As We See It...

Late Again!

It is probably unnecessary for us to point out that this issue is late. Five months late, to be more or less exact. Under the circumstances, it took more than a little gall to date this our "Winter 1975/76" issue, but the truth must out, and the truth of the matter is that this "Winter" issue will be going out to subscribers around the end of August 1976.

We are underscoring that fact for the benefit of new subscribers who, on receiving as their first issue a copy that looks 6 months old, may suspect some kind of ripoff. So we repeat: Despite the date, this issue was up-to-the-minute as of July 31, 1976.

As for our current subscribers, please accept our apologies for keeping you waiting so long. You have been more patient than we had any right to expect. We offer no excuses; all we can say is that we shall try our damnest to see that it doesn't happen again. We have, you will note, made this issue a bit fatter than usual to compensate, somewhat, for its lateness. But please, don't expect an 80-page issue every 3 months. We'll never go back to our original 32-page count, but neither have we any intention of getting involved in an obesity race with our "competitors." We try, most of the time, to make our copy brief and concise rather than sprawly and verbose, and we'll have another 80-page issue only if (1) We are deluged with ads, and must add extra text pages to maintain a decent ad/text ratio, or (2) There is too much to report on within the confines of a 60 to 70-pager.

FYI: Note also that, as of this issue, we are obliged once more to raise our rates, for all the usual reasons. We're raising them a bit more than is necessary to offset rising costs, for two reasons: First, we don't want to have to raise them again this coming year when the next round of annual (or semi-annual) Post-Office rate hikes come round again. And second, we are going to start buying outstandingly good articles for publication in the magazine, and we have other plans for expansion and diversification that will cost, too. The result, you will find, will be an even more interesting and informative 'Stereophile' than previously. Some of our plans for the future are detailed herein, some will come as pleasant surprises.

Remember, this publication is for your benefit. Let us know what you'd like to see in it.
Most conventional types of frequency-selective filter circuits are familiar from common applications in record playing equipment. The high-pass filter (figure 1), which appears in the form of a rumble filter on amplifiers and preamplifiers, allows all signals above a certain frequency (say above 50 Hz) to continue on through the system, while blocking out lower frequencies. The low-pass filter (figure 2) is exemplified by the scratch filter, which prevents frequencies above, say, 8 kHz from passing, while allowing lower frequencies through. If both filters are switched on at once, the effect is that of a band-pass (figure 3) which passes only a range of frequencies between two prescribed limits. Multi-range equalizers such as the Soundcraftmen and SAE ones can provide band-pass or band-suppression (attenuation of a limited-width band) functions.

Phase effects (time delay of some frequencies with respect to others) are inevitable by-products or errors of low-pass, band-pass, or high-pass filter types. In the all-pass filter, phase shift is the goal. As the name indicates, an all-pass network is intended to transmit all frequencies with equal amplitude while providing some desired phase shifting, and this turns out to be an easy requirement. Although very elaborate and complicated frequency-blocking filter types cause unwanted phase changes, the simplest all-pass filters, such as that shown in Figure 4, provide phase shifting with no change in output level. This is an example of a circuit with perfect frequency response, but with distorting effects on transient information. You can find, by connecting an audio generator to the input and an oscilloscope to the output, that changing the frequency of sine waves at the input does not affect the level of the output signal, yet a 1 kHz square wave comes out badly distorted. In other words, although phase shift is intimately associated with frequency response changes (as in low-pass or high-pass filters) the opposite is not necessarily the case, as the all-pass filter demonstrates.

So what use is it? It is used as a phase-correcting device. When a signal already has noor phase-frequency characteristics (perhaps at the receiving end of some sort of transmission line), an all-pass filter designed with complementary phase-shift can help to restore the signal to its original condition.

**Operation**

By looking at the simple demonstration circuit, we can get some insight into the all-pass concept without resorting to complex mathematical analyses. (A brief description from that point of view is included later on). Now, given the circuit of Figure 4, we would like to know why the output voltage, E₂₀, is related to the input voltage E₁ in the unusual way that no matter what the frequency of the input voltage is, the output voltage level is always one-half the input voltage, while the phase angle of the output may vary with the input frequency.

Since it is claimed that the output level is constant for any frequency, let us put the circuit to the test, so to speak, and examine the operation of the circuit at the frequency extremes: 0 Hz (or DC) and ω Hz (infinite frequency). What is the result of applying a DC voltage (that is, a frequency whose value is zero) to the E₁ terminals of the circuit? In other words, what is the difference in voltage between the E₁ and the E₂ terminals (voltage at one terminal subtracted from voltage at the other). Suppose we imagine the circuit as divided into two parts—left and right—in order to make it easy to find each separate terminal voltage. (This approach is justified by the fact that the circuit in operation will only tolerate high-impedance loads, a condition which simulates well our analysis with no connection to the E₀ terminals).

The problem begins to look easier already, because the left portion of the circuit is a

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**The All-Pass Filter**

A simple solution to some knotty audio-design problems.

by David R. Schaller

*Box 353, Milwaukee, Wisconsin 53201.*

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Figure 1. High-pass filter and response curve.

Figure 2. Low-pass filter and response curve.
The voltage appearing across E_0 has been reversed, which is another way of saying it has undergone 180 degrees of phase reversal.

Simple voltage divider with two equal-value legs, and the voltage V_b is obviously just half of the input voltage, 1/2 E_t. What about the right-hand part of the circuit? At DC, or zero frequency, the reactance (AC resistance) of the capacitor goes to infinity, because a capacitor is an open circuit for DC. This means that the bottom half of the right-hand part of the circuit will behave as if it is not there at all. No current will flow through R_a, and without current flow there can be no voltage drop through R_a. So the voltage appearing across V_a will be the same as if R_a had zero resistance. It will be the same as input voltage E_t. And since the voltage at V_b was half of E_t, then the potential difference across E_0 will be equal to 1/2 E_t. Notice that V_a - V_b is positive for a positive E_t; the “phase angle” is zero. Now let us contrast this behavior with the results at infinite frequency.

