and some hardness is still perceptible at 0.05% THD. The "veil" rarely becomes audible, because it is covered up by the screech. Hence, the transistor's reputation for "clearer" sound.

Dynaco's Dave Hafler (who supplied much of the info for this piece) suggests that the industry devise a way of "weighting" the distortion readings to favor the higher-order harmonics, as we now weight signal-to-noise ratio readings to favor that part of the spectrum where the ear is most sensitive. This seems like a fine idea, but the industry seems in no hurry to consider it. Heaven forbid, that the consumer should be given a better way of distinguishing the good from the bad!

Laboratory Tests on Twelve Tone Arms

by John Wright

(Conclusion)

Text reprinted with permission from the June 1969 issue of Hi-Fi Sound*

Goldring-Lenco L-75

Nominal length: 9 in. Rear overhang: 3 in. Distance from turntable center: 8-5/16 in.

Mounting: An adjustable bit may be required, for the arm base requires a 1-3/16-in. hole. Due to the length of thread on the pillar and rest, some countersinking may be necessary if the mounting board is too thick.

Cartridge acceptance: No additional counterweights are required to balance the arm for cartridges weighing from 0 to 16 gm. No allowance must be made for tracking force, as this is applied by a separate rider weight.

Headshell: This is rather massive in appearance, and weighs 14 gm. It contains the arm offset angle, and has a sliding platform for exact tangency adjustment with the protractor supplied.

Height adjustment: Accommodates the full range of turntable heights from 7/8 to 1-3/4 in.

Lifting device: None supplied or available.

Leads: Only 8 in. of unterminated cables are fitted, for connection to a terminal strip and thence to low-capacitance cables to the preamp. As supplied, and before shortening, each channel measured 120 pF of capacitance.

Lateral balance: An eccentric counterweight is used in conjunction with the rider-weight assembly. Lateral balance is achieved after setting vertical balance for zero gm. tracking force and then tilting the entire motor board while adjusting the eccentric counterweight until the arm no longer swings sideways.

Damping: The counterweight is decoupled on a strip of piano wire embedded in rubber, providing greater isolation than was found in any other arm. Additional damping is provided by vertical pivots that are knife-edges mounted in rubber.

Stylus force: Achieved by sliding a rider weight forward along a linearly-calibrated rod, nominally in ½-gram increments. The calibrations were found to be 95% accurate up to 2 gm., 90% accurate to 5 gm.

Bias compensation: By weight-and-thread method over a "corkscrew" device which clips to the main pillar. Although not a linear arrangement, it could be set with satisfactory accuracy using the intructions supplied.

Friction: Largely affected by the dress of the leads going from the pillar to the terminal board. For

---

*Haymarket Publishing Group, Gillow House, 5 Winsley St., London W-1, England.

our tests, the leads were left disconnected and lateral friction was measured at 52 mg. It was difficult to determine the vertical friction of this design because of the damping in the knife-edge bearings. It would be fair to say, though, that the resistance to movement over an average record warp is on the order of 12 to 20 mg.

Effective mass: This measured high at 23 gm., but caused no trouble, probably because of the highly effective damping.

Comments: It is a pity that no matching lifting device is available for this arm when used separately from the GL75 turntable. While the weakest point in the design is undoubtedly the rather high effective mass, the arm has much to offer in its price range in terms of performance and ease of operation.

Neat G-30

Nominal length: $9\frac{1}{2}$ in. Rear overhang: allow 3 in. Distance from turntable center: 9.15 in.

Mounting: The pivot could be accurately positioned with the template provided, although extreme accuracy is not necessary as overhang adjustment is provided in the headshell by slotted mounting holes. However, upon installation we found that it was necessary to mount the cartridge as far back in the shell as it would go before zero tracking error could be achieved at the center of the record. It was discovered that the full use of the adjustment slots was only available with a non-standard-dimensioned cartridge such as the Neat V-70; we therefore recommend that for other cartridges the arm be mounted 0.2 in. farther back than recommended in the instructions. Furthermore, it was found that the offset angle was 17^{o} instead of the more usual 22^{o} for a $9\frac{1}{2}$-inch arm, and this means that the minimum possible over-all tracking error is not achieved. This is a fine point, but since it would have cost no more to have got it right, it seems a pity. Setting-up in all other respects was very easy and foolproof, but the use of an alignment protractor is recommended.

Cartridge Acceptance: The arm balances out for cartridges weighing between 6 and 20 gm, and no allowance need be made for the required tracking weight as this is applied by a separate rider weight.

Headshell: This has slots so that the exact position of the cartridge for overhang can be adjusted when mounting (See above). The headshell weighed 7 gm.

Height adjustment: As supplied, the arm would partner turntables from 1 to $2\frac{1}{4}$ in. high, the upper limit of the range being controlled by the permissible adjustment on the arm rest. With optional lifting device fitted, the minimum height is then restricted to $1\frac{1}{4}$ in.

Lifting device: Clamps to main pillar, is of hydraulic type and functions well. Optional extra.

Leads: Leads measuring 4 ft. 9 in. plug into bottom of pillar, and the total capacitance per channel was 500 pF, which is really too high for many cartridges. Maker's advice concerning shortening leads to the minimum required would be useful.

Lateral balance: No specific arrangements are made for this except that, by the nature of the design, the mass of the headshell and cartridge is somewhat balanced by the rider-weight assembly.

Damping: The counterweight is mildly decoupled from the main arm tube.

Stylus force: Applied by moving a

separate rider weight along a calibrated rod attached to the front of the pivots, after having balanced the arm with the main counterweight. Required force is set in conjunction with a set of small scales provided, which proved to be 94% accurate. This seems at first sight an unnecessary expense, since the rider-weight rod is calibrated. However, these calibrations are equally spaced and, due to the basic geometry of the arm, this does not provide equal amounts of force change with each division, although it could if the calibration marks were rearranged. As it stands, these divisions represent changes of 0.4 grams per step.

Bias compensation: None supplied or available. While rather better than using some inaccurate and friction-loaded device, this does seem rather a pity since the friction in the arm is commendably low. Perhaps the user could make up a simple add-on weight-and-thread device without too much trouble -- as indeed could the manufacturer or importer as an extra.

Friction: This proved to be exceptionally low, particularly for an arm of this price, with fine leads very well dressed down the center of the pivots. Lateral friction measured a mere 20 mg. and vertical 17 mg.

Effective mass: This measured 17 gm. -- a most satisfactorily low figure for the types of cartridge likely to be used.

Comments: An excellently engineered, simple arm. Bearing in mind our recommendations regarding tracking error and the possibility of adding a side-thrust corrector, it is likely to give as good performance as most people would require.

Ortofon RS-212

Nominal length: 8-7/8 in. Rear overhang: 3 in. Distance from turntable center: 8-7/16 in.

Mounting: By boring one hole and inserting three screws, all of which are positioned by means of a metal template and plastic mounting pillar. These proved to be accurate. No overhang adjustment or alignment protractor is provided, although the exact position of the cartridge in the headshell may be slightly altered via the cartridge-mounting plate.

Cartridge acceptance: An additional screw-in weight is provided in the counter-balance, and with this inserted the arm would balance for cartridge weights between 14 and 22 gm. Without the extra weight, it balanced out between 6 and 13 gm., although these figures will be slightly modified by the use of the cartridge-mounting plates in the headshell. Since the stylus force is applied by a spring arrangement, no additional allowance must be made for it.

Headshell: The headshell by itself weighed 8 gm. To this must be added the weight of the cartridge-mounting plate, of which two are supplied. One, weighing 1 gm., has fixed but reversible mounting holes, to provide a choice of two overhang positions 1/16 in. apart. An alternative plate, weighing 4.5 gm., allows for greater adjustment via a slotted mount, but since the screw holding this is not countersunk, it was impossible to mount the cartridge flush with the plate as the head of the screw protruded.

Height adjustment: The arm mounts turntables of 13/16 to 2-1/8 in. height, adjustment being made by an Allen screw holding the main pillar.

Lifting device: This was part of the pillar assembly, was damped in action, and functioned most satisfactorily.

Leads: Leads measuring 4 ft. 9 in. are supplied, to plug in at the base of the arm, and are terminated by

standard phono plugs. Capacitance measured 140 pF per lead.

Lateral balance: Due to the "S" shape of the arm tube, some degree of torsional balance is achieved by the mass of the cartridge being in line through the pivot with the mass of the counterweight, although the success of this arrangement will depend on the weight of the cartridge used. Lateral balance is maintained through the use of springs rather than weights to provide tracking force and bias compensation.

Damping: Without dismantling the arm, we could find no signs of any kind of damping.

Stylus force: A single spring is used to apply both stylus force and bias compensation. After setting the arm for zero gm., the stylus force is applied by rotating a knurled thumb screw on the counterweight. Because of the spring tension, stylus force will vary slightly with record warps, but the calibrations were in any case found to be rather inaccurate.* With bias compensation applied, the stylus force tended to increase as the arm swung toward the inside of the disc, and the extent of this variation depended upon the amount of compensation applied. To accommodate all likely settings of stylus force and bias correction at all points across the record, it would be safest not to assume a calibration accuracy of better than ±20%, particularly over the range of 0 to 2 gm.

Bias compensation: Applied by slight lateral displacement at the termination on the pivot of the stylus-force spring. It is basically frictionless, which says much in its favor. It need only be set once at the outset, as its effect is automatically adjusted with the stylus force adjustment. Slight errors above and below the nominal setting were observed across the record, but in view of the changes in stylus force, the device was on the whole quite effective. Because of the lack of precision of the whole arrangement, no appreciable differences were found between the bias requirements for spherical and elliptical styli.

Friction: With the spring disconnected, lateral friction varied across the record between 73 mg. and 182 mg., giving a nominal figure of 90 mg. Vertical friction was quite low at only 17 mg.

Effective mass: Using the small mounting plate in the headshell, and with the additional rear counterweight removed, the effective mass for balance of a 7 gm. cartridge was 17 gm.

Comments: Once the instructions had been fully understood, the arm was relatively easy to set up and adjust and extremely easy to use. Although the mounting arrangement provides for accurate positioning of the main pillar, an alignment protractor would be of value when installing the cartridge. The arm cannot be seriously considered for use at forces of below 1½ gm., but it is likely to give years of robust service in professional applications.

SME 3009-II

Nominal length: 9 in. Rear overhang: allow 3¼ in. Distance from turntable center: 8.45 in.

Mounting: By cutting a 1 by 2½-in. hole. Exact positioning not necessary, as the base has a sliding adjustment for tangency.

---

*We did not find this to be the case, once the knurled screw had been set to its zero point according to the instructions. We did in fact find the calibrations to be accurate to within 1/8 gram. Ye Ed.

Cartridge acceptance: Will balance cartridges weighing between 4 and 20 gm. without alternative counterweights or headshells. No allowance has to be made for tracking force, as this is applied by moving a rider weight forward.

Headshell: A perforated lightweight headshell is provided, weighing 5½ gm. The headshell can be twisted on the arm to ensure that the stylus is truly vertical to the disc when viewed from the front.

Height adjustment: As supplied, the arm can partner turntables from 1 to 1-5/8 in. high. A separate pre-cut thin mounting board is necessary (and available) for the Thorens TD-124 and TD-121. Other, very low turntables will have to be raised up a little to use this arm. A separate extra base is available to raise the height of the arm for high turntables like the Garrard 401.

Lifting device: A damped lifting and lowering lever is integral with the pillar, and serves as an arm rest and lock. The lowering action is spectacularly successful.

Leads: Leads measuring 3 ft. 10 in. are supplied, and the measured capacitance was 130 pf per channel. These plug in at the base of the pillar, and a shielding sleeve fits over the contacts to avoid hum pick-up.

Lateral balance: Achieved by extending the rider-weight rod outwards from the main counterweight. Although slight differences in lateral balance may occur with changes in stylus force, this is of little importance in this type of design employing separate lateral and vertical bearings.

Damping: The counterweight-and-rider-weight assembly is appreciably decoupled from the main part of the arm. An alternate version is available with (or convertible to) damped lateral bearings, which is essential when using undamped cartridges. The vertical knife-edge pivots have also been known to chatter under adverse conditions with undamped cartridges. The base is somewhat isolated from the motor board by rubber grommets, whose compression can be varied to minimize transmission of rumble and acoustic feedback.

Stylus force: Applied by moving forward a rider weight along a calibrated rod, this proved to be accurate. The weight is comprised of two pieces so that the force calibrations can be in ½-gram increments (both weights) or ¼-gram increments (one weight removed).

Bias compensation: Via the weight-and-thread system. The instructions advise that the position of the thread guide should be such that the thread is at right angles to its arm lever at the center of the record. Our tests indicated that less error occurred when the thread was at right angles to the arm at the outside of the disc. The suggested calibrations were found to be accurate for spherical styli, but we would recommend using half a notch more for ellipticals.

Friction: It was found that the leads were very carefully dressed to give a very slight outward pull -- just enough to overcome bearing starting friction. From a position of rest, lateral friction measured 12 mg, but to accommodate lead torque, an over-all figure of about 24 mg. may be expected. Vertical friction measured 17 mg., probably due mainly to the leads.

Effective mass: Balanced for our 7-gm test cartridge, with both rider weights in place, this measured a little over 10 gm., which is unusually low for a robustly-built arm with a detachable headshell.

Comments: This arm is beautifully engineered and a delight to the eye, even if perhaps a little more complex in construction than is necessary for the average user. All factors of performance have been carefully weighed one against the other to obtain a balanced design that will perform well with the majority of cartridges under the majority of conditions. When the date of this product's conception is borne in mind, it is clear why it has earned such an outstanding reputation.

Sony PUA-237

Nominal length: 9-11/32 in. Rear overhang: 3 in. Distance from turntable center: 8-25/32 in.

Mounting: Bore one hole and mount the pillar using the wrench supplied. A separate hole is required for the rest post. Extreme accuracy is not required, as tangency adjustment is provided at the headshell. Setting up the arm is a fairly simple matter, as is re-balancing when changing cartridges.

Cartridge acceptance: As supplied, the arm could be balanced with cartridges weighing 11 to 25 gm., but a lead weight is supplied for use in the headshell to allow use of cartridges weighing as little as 3 gm. Allowance has to be made for the required tracking force.

Headshell: Provides tangency adjustment without any visible sliding plate. No alignment protractor is provided, but instead rather complex instructions are given for measuring the position of the stylus tip in the headshell. Such a setting-up procedure does not take into account initial mounting error, so we would strongly recommend the use of an alignment protractor, which is in fact the easiest method anyway. The headshell can be twisted on the arm for perfect vertical alignment and then locked in place. The headshell weighed 10 gm., and an 8-gm. weight is supplied for use with conventional lightweight cartridges.

Height adjustment: The arm can be used with turntables of from 1-1/16 to 2¼ in. high, which really requires the use of thinner mounting boards with some turntables.

Lifting device: A hydraulic lowering device is integral with the pillar and worked well. An unusual feature was the ability to cue the position of drop for the first groove of a 12, 10 or 7-in. disc. The arm can also be locked onto its rest post.

Leads: Cables measuring 4 ft. 9 in. plug into the base of the pillar, and their capacitance measured 130 pF per channel.

Lateral balance: The arm is so designed that the mass of the counterweight assembly is offset behind the pivot to balance the offset of the headshell and cartridge. A further fine adjustment can be made by the provision of a sliding lateral balance weight placed just in front of the pivot.

Damping: Very little is applied, and this via slight decoupling of the main arm tube just in front of the pivot.

Stylus force: Applied via slight unbalance of the counterweight system, which is assembled in three parts. After initial balancing of the arm with the whole counterbalancing assembly, the first segment of the counterweight is slid forward along a calibrated scale with click stops at ½-gm. intervals. This proved to be accurate.

Bias compensation: Applied by means of a cam operated by variable spring tension. The cam is shaped so as to give correction according to a cal-

culated curve relating to change in surface speed across the record. In practice, this was found to provide too much correction in outer grooves and too little in inner grooves when using an elliptical pickup at the recommended bias setting. The device involved two moving parts, both of which are roller bearings, but it was not easy to determine whether or not this interesting system caused inherently more or less friction than the weight-and-thread system.

Friction: The leads are as fine as we have ever encountered and did not add any perceptible drag. Lateral friction measured 25 mg. and vertical measured 16 mg.

Effective mass: To use our 7-gm. simulated cartridge it was necessary to use the lead weight in the headshell and, not surprisingly, the mass then measured very high at 28 gm., 18 of which were at the headshell before the cartridge had even been added. It is possible to remove the rear section of the counterweight with a screwdriver and still use the arm in a normal manner, except that it is just a little more tricky to balance out. With this weight removed, one can use the lighter cartridges without the extra headshell weight and thus bring the effective mass down to a much more respectable figure.

Comments: The arm is excellently engineered and has a camera-like finish which inspires confidence even before one has tried it. It has undoubtedly been designed with the Sony cartridge in mind, and is not as ideally suited for use with other cartridges.

Thorens TP-13

Nominal length: 9 in. Rear overhang: 2-3/4 in. Distance from turntable center: 8.35 in.

Mounting: This was the most difficult arm to mount accurately due to the rather oddly-shaped hole required. Extreme accuracy is not necessary, as there is tangency adjustment at the headshell. On the other hand, no alignment protractor is provided, and using one would be much simpler than trying to measure the overhang. Care must be taken when screwing down the base to ensure that all three grommets are equally compressed, or the arm will be tilted.* Also, as mentioned in the instructions, care must be taken to see that the leads are properly dressed under the motor board so as to minimize resistance to lateral movement. The actual setting-up of the arm with a cartridge, or changing of cartridges, is quite simple.

Cartridge acceptance: The arm could be balanced for cartridges weighing between 2 and 17 gm., allowance having to be made for the required tracking force.

Headshell: This plug-in shell is very skeletonized, weighing only 8 gm., yet allowing for adjustment not only of overhang but also of vertical tracking angle -- the only arm to have provision for this.

Height adjustment: The arm proper will only partner turntables of 1-3/8 to 1-7/8 in. height. The rest post has no height adjustment, and holds the arm horizontal only when the arm is adjusted for a 1½-in.-high 'table. It is obvious that this arm was primarily intended for use with the Thorens TD-150 turntable, and is therefore not as adaptable as it might be.

Lifting device: A simple hydraulic

*A sample that we tested had a built-in tilt that caused a 5-degree list at the headshell. This could not be remedied; the cartridge had to be shimmed up at one side to get it vertical to the disc surface.--Ye Ed.

device is integral with the pillar and works satisfactorily.

Leads: Leads measuring 4 ft. are attached to the base of the pillar. Capacitance measured 300 pF per channel.

Lateral balance: No separate provision is made for lateral balancing, but the design is so arranged that the counterweight assembly is offset so as to balance the offset of the headshell and cartridge. This also puts the mass of the counterweight in line with the tip of the stylus.

Damping: No damping is applied to the arm itself, but some isolation from the motor board is provided by the mounting arrangement via rubber grommets, which should deter transmission of rumble and acoustic feedback through the pillar.*

Stylus force: Applied by vertical imbalance after having balanced out the arm to zero with the special calibrated plate supplied. The arrangement proved simple and effective, and was shown to be as accurate as we could measure in view of the friction of the pivots.

Bias compensation: A weight-and-thread device is available as an optional extra, and is quicky and easily installed. Our tests showed that the device was rather more effective if adjusted for a tracking force of 1 gm. more than was actually being used. It was noticed that the length of the nylon thread was insufficient for some bias settings, and would not only hinder the free lateral movement of the arm but would in some cases actually prevent the arm from traversing the entire surface of the disc.

Friction: Even after careful arrangement of the wires, friction in our sample was higher than we would have liked, particularly if the arm is to be used with the best light-tracking cartridges. Lateral friction varied between 100 and 230 mg. over its swing range, and much of this was from the bearings rather than the wires. Vertical resistance measured 100 mg.

Effective mass: At 12 gm., this measured satisfactorily low for the type of arm.

Comments: This arm is not suitable, and indeed we feel not intended, for use with ultra-light-tracking cartridges, but once set up for the type of cartridge it <u>is</u> suited for, tracking say in the 2 to 3 gm. range, it will provide a standard of performance in keeping with the ancillary equipment that it is likely to be used with.

---

*We are not at all convinced of the logic behind this. Since a pickup's output is generated by motions of the stylus <u>relative</u> to the cartridge, it would seem to us that the ideal condition would be with the tone arm fastened as rigidly as possible to the turntable-support platform. A flexible tone-arm mount, as when the arm is "decoupled" via rubber grommets, would seem to encourage rather than deter movements of the arm independently of the turntable.—Ye Ed.

Japan's 4-Ch. Disc

The Victor Company of Japan has announced a compatible 4-channel disc recording system utilizing modulated ultrasonic carriers superimposed on the main stereo signals.

The system may well be practical, but we don't think it has a hope of being generally adopted because, while it may be possible to reproduce the requisite 45-kHz upper-frequency range from a disc (and then again, it may not), that requirement will prohibit the system's use with any of the home-tape media.

Stereophile Reports are primarily subjective reports, based on actual use of components in the home. Components for testing are taken from dealers' stock or, when not available locally, are obtained from the manufacturer, and only one sample is tested unless indications are that it is defective. If a retest is necessary, our experience with both samples will be reported. The manufacturer is sent a copy of the report prior to publication, and may if he wishes append a manufacturer's comment. He cannot, however, demand that the report be changed or that it not be published. Stereophile Reports are copyrighted, and may not be reprinted or quoted without the written permission of the publisher.

An equipment reviewer can approach a report in several ways. He can measure everything in sight and publish the results without comment, for the edification of those who feel they can interpret the measurements. He can measure, compare the measurements with those of competing components, and give the one in question some sort of rating. Or, he can listen to it.

If he listens, he must then convey his findings to his readers, which is a little more difficult than merely quoting test results. But he has a choice of approaches here, too. The easier of the two (and less risky because it needs no justification) is the personal or this-is-how-it-strikes-me approach. Here the reviewer is cast in the role of critic, and like the theater or record critic, his personal judgements are enlightening only to those readers who have learned from following his advice whether or not they usually agree with him.

The strong appeal of the pure-measurements approach is that instrument readings do not (supposedly) reflect the personal biases of the tester, and should thus yield reports that are equally meaningful to all readers. Unfortunately, there are many things that we can hear in reproduced sound that we cannot as yet measure, so the biased subjective evaluation of a trained listener may nonetheless be more meaningful to any reader who will also be listening to the equipment than would the most comprehensive tabulation of test results.

The subjective tester does not, however, have to be exclusively personal in his approach to reports. Certainly, it is not possible to divorce one's biases and prejudices from any purely subjective experience like listening, but it is possible to supplement them with data that will give other people, with different biases, a good idea of how the equipment actually sounds, so they may decide for themselves whether or not they may like it.

This, of course, is a two-way street. The reader must have enough understanding of his own personal preferences in reproduced sound to be able to guess how he will react to the things the reviewer describes. And the reviewer must be able to describe these things in terms that will have some meaning to the reader. And therein lies the problem: There is no accepted means for describing reproduced sound.

Words are not "invented" by professional word-coiners; they are created on the spot by individuals who suddenly find themselves faced with the need to say something that nobody has ever needed to say before. And since the reproduction of sound is, relatively, a very recent endeavor of man's, there has not been until recently a need for a comprehensive lexicon for describing it.

Early sound reproduction was so low-fi that it never really occurred to anyone to analyze it in terms of the real thing, and words like "thin" or "heavy" or "shrill" were adequate for distinguishing one reproduction from another. But as the potential for realistic sound reproduction increased and sonic differ-

ences between different reproducers diminished, the ear started to tune in to these more-subtle differences. But there were no words with which to describe them.

Any enterprising audio writer could make up words like meesen and bloppish to describe these subtle qualities of reproduced sound, but he would then have to be prepared to explain them every time he used them. It makes more sense to use words that are familiar from other contexts and can thus elicit from most readers a mental image of what the writer is hearing in the sound.

Hearing and vision are both spatial senses, in that they give us information about the size and location of objects around us, as well as about the specific nature of those objects. Thus, an accurate reproduction of sounds or images will seem to place the originals in their proper locations away from us, as though we are perceiving them through a perfectly clear window of indeterminate size, and anything which detracts from this clear-window illusion is said to distort the reproduction. Perhaps it is not too surprising, then, that much of what happens to sound in the process of reproduction can be described in the same terms as photographic distortions.

Photography has been with us for almost 150 years, and has accumulated a rich lexicon of descriptive terminology, much of which seems so appropriate for describing certain aspects of reproduced sound that it might well have originated with audio. We can just as easily equate terms like focus, detail, murkiness and fuzziness with the qualities of a sonic reproduction as we can with those of a photograph. And while some other terms, like graininess and "snap," may be harder to envision in terms of sound, they can nonetheless convey an impression or feeling similar to that produced in a listener by certain aspects of the reproduction. Which is what audio imagery is all about.

Photography isn't the source of all our audio lexicon, though. "Flabby" and "fluffy" and "strident" are more descriptive of what they describe than is any visual imagery, and some others like "gutsy" and "authoritarian" convey an idea of the general feeling one gets from certain kinds of sound. In fact, since there is no standardized lexicon for describing sound, it might be said that anything goes, as long as it conveys to the reasonably-literate reader an impression of what the reviewer heard and is trying to describe.

Reproduced sound may be described fairly comprehensively in terms of texture, detail, weight and color, with the additional criteria of cohesion, openness, imaging, and perspective or apparent distance applying to loudspeaker sound. We'll take a closer look at these in the next issue.

Postponed Reports

Audio Research preamps

Our samples were found to have extraordinarily good phono preamp stages -- the best we've heard to date -- but the high-level sections had a rather veiled, heavy sound that the manufacturer traced to a small design error that caused a mild hump in the response range around 300 Hz. Both units were returned for modification.

Harman-Kardon CAD-5 recorder

First sample arrived with bias or record equalization misadjusted, causing markedly rising high end with recommended tapes. This unit subsequently developed circuit noise and drive-system stalling after about 10 hours of use, and was returned to the factory. Second sample still works fine but was also delivered in imperfect adjustment. We have ordered a service manual, and will test the unit after having adjusted it for peak performance.

Thorens TD-125 Turntable

Type: Three-speed transcription 'table with electronic drive. **Price:** $130 w/ walnut base. **Distributor:** ELPA Mktg. Inds., Inc., New Hyde Park, N.Y. 11040.

Some years ago, a firm called Weathers Industries (best known for their FM phono pickup) produced the first electronic-drive turntable for home use. An oscillator was used to generate a sine-wave signal, and a small power amplifier beefed this up and fed it to a synchronous motor.

The Weathers turntable was not a great commercial success, perhaps because it didn't look as if it could be as good as it really was. But it did prove that there were real advantages to an electronic drive.

Non-synchronous turntable motors tend to vary substantially in speed with variations in load and line voltage. They will however run smoothly at reduced speed, which makes it practical to design them for higher-than-normal speed and fit them with a variable-load device that can be used as a vernier speed control.

A synchronous motor, on the other hand, "locks in" to the frequency of the AC supply, and is thus much less susceptible to voltage and load changes. But if slowed down to below its locked-in speed, it either goes into violent oscillation or loses most of its power, so it is not easy to fit with a vernier speed control. Production tolerances being what they are, very few synchronous-drive turntables run exactly on speed, and since many of them use lightweight drive motors, they will slow down somewhat when loaded with a Dust Bug, and there is usually no way of bringing them back up to speed. An electronic drive providing a stable but adjustable supply frequency to a synchronous motor can combine the advantages of both kinds of motor with the disadvantages of neither.

There is another advantage to an electronic drive system, mainly of interest to the manufacturer. The fact that most European countries have a 50-Hz AC supply has been a constant source of bother to makers of synchronous-drive devices, because the 50-Hz motors run faster on the U.S.-standard 60-Hz supply. The usual solution has been to use a smaller motor pulley on units destined for U.S. sale, but with an electronic drive, one motor (and one pulley) will provide the correct speed anywhere.

As a matter of fact, even the built-in stroboscope in the TD-125 is easily convertible for 50- or 60-Hz AC supply, merely by shifting the position of a small masking plate. The strobe is illuminated by a neon bulb, and is clearly visible through a transparent panel in front of the platter. The strobe pattern is fastened to the underside of the platter, and the concentricity of the strobe varies slightly from one sample of the TD-125 to another. This has absolutely no effect on the turntable's performance, but it can cause a perceptible back-and-forth fluctuation of the pattern. It must be borne in mind that this is in the strobe only, and is not indicative of turntable wow.

The TD-125 has no 78-rpm speed, and the motor is not designed to function efficiently at that speed. But if you don't need the 16-2/3 speed, and could use 78 rpm occasionally, there is a simple way of modifying the electronic drive to obtain 78 rpm. ELPA can supply conversion instructions on request, but they emphasize the fact that, at the 78-rpm setting, the 'table will produce more than its rated rumble (because of the higher platter speed), and the motor may not start up without some assistance. Recommended starting procedure is to get the platter going at 45 rpm, and then switch to 78.

Some TD-125 owners have reported

a gradual downward shift in the central speed settings as the unit "ages." With some samples, the vernier control must ultimately be set near the upper end of its range to obtain the proper speed, although it may take many months for the drift to go that far. After six months of use, our sample had drifted so slightly that the vernier had only to be a few degrees from center to zero-in the speed. This slow drift may be a minor annoyance, but it is hardly serious because there are adjusting pots inside the unit for setting the center frequency of each speed, and these pots provide a very wide range of control.

Hum radiation from the TD-125's drive motor was not unduly high, but was deemed too high for satisfactory use with such hum-sensitive pickups as the Decca units. (Later-production 'tables are fitted with drive motors whose shielding permits the use of any but the most hum-prone pickups.)

Apart from the potential hum problem, the only other precaution to observe when mating the TD-125 with a pickup is to check the arm's required under-the-motor-board depth. The TD-125 is one of the lowest-profile turntables available, and while this looks lovely, it does preclude the use of deep-pillar arms like the Decca International and the Shure/SME.

The only other hitch we encountered with our sample TD-125 proved to be the fault of the instruction manual rather than the turntable. As initially installed, the TD-125 seemed to be inordinately critical as to levelling, and had obviously inadequate vibration isolation. It was feedback-prone and unduly susceptible to floorborne shocks, and would have gotten harshly criticised for this in our report had we not noticed three little knurled screws under the motor board, each with a little dab of red paint on it. There was no mention of these in the instruction manual, but we recalled that previous Thorens turntables had used similar screws to hold the two main sections of the turntable together for shipping. Anyway, we tried removing these, and that was the end of the suspension problems. Feedback tendencies vanished, and the unit became almost (but not quite) as immune to floor vibrations as the AR turntable, which still has the best suspension system we have seen. We wonder, now, how many users have condemned the TD-125's suspension because, thanks to one little omission in the instructions, they never got it to work properly.

Apart from these few minor criticisms, we found the TD-125 to be one honey of a turntable! It looks beautiful, it is beautifully put together, and it performs beautifully. Our sample had completely inaudible rumble, wow and flutter and, despite its rather small motor, it had enough torque to permit disc cleaning with a Watts Preener without bringing the platter to a slow stop. Needless to say, it was only slightly affected by Dust-Bug loading. In short, it did everything a turntable is supposed to do, and did it as well as anything we have ever tested.

MFR'S COMMENT: Audiophiles contemplating using the Shure/SME tone arm with the TD-125B should order the model 3009 Type II/HE, the "HE" designating an output cable that plugs horizontally into the arm base. The usual vertically-oriented plug causes the cable to touch the bottom panel of the 'table base, thereby coupling motor vibrations and external shocks up the cable to the "floating" motor board. Shure/SME, England, offers a modification kit for converting earlier-model arms from vertical to horizontal cable entry.

Although it is indeed necessary to remove the red-painted screws when setting up the turntable, it is essential to replace these when transporting the turntable. Failure to do so may result in the chassis

separating from its mounts and breaking the interconnecting wires.

REVIEWER'S ADDENDUM: Subsequent comparisons between the TD-125 and a Sony TTS-3000 revealed the following: The Sony has very slightly better speed regulation under the extra loading of a Dust Bug, but the difference was judged to be negligible. The Sony has its operating controls mounted on the floating platform, the Thorens has them on the base. Thus, the Thorens is far less susceptible to jarring due to operation of its controls. The Thorens was also judged to have a markedly more effective shock-isolation arrangement than the Sony, probably because the former's heavier platter gives the floating section higher inertia.

Century General Mini-Gen Oscillator

DESCRIPTION: An ultra-compact self-powered sine-wave generator. DIMENSIONS: 4 in. L x 2-7/8 W x 2¼ D, over-all. PRICE: $14.95, with probe and battery. MFR: Century General Corp., 570 Seventh Ave., New York, N. Y. 10018.

Any tape recordist who wishes to get the most from his recorder must adjust it to suit the brand and type of tape he uses. This calls for a sine-wave generator, which is no problem to the person who already owns one, but what about the person who doesn't? Equipment catalogs will show that you can pay upwards of a thousand dollars for one of these that is suitable for making ultra-precise measurements of distortion and frequency response, or as little as forty bucks for one that is good enough to make frequency response determinations on a home system. But until now, the person who only wanted something for setting up his tape recorder had to go the forty-dollar route, even though he might never need the wide frequency response that contributes significantly to the cost and bulk of the oscillator.

Now, there's a much cheaper way out: The Mini-Gen way. This tiny, battery-powered gadget offers switch selection of a mere three frequencies, but they happen to be frequencies that are called for in setting up the record circuits of most good tape machines: 400 or 1,000 Hz for setting bias and meter calibration, and 10,000 Hz for adjusting record equalization and, in a pinch, record head alignment.

Its distortion is moderately high (just barely audible), its frequency response is good but not perfect (3/4 dB down at 400 Hz, ¼ dB down at 10,000 Hz in our sample), and it is limited to the three switch-selected frequencies. It will deliver up to 2½ volts to a high-impedance load, and provides an effective output impedance of around 1,000 ohms at 400 Hz and 500 ohms at 10,000 Hz, so it is largely unaffected by output cable capacitance and can be used to drive a professional-type 600-ohm transmission line. In other words, it is not a precision instrument that will allow you to measure distortion and frequency response to 0.1% accuracy. But when it comes to setting up a tape recorder, the $15 Mini-Gen will will do as well as a $1,000 sine-wave generator. It will also, of course, serve as a test source to facilitate checking left-right cable continuity in your main system, and is small enough to be carried along on remote recording jobs without adding significantly to the weight or bulk of one's accessory kits.

In view of its ready portability, the Mini-Gen may even be of interest to the recordist who already owns a larger sine-wave generator but would rather not lug it around to remote recording locations. But for tape recorder setups, it is really all that anyone is likely to need. It's

ideal for the purpose, and the price is right. What more could one ask?

Frazier SEE24 Environmental Equalizer

DESCRIPTION: 2-channel, 2/3-octave passive equalizer. **Gain**: -1 db with all adjustments at max; loss after equalization depends on loudspeakers and acoustical environment. **Price**: $795; $150 extra for sound survey and equalizer adjustment and installation. **MFR**: Frazier, Inc., Box 34216, Dallas, Tex. 75234.

Two issues ago, we reported on the Advent Frequency Balance Control, a multi-band control device ("tone control unit" understates the case) intended primarily for program equalization, and for use by the consumer.

The Frazier equalizer is similar in that it is also a multi-band equalizer, but there the resemblance ends, for the SEE24 is not adjustable by the user and is not intended as a means of correcting program deficiencies. It is, rather, intended for use as a so-called environmental equalizer, for the correction of frequency response aberrations due to loudspeakers and their acoustical environments.

The Frazier SEE24 is a passive device (employing no amplification), consisting of a series of L/C band-suppression filters, each with its own screwdriver-adjustable attenuation control. Each filter affects a band roughly 2/3 of an octave in width, and the audio range is covered by 12 filters. Center frequency for the lowest-range filter is 63 Hz, and the topmost one is centered at 10,250 Hz.

The device requires operation into a load of 10,000 ohms and, since few audio components provide this low a load, the device is supplied with the necessary load resistors already attached. Each band-suppression filter provides an essentially straight-through path for all frequencies outside of its operating band, so with all filters set for minimum attenuation, the device functions pretty much as a straight wire from input to output. Because of this, the 10,000-ohm load resistors in the outputs also determine the device's input load characteristics. And while most solid-state components will work satisfactorily with their outputs loaded this way, some won't. And most tube-type components almost certainly won't. Also, since the device has no internal gain, it can only attenuate the appropriate bands. Thus, when it is used to equalize a system for flat acoustical response, it can do so only by pulling the level of the response rises down to the level of the dips, and the result is a loss in over-all system gain.

Obviously, the extent of the gain loss will depend on how smooth the over-all response was before equalizing, but if the speakers are pretty good to begin with, the over-all gain loss should not amount to much over 3 dB., and most systems have more than enough reserve gain to take care of this.

The only real problem we can foresee as a result of this gain loss is that, if it is great enough, it can increase distortion in the system. The Frazier device is generally installed between the preamp-control center and the power amplifier. This is done so that, regardless of what input source is being used (tape, phono, etc,), the Frazier device will "see" the same source impedance. It could, of course, be inserted in series with the preamp's Tape Monitor connections, but since the Tape outputs usually follow the input selector switch, the tuner, tape recorder, or phono preamp will be feeding the device directly, and their different output impedances may affect the device's equalization characteristics, yielding a different

over-all response from each input source.

Unfortunately, with the device located at the output from the control center, its gain loss must be made up by driving the control center's outputs harder, and this will frequently mean an increase in its distortion. Some preamps will in fact start to overload if driven to more than about 6 db beyond their "normal" operating output level.

These are not criticisms of the device, but merely precautions to be observed in its use. For instance, most solid-state components today have sufficiently low-impedance outputs that they can feed the SEE24 directly without affecting its behaviour, and in any such all-solid-state system, we would recommend putting the SEE24 in the Tape Monitor circuits rather than at the control center outputs. This would also allow the device to be used with a receiver, which normally has no provision for inserting anything between its control section and its output section. On the other hand, you would either have to give up the normal tape record/monitoring facilities (which would be occupied by the SEE24), or add your own external switch and connections for it. So, take your pick.

The SEE24 is available by itself for the staggering sum of $750. This price is probably justified by the number of costly parts therein (24 each: precision inductors, precision capacitors, 24 Allen-Bradly potentiometers), but it is not a purchase that the average hobbyist -- even the one with a $4,000 system -- is likely to make without some deliberation. Then, there is the problem of adjusting it properly to the requirements of the system.

If you have an exceedingly acute ear and limitless time and patience, you can adjust the Frazier device fairly well by ear, using the interstation hiss from a non-muting FM tuner, but we don't advise trying it. The main problem with this approach is that one can never be sure it is adjusted properly, and will more likely than not spend the rest of his listening days "diddling" with the device in an attempt to make the system sound just a shade better with this or that recording, and the fact is that no amount of equalization can make all recordings sound as good as they could.

As a matter of fact, Frazier does not recommend trying to Do It Yourself. Normally, the SEE24 is sold as a "package" for $945, and this includes a detailed sound survey of your system-and-environment frequency response, and the necessary adjustment of each channel of the equalizer to obtain the flattest possible measured response from each system channel. The result should, according to Frazier, be the best-quality sound that your component system is capable of delivering in your particular listening room.

Is it really? Well, to try and find out, we arranged with Frazier's local field representative to have him come in and equalize a high-quality system for us.

Before he came, however, we set up a KLH Nine in our largest listening area, but positioned the panels in such a way as to provide optimum stereo separation and imaging without concern for any other aspect of their sound. That is, we made no attempt whatsoever to position them for good frequency response at the listening location. And like all speakers that radiate from the rear as well as from in front, this inattention to proper placement made the Nine sound pretty ghastly. The sound was piercing, yet dull at the extreme high end, hollow, deficient in the upper-bass range, slightly heavy in the mid-bass, and entirely lacking in deep bottom. But the imaging seemed to be very good!

When the Frazier rep -- Jim Loder, of a firm called Eldiserco -- arrived with an equalizer and the equipment for the survey, the first thing we did was to listen to the

Nine reproducing some program material. He agreed that it sounded lousy, and proceeded to set up his equipment. This consisted of a General Radio 1382 noise generator, a 1564A spectrum analyzer, and a 1560P7 probe mike (Figure 1).

The mike was placed on a small stand at a location where a seated listener's head might be, and connected into the spectrum analyzer. The pink noise generator was fed into an Aux input on the system, and one Model Nine panel was driven to an output level of about 60 dB, as measured on the analyzer. Then the response of that channel was plotted on special graph paper having its frequency divisions 1/3 of an octave apart.

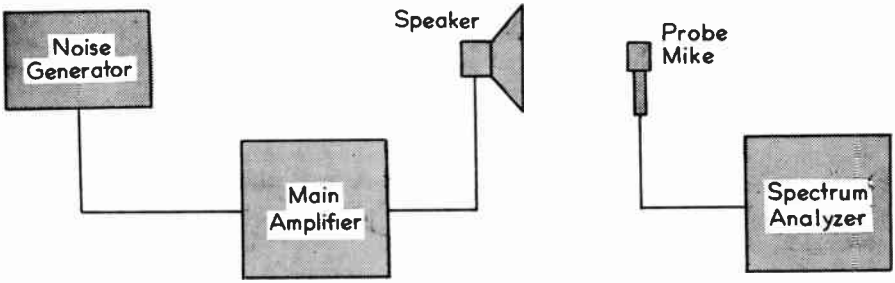


Figure 1

When measuring system response in this way, the full range of frequencies is reproduced simultanously by the loudspeaker, with average equal energy per octave. The spectrum analyzer has a variable-bandpass filter that can be switched to read either 1/10 of an octave of bandwidth or 1/3 of an octave width. The 1/10-octave bandpass is useful mainly for measuring (fairly accurately) the frequency of a specific tone, and had been used previously to ascertain that the opening organ pedal note of "Also Sprach Zarathustra" ("2001" to philistines) was close to 32 Hz in frequency. The 1/3-octave bandpass is however used for environmental response measurements.

Incidentally, noise (hiss) is used for tests like this because it tends to excite room resonances much less acutely than do steady-state sine-wave tones. Standing waves take a short period of time to build up, and since it is reasoned (with some justification, we feel) that the transient nature of music would also tend to discourage such a buildup, the random noise signal was considered to give a more realistic representation of the actual listening response of the room.

To obtain the readings for the response curve, the spectrum analyzer is tuned to each of the 1/3-octave center frequencies (40, 50, 63 Hz, etc.), and the sound pressure level picked up by the probe mike is read directly from the analyzer's dB meter. The resulting response curve shows how much correction will be needed in various parts of the audio range in order to produce the flattest possible response from each channel.

The response measurements are made on one loudspeaker at a time, because it is necessary to know which channel is doing what in order to apply the equalization to the proper speaker. This technique could however yield misleading test results, because a pair of speakers tend to reinforce one another's bass response, thus giving more low end than will either speaker by itself. Apparently, this happened in the case of our experimental setup.

Incidentally, a Frazier environmental response measurement can be a rather traumatic experience for

those present, for the measurements require that the pink noise, which sounds like Niagara Falls, be reproduced at a sound-pressure level of between 60 and 70 dB, which is louder than you'd think, and the complete system setup may take more than 2 hours. Evidently, it does not bother Mr. Loder, but we would suggest that disinterested parties vacate the premises for the duration. The sound levels aren't high enough to do any physical damage to the ear, but they can induce headaches.

Curves A in Figure 2 show how our purposely misplaced Model Nines measured up, before equalizing. The top curve A, for example, showed a maximum of about 8 dB between the highest rise and the deepest dip in the response. Since the Frazier equalizer can only attenuate signal bands, it would be necessary to pull down the highest rise by 8 dB to match it to the deepest dip. Fortunately, most of the audio range required less attenuating than this, but the overall gain loss due to the final equalization amounted, in the case of our Model Nine setup, to around 5 dB. We had enough reserve gain in the system to cope with this, but there wasn't much left over.

After the initial curves were run, the SEE24 was inserted into the system (at the Tape Monitor connections), and each of its bandpass controls was adjusted according to the readings on the spectrum analyzer.

Curves B in Figure 2 show the measured responses of the misplaced Nines after the Frazier equalization. They are obviously better than the Before curves, and could probably have been improved even further had we not run out of time.

It is not, however, possible for the Frazier SEE24 to produce an absolutely linear response from most loudspeakers, because the 2/3-octave bandwidths of equalization can only tend to average out those response deviations that occupy half an octave or less.

For instance, the measured response in both channels of our misplaced Model Nine system showed a slight but sharp peak at 8 kHz. Since this frequency lies midway between two controlled bands on the SEE24, it was of course not possible to bring this peak down without further depressing the mild dips on both sides of it, simply

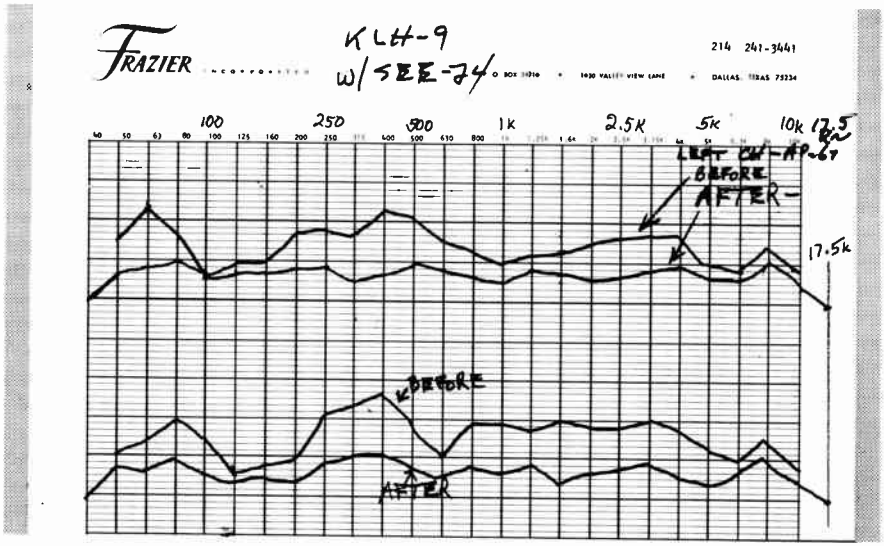


Figure 2

because of the 2/3-octave width of the controlled band. This type of sharp deviation could better be handled with an equalizer having 1/3-octave or narrower bandpass characteristics, such as the Altec "Acousta-Voicing" equalizer

So, how did the Nine sound after the Frazier equalization? It sounded a lot better than it did before. It was smoother, richer, and obviously more natural. There was still no really deep low end, but with the hump around 70 Hz pulled down, the range below that, down to about 50 Hz, became more audible, so the effect was an apparent increase in deep-bass output.

We also noticed some improvement in the system's stereo imaging. The reason for this should be evident from the Before and After curves of Figure 2.

The ear is acutely sensitive to channel imbalance in the range between about 400 and 4,000 Hz. As little as 2 dB of imbalance through this broad range can cause a noticeable lateral shift in the apparent direction of a sound. In the unequalized Model Nine, in our room and with the un-optimized speaker placement, left-channel output was several db above that of the right channel between 500 and 800 Hz and between about 2 and 4 kHz, and was significantly below that of the right channel from about 900 Hz to 2 kHz. Thus, the localization of any instrument contributing frequencies within this range would tend to shift somewhat depending on where most of its energy occurred at any given moment. The result was a slight broadening of some instrumental sounds, and a tendency toward some lateral "wander" as certain instruments played different pitches. In reducing these intra-channel differences, the Frazier equalization improved the imaging.

Our only reservation about the final sound was that it seemed a shade over-ripe, as though it were somewhat richer-than-life. The bass was just a bit too fat (mutual reinforcement?), and sounds seemed to be a little farther away than before (which would no doubt please many listeners). Both of these things could have been changed if desired, by a bit of additional work on the Frazier equalizer, but the basic point was that the equalization had significantly improved the sound of the initial speaker setup.

In other words, the Frazier system does seem to work quite well. It is in fact probably safe to say that there are exceedingly few reproducing systems that cannot be improved to at least some degree through the installation of the SEE24.

Whether or not you will like the "improvement" is less certain, though. Although we all like to salaam at the altar of the Flat Res-response, the fact is that most of us really do prefer certain colorations in reproduced sound, even if only through a personal preference for a "close" or "distant" seat in the concert hall. In addition, there is the still-unpredictable nature of our subjective response to things other than frequency response which sound as though they affect frequency response.

A case in point here is the system in which a small amount of distortion is making the high end sound somewhat "hotter" or brighter than it would be were there no distortion at all. Such a system sounds better with the high end somewhat rolled off, and will thus sound too bright through a speaker with truly flat high end. Even the best of today's recordings -- on tape or disc -- have enough high-end distortion on them that they sound a little hard to take on a speaker with truly flat high-end response. So while objectively-determined loudspeaker equalization can usually improve matters, it can't be expected to yield what sounds to you like perfection.

So, is it worth the money? Our feeling is this: If you own a top-notch system, and feel that it

should perform better than it seems to, environmental equalization may well be the best solution. If you're pretty much satisfied with the sound you're getting now, chances are you're better off without system equalization. If you're kind of uncertain about how you feel towards your present sound, you may or may not choose to take the plunge. It's up to you. If you don't like the result, you can get a full refund on the return of the SEE24 and pay only $100 of the $150 installation charge.

MFR'S COMMENT: The philosophy behind the manufacture of the SEE24 is based on the fact that a loudspeaker manufacturer can predict and control all aspects of loudspeaker performance except those resulting from the acoustical environment in which the speaker will be used. Room acoustics can limit frequency range and destroy response smoothness in such unpredictable ways as to make it impossible to guarantee the performance of even the finest loudspeakers in the owner's own listening enviroment.

The only remedy now available or foreseeable is some form of environmental equalization. The SEE24, with its 2/3-octave filters, permits us to adjust any system to within ±3 dB of perfect linearity as measured in 1/3-octave segments -- a parameter of performance that we feel is acceptable to the most demanding audiophile.

REVIEWER'S ADDENDUM: Since a measured frequency response of ±3 dB allows for a total peak-to-dip response of 6 dB, we don't feel this would be "acceptable" to a critical listener. On the other hand, if a given speaker in a given environment had an even wider response deviation than this, prior to equalization with the SEE24, nobody could possibly argue that the final result doesn't constitute a dramatic improvement.

In practice, the final result (assuming a good speaker system to start with) generally sounds a good deal smoother than the maximum permissible limits of ±3 dB would suggest.

Advent Speaker System

Type: Two-way direct radiator. **Impedance:** 8 ohms. **Power capacity:** 100 watts program. **Crossover:** 1,000 Hz. **Balance control:** Tweeter switch selects Flat, +3 dB, or -3 dB. **Price:** $116 walnut, $102 unfinished. **Mfr:** Advent Corp., 377 Putnam Ave., Cambridge, Mass. 02139

After a number of years of equipment reviewing, one gets rather blasé about "compact" loudspeakers. The appearance of yet another one that looks like hundreds of others and embodies no radically new innovations to pique one's curiosity is likely to be greeted with a passionate Ho-Hum.

That, at least, is how we felt about receiving a pair of Advent's speakers -- their first product since the company was formed. Of course, we were pleased to see a new hi-fi manufacturer taking the plunge, and we wished them well, but my God, not another oversized "bookshelf" loudspeaker! Who needs it? And at $112, could it possibly be any good? Sure, the Dynaco A-25 was a pleasant surprise, but could there be another one so soon?

Dutifully, though, we hooked up the Advents and gave them a listen.

Our first reaction was Ho-Hum! They didn't send us. They seemed to have no character at all. But is that bad? Well, no, as a matter of fact. A speaker shouldn't have character. And indeed, the Advents did prove to be about as uncolored as anything we had ever heard. No squawk, honk or hollowness, no

papery or metallic flavor from disc surface noise, no flabby mid-bass boom. The extreme low end was very deep, evidently good to at least 35 Hz, and the highs were extremely smooth, sweet and detailed.

After several weeks of listening, we still hadn't found anything to complain about. We couldn't even find any sonic characteristics to hang adjectives on, in order to try to describe their sound. They were, in fact, the least-colored loudspeakers we have ever heard, and this includes the highest-priced systems currently available.

Probably for just that reason, the Advents proved eminently easy to live with, and sounded equally comfortable and natural at low or room-filling listening levels. Dispersion was excellent and so, as a consequence, was the stereo imaging. Driver blending, too, was excellent, and the speakers did an outstanding job of reproducing the front-to-back perspective in stereo and mono program material.

Sweeping an audio oscillator through its range revealed no humps, dips or rattles. Bass response was very smooth down to around 37 Hz, and rolled of gradually below that, producing what we judged to be usable output down to 30 Hz. There was no trace of low-end distortion until the system was driven to what would normally be entirely excessive (for most people) listening levels.

In fact, the only respect in which we felt the Advents took a back seat to any other speaker system was in transparency. Compared with the KLH Nine full-range electrostatic, which has some other imperfections and costs over $1,000 anyway, the Advents seemed to be playing through a velvet fog. It wasn't a matter of high-end response -- the Advents actually had more of this than the Nine when the latter was oriented so its tweeter beams weren't aimed our way. It seemed more a matter of "focus," as though the Advents were slightly smudging transients in the sound.

Of course, the comparison with the Nine in this respect is patently unfair, because of the price discrepancy and because it has that quality of "focus" to a degree which is unsurpassed by any other speaker. But Advent's literature for their speaker invites comparison with the best available, and indeed, except for the slightly veiled sound, the Advent speaker has no need to feel embarassed by such a comparison.

In terms of price, of course, the Advent speaker invites comparison with the Dynaco A-25, which we reported on three issues ago. The A-25 has somewhat more transparency than the Advent, a very slightly forward sound (by comparison), a somewhat rougher and not-quite-so-extended high end, somewhat lower efficiency, and rather less capacity for producing deep bass at high listening levels.

Both systems tend to be noticeably amplifier-sensitive, in that their low-end performance is audibly affected by the power capability and damping factor of the driving amplifier, although the Advent seems a little less affected. The Dyna, however, seems to perform at its best with amps of moderate power and damping (50 to 80 watts per channel), and tends to thin out at the bottom when used with high-powered high-damping amplifiers. The Advents, in most environments, sound a shade heavy and underdamped at the bottom with a moderate-power amplifier, and are at their best with high-damping brute-force amplifiers like the Crown DC-300. The differences here are rather subtle and, due to the higher efficiency of the Advents, high-level listening requirements may tip the scales in favor of them when there is not a great deal of amplifier power available.

Certainly, it is no criticism of the Dyna speakers that their low-end performance is best with the kind of amplifier that most people would normally buy for use with inexpensive

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 downrated 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:

* Professional Scully 282-2 tape recorder superseded in Group A by more-practical Revox A-77 home-type machine.

* Advent 200 cassette deck (when used with Crolyn tape) added to recorder Group C.

* Tandberg 6000X recorder added in Group B

* Audio Research SP-2 preamp supersedes inferior Marantz 7C and McIntosh C-22 in Group A.

* Improved Infinity preamp moved from Group B to A.

* Dynaco PAT-4 and Sony TA-2000 preamps dropped to Group C, replaced in B by Citation 11.

* Dynaco PAS-3x dropped to Group D to reflect quality improvement at top of pile.

* Audio Research Dual-50B amplifier supersedes discontinued Marantz 9A and Futterman H-3A in Group A.

* Citation 12 amplifier supersedes inferior Crown D-40 in Group B.

* Acoustic Research amplifier dropped from Group B to C to reflect quality improvements at top of listing.

* Beyer DT-48S phones upped to Group B to correct ranking error in previous listing.

* Beyer DT-480 phones added in Group C.

* Advent 101 noise-reduction device and Century General "Mini-Gen" oscillator added under "Miscellaneous Devices."

Sources: Decca products: Paoli High Fidelity Consultants, Box 876, Paoli, Pa. 19301 and the Lee Creighton Company, 740 Haven Pl., Linden. N. J. Goldring pickups: IMF Products, 7616 City Line Ave., Philadelphia, Pa. 19151. Audio Research Corp., 2843 Twenty-Sixth Ave. South, Minneapolis, Minn. 55406. Stax phones: Audiophile Imports, 8 E. Huron, Chicago, Ill. 60611. Beyer DT-48S phones: Gotham Audio Corp., 2 West 46th St., New York, N. Y. 10036. Beyer DT-480 phones: Revox Corp., New York. Infinity Systems, Inc.: 20940 Knapp St., Chatsworth, Ca. 91311. Century General: See report in this issue.

Tone Arms
(A) Rabco SL-8E, Decca International (1)
(B) Shure/SME 3009
(C) ADC

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

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

Tape Recorders
(A) Revox A-77
(B) Tandberg 6000X
(C) Sony 352D, Sony 155 (playback only), Advent 200 cassette deck w/ Crolyn
(D) Sony 250A, Harman-Kardon CAD-5 cassette deck

Microphones
(A) Sonv C-37FET, Neumann U-87
(B) B&O 100, Sony C-22FET, PML capacitor
(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-2, Infinity
(B) Citation 11
(C) Sony TA-2000, Dyna PAT-4
(D) Dyna PAS-3x

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

Receiver
(B) Heath AR-15

Headphones
(A) Koss E-9, Stax SR-3
(B) Koss PRO-4a, Beyer DT-48S w/ round cushions
(C) Sharpe HA-10-II, Beyer DT-480
(D) Beyer DT-90

Speaker Systems
(A) Two KLH Nines (4 panels), Infinity Servo-Static I, Hartley Concertmaster
(B) Advent (no model #), Janszen Z-600, Quad ESL (6), Hartley 220MS/Holton, single KLH Nine (two panels)
(C) Dynaco A-25, Advent
(D) Acoustic Research AR-4x, ADC 404

Miscellaneous Devices
(A) Advent 100 universal B Dolby
(B) Advent Frequency Balance Control
(B) Advent 101 B dolby
(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 SME arm, with suitable adapter. (5) Integrated preamp/amplifier. (6) Use with Quad 303 amplifier.

speakers. (The Dyna Stereo 120 amplifier is an ideal driver for the A-25's, not surprisingly). But the performance of the Advents with top-priced top-performance amplifiers suggests that it might not be at all absurd to consider using them and, say, a DC-300 in preference to a couple of $300 speakers and a $250 amplifier.

Since the Dyna speakers are often heavily discounted in the stores, it may not really be possible to make a meaningful price-versus-performance comparison between them, but there is no doubt in our editorial minds that each is a "best buy" in its usual price bracket. Where local pricing makes them fairly competitive, your specific installation requirements may force the choice between them. The Advents work best standing on the floor or raised a few inches above it, while the Dynas are generally at their best a few feet above floor level, which is appropriate for bookshelf-sized speakers. Otherwise, our own inclination would be to choose the Advents, if only because they seem more amenable to future up-grading of one's present power amplifier.

As for the Advents versus the top-of-the-line speakers, we can only say that you may prefer them to a pair of KLH Nines or Altec A-7's, or you may not. By all the accepted standards of evaluation (excepting efficiency, where the Altecs excel), the Advents are as accurate reproducers of sound as any top-line system we have heard. But we must face the fact that accuracy is no guarantee of personal satisfaction with a loudspeaker, and that many people value transparency above lack of coloration and find that a closer or more distant-sounding speaker conveys a more convincing illusion of realism than one that is completely neutral. We feel, though, that listeners who have no particular preference for a certain aspect of or kind of reproduced sound will be as happy with the Advents as with anything costing up to five times as much. Maybe even moreso.

MFR'S COMMENT: We are very grateful that Stereophile has evaluated the Advent loudspeaker on the basis of absolute sound quality rather than restricting comparisons to its price peers.

We are a bit confounded by the statement that the speaker is "noticeably amplifier sensitive," because this does not agree with our experience. The Advent loudspeaker is critically damped, having an almost ideal system Q of slightly less than 1. As a result, it does not change character when used with different amplifiers which differ only in damping factor, so long as each of them has a minimum damping factor of 10. Any speaker will sound heavier in the bass, for better or for worse, with a low-damping-factor amplifier.

We wonder how many amplifiers Stereophile used with the Advent speakers. The two mentioned in the review have been noted in prior Stereophile reports as having sonic differences when auditioned on other speakers. We suspect that what the reporter heard with the Advents were the previously-noted differences between these amplifiers, rather than differences between otherwise-similar amplifiers that were caused by the Advent speakers.

Revox A-77 Tape Recorder

In terms of performance, this is unquestionably the best tape recorder we have ever tested, and we've tested some of the top professional machines.

It has a full complement of internal setup adjustments for matching it to the tape you're using, and although Revox states that A-77's are pre-adjusted for 3-M's 203 tape, we found that ours could

be significantly improved (for use with that tape) by some further adjustment, after which it produced the smoothest, widest-range tapes (at a given speed) of any recorder we know of. The extended low- and high-frequency response limits are impressive enough, but in fact it is the unusually smooth response between these limits that makes the A-77's playbacks sound virtually indistinguishable from the original signal.

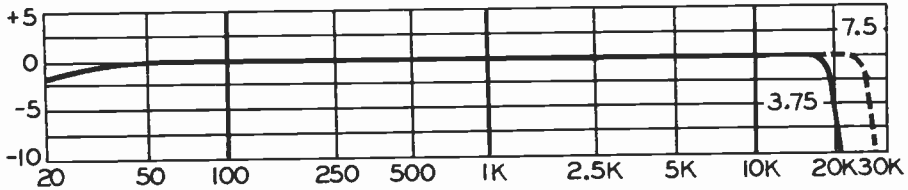
Mechanically, the A-77 handles and performs superbly, with totally inaudible flutter (due in part to the flutter-filtering tension arm that was added shortly after the recorder was introduced), but there are indications that the deck may not be as trouble-free as the electronic sections evidently are.

We have never known a tape recorder that didn't have at least one "weakness" of some kind. The KLH Forty had tape-handling problems, the earlier Tandbergs had problems due to overheating, and even some of the big professional Ampexes have motor and solenoid problems. As for the A-77, a number of users have reported problems with the relay contacts and the reel-drum brakes. The fact that Revox's instructions recommend using reverse-wind torque (instead of the Stop button) to slow the tape after a high-speed wind suggests that the manufacturer, too, may be aware of a certain weakness in the braking system.

It is easy enough to get into the habit of doing this, and worth doing anyway because it stresses the tape less, but the <u>need</u> for doing it does make one feel just a little insecure about the deck.

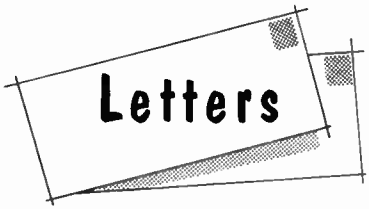
Of 46 A-77 owners we have heard from, though, only 3 have had brake failures, 13 have had troubles that might have been attributable to relays, and 32 said they had had no problems that required professional service. Of the ones who did, <u>all</u> reported prompt and effective service from the Revox people, which may set some kind of a record. Our own A-77 (which we bought) has been used for perhaps 250 hours to date, and has worked flawlessly.

The A-77 is, by the way, available on special order in a 2-track version and/or a high-speed (15 and 7½ ips) version, for professional use, and no professional need apologize for using it. As for the home-type 4-track slower-speed one, this is going to be hard to beat. For sheer fidelity of recording, we doubt that it <u>is</u> beatable at the present state of the art. But we'll keep looking.



MFR'S COMMENT: Very early-production models of the A-77 used Nylon brake shoes, which did on occasion "grab" during high-speed stops, but all A-77's made since over a year ago have cotton-pad brakes which have eliminated the problem. It is now entirely safe for the recorder to go from a high-speed shuttle directly to Stop braking, although it is still easier on the tape to slow it via reverse torque before stopping it.

The relay problems that some A-77 owners have experienced appear to be the result of air pollution, since the trouble can be effectively eliminated by a special contact-surface treatment that can be done by Revox in the U.S. or by any of their dealers.



Quad ESL Reliability

Wonder of wonders, maybe Quad really did fix their electrostatic speakers' power supplies four years ago. My pair just passed age four with no problems.

Skip Koff
Philadelphia, Pa.

Yours and a lot of others. The Quad speakers are now officially off the "problematical" list.

We can quibble with their extreme low and extreme high-end ranges, but they're still as natural-sounding as anything we've heard.

Quadriphonic Holt?

Was that by any chance Ye Editor & Publisher wearing the four headphones on your Summer cover?

R. L. Wilkes
Alexandria, Va.

No, it wasn't.

Devilish Divinations

Sometimes I wonder if you people aren't in league with the devil.

When the first Dolby discs came out, you predicted that the Dolby would end up in the home, reducing noise from commercially-made Dolbyized discs and tapes. Well, now there is a home-type Dolby, Ampex has started to release Dolbyized cassettes, and there are rumors of Dolbyized discs in the offing.

Two issues ago, when Quadriphonic recording was announced, your cover showed someone wearing two sets of headphones for four-channel listening. The June issue of Audio, which came out about six months after that issue of Stereophile, carried a news item about a four-channel headset that someone has patented and, presumably, intends to manufacture. Of course, your cover photo was only in jest. Or was it?

Where do you get your advance information? From a pentagram on the listening-room floor?

Harry Bloch
Teaneck, N.J.

Our "predicting" follows the precept "If something can be done, for profit, it will be done." Both of these things could obviously be done at the present state of the art, both would obviously make money for someone, so it was inevitable that eventually someone would take a crack at doing them.

The home Dolby works like a charm; the 4-channel headset may or may not be such an overwhelming success. We shall see....

More on the Spiff

As a former audio salesman, I was glad to see your remarks about "spiffing" in the audio industry. (Spring and Summer, 1968) However, I got the feeling from reading your comments that you either have never sold audio equipment yourself, or have sold it only in a professional or consulting setup that was really serving the customer's needs. Most Stereophile readers probably make up their own minds anyway, but I doubt if many people realize just how sick the whole retail audio operation is. For every audio store where the people are both knowledgeable and honest, there are a hundred where caveat emptor is the guiding rule.

The letter from the chairman of the New York Audio Society was typical industry whitewash. While his comments on spiffing were not outright untruths, they were at least misrepresentations. To say that spiffing makes no difference because everybody does it is a great over-

simplification. To begin with, not everybody does it. Dyna and AR, for example, spend their money on making quality products instead of on paying salesmen under the table. They are exceptions, though. Practically all of the "big-name" manufacturers spiff -- usually a couple of percent of the selling price of the item. But if sales are down for a certain manufacturer, the spiff will be raised for a short time on a special promotion. Thus, the customer could come into a store one month and be told that a Harman-Kardon receiver is the one for him, and come back a month later to learn that Scott is now the industry standard.

As far as most salesmen being "very knowledgeable," this is seldom true in the New York area and even-more-seldom true in other parts of the country. There are however several things that most salemen are knowledgeable about: The spiff on each item in the store, down to the penny. Exactly what items are in stock at that moment. About how much money the prospective customer can be persuaded to spend. How to "sell away" from any item in the store to one with a higher spiff or that is in stock at that moment. And how to spot a customer who knows something about audio equipment.

What the salesman is almost certainly not knowledgeable about is: What the customer actually requires for his own particular ears and musical tastes. What constitues a "balanced system." What specifications actually mean and how the tests are conducted. What changes in a system will make significant improvements in sound and what changes will provide only negligible improvements.

I have worked with salesmen who solemnly assured customers that RMS meant "Radio Manufacturer's Standard"! Or that Koss electrostatic headphones would only realize their full potential when driven by a Crown DC-300!

A cardinal rule for the customer should be Never buy "house-brand" merchandise. With all too few exceptions, this stuff is nothing more than attractively-packaged junk, marked up sometimes as high as 500%. And of course, no manufacturer can afford to spiff the way a large dealer can when he is pushing his house-brand stuff.

I could go on for many more pages about how the customer gets bilked, or describe how to rig a demonstration so subtly that only the most experienced audiophile would suspect that anything was amiss. I learned these things, but because I didn't practice them I made several friends but not much money. Finally, I got into another line of work, and now listen only to my own system. Take it from one who was behind the counter: Spiffing is dirty business, and by and large, so is the whole audio selling field.

John Scorgie
Hales Corners, Wis.

We reiterate our advice to readers: Some dealers may be honest and knowledgeable, but unless you know for a fact that yours is, it's best not to assume he is.

Hi-Fi Newsletter

I've been hearing some rumors these days about a new hi-fi-type magazine called Hi-Fi Newsletter. Does this have anything to do with Stereophile, or is it a competitor, or what?

Charles Paulson
Decatur, Ill.

The Hi-Fi Newsletter does not have any connection with Stereophile (except that editor Victor Fernandez is one of our subscribers), and we suppose that it could be considered a competitor in that it does endeavor to do some of the same things Stereophile does, and is also subscriber-supported. It looks like a worthwhile addition to the audio-publication field, though, and any Stereophile readers who are curious

to know more about it can write to Hi-Fi Newsletter, Box 593, Hialeah, Fla. 33011 for more information.

Petulant Cover

Two issues ago, you ran a blank cover on the magazine and complained petulantly that you were doing that because you hadn't had much reaction to previous covers and were wondering if anyone cared. Did you get any useful suggestions as to how your covers might better be used?

Nat Smedley
Shaker Heights, Oh.

A few, but mostly there wasn't much reaction, so we went back to the kind kind of covers we like.

Dyna A-25's

On the basis of very favorable reviews in your publication and others, I recommended the purchase of Dyna A-25 loudspeakers to two friends for their initial hi-fi ventures. I was able to borrow one friend's purchase for evaluation in my home, as he has not yet obtained the rest of his components, and this experience has led me to some rather surprising observations.

In particular, certain claims for Dyna's "aperiodic" design must, I feel, be qualified. In this case at least, it would appear that Dyna's implied criticisms of the acoustic suspension design are not true.

My first point is that Dyna's design is not more efficient than a typical acoustic suspension system. The AR-3, for instance, is generally recognized as one of the least efficient loudspeakers, yet on the basis of my measurements (constant input power, various warble tones, identical speaker and mike placements), the Dyna was found to be about 2 dB less efficient than my AR-3. All speaker controls were set for flattest response in my room. I recognize the accuracy limitation involved in my using the speakers' nominal (rather than measured) impedance for my input power figures, but the supposedly flatter impedance curve of the Dyna would favor its efficiency as calculated.

My second point is that Dyna's aperiodic design is not less resonant, with better bass definition, than some acoustic suspension systems. In fact, it appears to have a significant resonance just below 100 Hz. This is made all the more noticeable in my home by an acoustical condition which causes a group of standing-wave resonances within a few hertz of 90 Hz. The AR-3, with its nearly flat response between 50 and 500 Hz is noticeably more immune to this problem than the Dyna, and its room placement is correspondingly less critical. With each system's location carefully chosen, the AR-3 clearly has better bass definition and a half octave more bass range.

Finally, the Dyna tweeter seems to have a smooth but sloping response. In my well-furnished room, the tweeter control must be advanced one notch above the "Flat" position. This however introduces a noticeable upward step in the response where this crosses from the woofer to the tweeter. In fact, there is an audible step even in the Flat position. Apparently this was traded off with the diminishing response in the upper mid-range. At any rate, it would seem that the type of level control pioneered by Electro-Voice, to avoid shelving at crossover, would benefit the A-25.

Subjective response measurements using the warble tones on Stereo Review's SR12 test record indicate that the Dyna's response above 500 Hz is more linear than that of the AR-3, but this does not seem to be the whole story for this important band. My AR-3's (not 3a's) sound decidedly more like Quad electrostatics than the A-25's.

What I'm driving at is, don't believe all you read. The Dyna A-25 does seem a good value, but it is hardly competitive with the better

and more expensive acoustic suspension designs that Dyna dismisses as resonant and inefficient. My criticism is not of Dyna's loudspeaker but rather the propaganda associated with it. Too often, equipment reviewers (and do not exclude yourself) are influenced by a manufacturer's claims and a past record of his general honesty, with the result that the reviewer's objectivity suffers.

Robert C. Moore, Jr.
Bernardsville, N. J.

Point by point:

Perhaps we have not seen all of Dyna's literature on their A-25, but we have not seen any claim that the speaker is "more efficient than a typical acoustic suspension system," if indeed there is a "typical" one. Dyna claims only that the A-25 has a smoother impedance curve, and thus allows most amplifiers to deliver more power. And while the implication is "more than most acoustic suspension systems," Dyna makes no specific comparisons, so neither can you or we. We found the A-25's to be neither more nor less efficient than an admittedly small sample of "acoustic suspension" systems, but did find them able to elicit more clean signal from a given amplifier than some of the acoustic suspension systems we compared them with.

Measurements of comparative loudspeaker efficiency can be very tricky when carried out in a listening environment, because room acoustics and speaker placement in the room can cause differences of as much as 12 dB in output from one frequency to the next. A measured efficiency difference of 2 dB would be highly suspect unless you made and then averaged a very large number of measurements. Although efficiency measurements are supposed to be made at 400 Hz, we have found a random-noise source (hiss) about an octave wide and centered on 400 Hz to correlate more closely with subjective efficiency differences.

As for the A-25's "significant resonance" below 100 Hz, why doesn't this show up in the measured impedance? We didn't observe this in the A-25, but we have heard what sounded like a similar resonance from the AR-3 in some rooms. Room acoustics could account for this disparity between our observations.

Perhaps we are influenced to a degree by what we read about products and by the reputations of their manufacturers. All we can say is, we try not to be. And when you live with a speaker system for some months (we put a pair of A-25's in our second listening area), the truth will out, promotional propaganda notwithstanding. After these months of listening, we will add to our A-25 report the observation that they do tend to sound rather small (in the sense of being somewhat closed in, but not boxy). But the rest of the report still stands.

Unbelievable Letters

Where did you ever get ahold of those hilarious letters from manufacturers that you printed in the Summer issue? I didn't think any hi-fi manufacturers could be as brutally frank as those letters were.

Arnold Wren
Sacramento, Ca.

Those "letters," you may recall, were printed under the title "Letters You'll Never Believe." Well, you shouldn't have believed them.

Every one of them was a fictitious figment of our imagination, freely fabricated from whole cloth for the sole purpose of entertaining our readers, at the expense of some manufacturers who might conceivably have written such letters but didn't, as far as we know.

Correctable XA

The AR XA has problems with vertical tone-arm pivot binding. To solve the problem: Disable the arm's vis-

cous damping (AR will supply the instructions happily and speedily). After reassembling the arm, loosen the pivot setscrews until it no longer seems that the stylus force gauge sticks.

Lee Crawfort
Lexington, Ky.

We faulted the Thorens TP-13 arm because it was rarely delivered in proper working order, and was ticklish to put in proper working order. We feel the same way about the AR arm. If it is necessary to disable the AR arm's vertical damping and then readjust the pivots before it will work right, why in the name of common sense doesn't AR do these things before they ship their turntables from the factory?

PAT-4 Tracking

After having put up, grudgingly, with the very poor volume-control tracking on my Dyna PAS-3 preamp, I was disappointed and frustrated to see that you made no comment at all about this aspect of the PAT-4's performance.

Can you tell me how they compare, or was the PAT-4's tracking too bad to mention?

H. A. Lewis
St. Louis, Mo.

It was neither bad enough to criticize nor good enough to praise, but you're right, we should have said something about it.

It was in fact much better than that of previous Dyna preamps. In our sample, the maximum balance change through the volume control's entire rotational range was a shade under 2½ dB, and was no more than 2 dB through the normal operating range of 9 to 2 o'clock.

Customer Service

You asked for readers' comments about their experiences with various manufacturers so here are mine:

The HEATH Company-- I have constructed several of their units, including the AR-15 receiver, and have found their consultants most helpful with problems. Not only that, but they have also sent me new parts when indicated, without charge. I must personally compliment and thank Mr. M. P. Kreiger, one of the consultants who has been most helpful to me.

ACOUSTIC RESEARCH-- Also a pleasure to do business with. They have even gone to the trouble to refund delivery charges without me even requesting this.

H. H. SCOTT-- Likewise, a pleasure to deal with.

David Schlein, M.D.
Linden, N. J.

Let's keep those cards and letters comin' in, Folks. And don't limit them to bouquets. If you feel you've been handed the short end of the stick by a manufacturer, let us know about that, too.

Miscellany

Crolyn Cassettes

We received (from Harman-Kardon) a couple of sample Crolyn cassettes bearing the BASF trademark, and gave them a brief try just before this issue went to press. The verdict? Excellent!

Any doubts we may have retained about the future of cassettes as a high-fidelity medium are gone. There is still room for considerable progress in the frequency response department — cassette sound is still notably deficient at the low end of the range and is often rather bumpy in spots — but the chromium-dioxide cassettes now put the new medium on a par with open-reel tape, particularly when used with a Dolby-equipped recorder. We'll have a detailed comparison between the Crolyn-

cassette sound and open-reel sound with at least one Dolby cassette machine in our report on the Harman-Kardon CAD-5, in the next issue.

Updated Dating

A number of years ago, thanks to a combination of poverty and inefficiency, we got badly behind on our publishing schedule. Partly because of the Second-Class mailing requirements, and partly because our expiration code was tied to the issue date shown on the magazine, we continued to date each issue as of the time when it should have come out, rather than according to actual publication date.

Unfortunately, despite our explanations, many new subscribers were convinced that we were sending them two-year-old copies of the magazine (containing up-to-date material), and others were confused about their expiration dates anyway. So, we've arranged with the Post Office to switch to current dating for this and subsequent issues, with this issue reflecting the intervening gap (mainly for the benefit of libraries). Expiration-code information will, as usual, be provided in a box above the Subscription coupon. Please check this if you suspect that your sub may be on the verge of expiring.

Shure Gauge

Shure Bros. are now selling for $4.95 a Model SFG-2 balance-type (No springs, honest weight!) stylus force gauge for which they claim 1/10-gram accuracy in the ½ to 1½-gram range. The maximum measurable force on the SFG-2 is 3 grams, suggesting that it was designed mainly with ellipticals in mind. Sphericals generally call for a tracking force of between 2 and 3½ grams.

Reports Coming Up

In the next issue: Reports on the Infinity 2000 and Bose 901 speaker systems, the Electra-Amplidyne Research speaker equalizer, the RABCO SL8E arm, the Harman-Kardon CAD-5 Dolby/Crolyn cassette deck, the Advent and Advocate Dolby noise-reduction units, the SAE preamplifier and the Stax tone arm.

Currently on hand but not yet written up: KLH Thirty-Three and

Time Up?

If your mailing label on this issue of Stereophile bears the number code **1-69** or **2-12**, this is the last issue due you on your present subscription, unless of course you sent us a renewal within the past three weeks. The next issue should be out on schedule, and we do not over-print substantially, so please get your renewal off to us promptly to make sure you get your copy of it.

Dynaco A-50 loudspeakers, Stax SR-3 electrostatic headphones, Koss PRO-4A headphones, Citation 11 preamp, Citation 12 power amp, Crown D-40 power amp, the Ampex Micro 54 and Advent 200 cassette decks, the Ampex ASR-100 receiver, and the entire line of Audio Research (formerly Peploe) tube-type components.

Promised but not yet received: IMF Studio and Monitor loudspeakers, Sony microphone mixer, Infinity and Crown preamps.

Audio Mart

The Audio Mart publishes, free of charge, Buy Sell or Swap ads from subscribers. Ads are published as received, so we cannot be responsible for the condition or quality of items advertised for sale. Each ad received is run once, in the earliest possible issue. Ads may be repeated as often as desired, but we must receive specific notification every time you wish us to rerun your ad. Dealer ads cannot be accepted, except for components that are used or are no longer listed in current catalogs.

FOR SALE

Heath AJ15 tnr, 2 AR-3a's, Marantz 15 pwr amp, best offers or will trade for Marantz 10B tnr. H. Wainstock, 1529 N. 3rd Ave., Upland., Ca. 91786. Phone 714-985-4436

Style 7C Klipschorn; pair Marantz Model 2 pwr amps; E-V 636 mike. All exc condtn. R. J. Vanderbilt, 38 West River Rd., Rumson, N.J. 07760. Phone 201-842-2202.

Volume 1, # 1 thru 12 of Stereophile. Best offer. B. Woodward, 1608 Richardson, Apt. 4, Columbia, Mo. 65201

Like-new mics: Turner 602 Lo-Z, lists at $59.50, sell for $25; RCA SK-45B dual-Z, list $45, sell $20; Calrad DM-21 dual-Z, list $13.95, sell $8. Also Dynaco Stereo 70 pwr amp, like new, sell $55. All postage prepaid. Ken Massey, 6132 Fairlane Dr., Acton, Ind. 46259

Revox 1222HS, new, near dealer's cost; Uher 4200 & all access, as new, reduced; Sony ECM22 & C22FET mics, as new reduced; new stu-

dio console, 4 stereo, 8 mic-line inputs, 4 pan pots, echo mixing, real bargain. Jerry M. Hyde, 301 Springdale Ave., Wintersville, Oh. 43952. Phone 614-264-4987.

Two KLH Nine spkr systs (4 panels), barely used, impeccable condtn. Must sell, will consider low offers. Will sell either pr separately. Harrison G. Pope, Jr., 51 Hillside St., Boston, Mass. 02120

Crown DC-300 pwr amp, new in facty carton, $585. Jim Crosby, 800 Camellia St., Ft. Lauderdale, Fla. 33313 (305)-583-7801

AR-3, teakwood, $125; Shure V-15-II stylus, new, $45. Frank W. Farlow, 8 Bowker St., Brookline, Ma. 02146

2 Neumann M50b capac mics (omni-dirctnl), as new, with instrctns, all access, 3 xtra 33-ft cables, ceiling suspensors, two tripod stands w/ screw-on connectors (xtend to 13 ft); $700 plus shippg. Stevens theater spkr syst, 10-cell horn twtr, 2 15-inch woofers, gray util cabnt; $200 plus shipping. R. F. McGraw, Rte. 1, Box 182, Carmel, Ca. 93921. Phone 408-624-2053.

Pair Infinity 2000 spkr systs, new, wlnt, blck grilles, $400. Revox G-36 Mk III 2-tr recdr, portbl & wlnt cabnts, remote control, 2 E-V 502B mic xfrms, 2 25-ft cables, perf condtn, $275. Bob Zeichner, 870 Cricklewood Dr., State College, Pa. 16801. Phone 814-237-7577

Two JBL Olympus S8R spkr systs in tawny wlnt, $1200; with built-in Energizer, $1400. Also custom 30-cu-ft bass spkr w/ 4 JBL LE-15A and 100/200 xover netwk, antique white, $600. All F.O.B. R. S. Loveland, 1126 Buckingham Ave., Norfolk, Va. 23508.

Acoustech Mk III pwr amp, facty wired, good condtn. Will ship p-p by UPS on receipt of $80. A. L. Steevs, 72 Lexington Dr., Croton-on-Hudson, N.Y.

Sell or trade: Janszen 65 tweetrs & 350 woofrs; Electrostat 3 tweetrs; AR2ax mid-ranges; ADC 10E Mk II cartdge. All in exc condtn; best offers, or swaps for Dyna FM-3, good-quality small spkrs, RABCO arm, or? Mark Aaron, 27-D Janet Dr., Poughkeepsie, N.Y. 12603

Infinity SS2 system, Rosewood, mint condtn; Crown DC-300, Mac C-26, Mac MR-65B, Bowers & Wilkinson DM spkrs, Advent spkrs, Acoustech X electrostatics, Marantz 2 amp, Newcomb TX-10 recdr. All offers or trades considered. Paul Heath, 81 Big Tree St., Livonia, N.Y. 14487 (716) 346-5630

Magnecord 1048-42X, $550; Revox G-36, $275; both as-new (new heads in Revox July 1970). Two AR3 spkrs, oild wlnt, $100 each or $180 the pair; Grado Lab tone arm, $15; Rek-O-Kut L-34H t'tble w/ base & hyst motor, $10; Shure V-15-II cartrdge, $15; Wharfedale Super 12 RSAL spkrs, $25 each or $40 the pair; Viking 85 tape deck w/ hyst motor & Nortronics record amp, $30; new Sony 155 playback deck, $50; pair JBL Apollo oild wlnt enclosures, $45 each or $80 the pair; all in exc condtn. Will consider trades for Scotch, Ampex or BASF tape and/or condenser mikes on any of above. F. R. Hermann, Box 119, Rte 1, Sanborn, N.Y. 14132 (716) 731-9325

Revox F-36, Quad 22, 2 Quad II's, Quad FM mpx, Quad AM-II, 2 Quad ELS (all items used about 10 hrs), Stax tone arm (never used), 1800-ft Mylar virgin tapes -- Soundcraft, RCA, Sony, Philips -- in sealed boxes. Best offers. R. Robinson, Apt. 1707, 8888 Riverside Dr. East, Windsor 16, Ont., Canada.

REL Precedent mono tnr, exc condtn, & stereo slide projector, unused: want 10½-inch-reel deck, transistor stereo amp. G. M. Wingate, P.O. Box 191, Hallowell, Me. 04347

Audio & Design arm, extra carrying arm with Decca Mark II, all for $100. Also Mattes SSP-200 amp, $200; Marantz 7T prmp, $200; KLH Model 18 tnr, $70. All in exc condtn. Will ship UPS prepaid. L. L. Clark, 69 Edgewater Pl., Edgewater, N.J. 07020

WANTED

ADC 18 spkr syst in exc condtn. George Mueller, Sliker's La., Schooley's Mtn., N.J. 07870

Anyone owning McIntosh MI-3 CRO unit, pls contact me for purposes of helping to receive information about it that I have been unable to get from mfr. Ron S. Brngal, 1037 E 156th St., Dolton, Ill., 60419

Weathers SC-1 electronic speed control, Weathers SE60A Harmony Trio spkr syst. F. Wayne Stellmacher, 471 Columbus Ave., Apt 12, New York, N.Y. 10024

Pair of Klipsch Cornwalls or Heresies; 2 Janszen woofers, in cabnts or not; Advent Frequ Balance Control; KLH FM tnr. Tom Groom, 324 N Spring St., Murfreesboro, Tenn. 37130

RECORDINGS

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

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

Charles A. Richardson, 1932 Old Annapolis Blvd., Annapolis, Md. 21401 (Classical, mostly symphonic, stereo & mono)

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

Mel Madorsky, 23241 Berkley, Oak Park, Mich. 48237 (Classical, stereo, off-the-air)

the stereophile
Box 49, Elwyn, Pa. 19063