Half of our job here is already done, since the voltage-divider portion at the left gives the same results regardless of frequency, and we know that the new value of V_b is again 1/2 E_t. But the capacitor’s reactance has now gone to zero (since the frequency has been chosen as infinity). The capacitor now acts like a short circuit. V_a now appears (or perhaps we should say tries to appear) across this shorted capacitor, and is simply shorted out to become zero. At zero frequency, it was R_a that behaved as though it had zero resistance, so the full input voltage appeared across V_a. Now, at infinity frequency, it is C that behaves as though it has zero resistance, and the full input voltage again appears across V_a. The potential difference across E_0 is, again, equal to 1/2 E_t. But in this case, the voltage appearing across V_a is drawn from the bottom of the two input voltage (E_t) terminals rather than from the top terminal. In other words, the polarity of phase angle terminology carries no connotation of a signal transfer to a position in advance of real time, but only represents conventional practice in choosing, for example, to say that one wave “leads” another by 1 degree rather than that the second “lags” by 359 degrees. You might say that ordinary measures such as tape or electronic signal delays provide information “from the past”, but no current techniques can go the other way! If the possibility of having one circuit with negative phase and another with positive phase inclines you
to try the effects of one on the other, remember to use some sort of isolation between the two (such as an emitter follower or operational amplifier connected as a voltage follower) so that each circuit has a low-impedance drive and a high-impedance load. An arrangement such as this might be a good illustration of phase compensation techniques, considering the first circuit as the distortion source, and the second as the corrective circuitry.

**Application of All-Pass Filters**

The first engineering interest in phase distortion arose from the use of long lines in communications. As early as 1918 the effects of phase differences on telegraph pulses were recognized and studied. It was the phone company’s research group which initiated studies into this aspect of communication; the transoceanic cables were a tremendous impetus for investigations of this kind. Bell Laboratories often dealt with phase changes so large that you might see graphs in technical articles which show ordinate values in *radians* (1 radian = 57 degrees)! With such gross phase errors, speech transmission may be affected adversely, as well as telegraph signals. Reference 4 contains some interesting photographs of wire-line-transmitted typescript (the so-called telephoto or facsimile transmission) before and after phase compensation was applied; the appearance of that “before” picture will be familiar to anyone who has ever used a photocopy machine and not held the source material flat against the window while it was being processed.

Many systems require phase shift to be almost linear with frequency. TV transmission requires complex phase equalizers.* Without entering the controversy over the audibility of small phase changes, it seems fair to say that the all-pass concept presents possibilities for those with speculative or experimental inclinations, and that the all-pass filter provides a genre-completing complement to the familiar low-, high-, and band-pass types which may be considered intellectually satisfying, or amusing, or perhaps both. For those who wish to pursue the broad areas of phase-changing circuits or effects in more detail than the introductory coverage here, a brief bibliography is provided. One general point needs mentioning, however: it may not be clear from any given reference source that you have a choice of two methods of designing a

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* Note that a “perfect” system with no phase shift is an unimportant special case of this requirement: if θ = αf, where “α” is some constant value and “f” is frequency, while “θ” is phase shift, “β” will equal zero for all “f” if “α” is zero. A signal which passes through a network with a linear phase-shift vs. frequency characteristic where “α” is not zero arrives undistorted, but delayed. Networks designed with this result as the desired effect, rather than the end product of phase-compensating some existing system, are known as delay lines.

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**Technicalia**

For those who would like a more general description of all-pass filter operation, a pole-zero plot of the transfer function is suggested as a very easy and rewarding way of visualizing the effect. All-pass circuits have a right-half-plane zero for each pole in the left-half-plane, (recall that it is RHP poles that are prohibited in stable circuits, not RHP zeroes) and each zero-pole pair is symmetrical about the jω axis, so that denominator and numerator vector contributions to the absolute value of the transfer function along the jω axis are equal, and the magnitude of the transfer function remains constant.

Although the example circuit shown has the drawbacks of an output which is attenuated 2X and appears at terminals which are both off-ground, it has compensating “draw forwards” as a demonstration circuit: it is simple, and it does not use any inductors. This last point is of practical importance. Aside from the well-known problems associated with inductors (resistance, nonlinearity, hum pickup, etc.) the large inductance values required for use in all-pass circuits in the audio range would remind a person of the values of filter chokes used in power supplies, except that these should be of close tolerance. Inductors such as this are unusual and expensive laboratory devices. For demonstration purposes, the “floating” output can usually be ignored, particularly if low impedance component values such as those shown are used. Naturally, if an oscilloscope with a differential input is available, it may be used, but it will probably be found that an ordinary single-ended type can be used without difficulty.

For information on other types of all-pass networks such as the unbalanced variety (with a terminal common to input and output sides) see books on network synthesis (some are mentioned later).
network to meet some requirements, since most sources simply cover one or the other method, and never mention the alternate approach. Simply stated, one can choose to require a passive network (consisting of resistors, inductors and capacitors, at most) or one can use an active network, in which passive networks are complemented by, or isolated from one another by, active devices (such as vacuum tubes, transistors, etc.). Obviously the second method is the more versatile of the two, and perhaps the more interesting, since the use of active devices makes possible such curious techniques as gyration (electronic transformation of a capacitor to produce characteristics of a nearly-perfect inductor), and of unusual circuits such as the "negative immittance converter" which allows simulation of negative values of inductance, capacitance, and resistance.

In addition to information on technique and application available from sources in the bibliography, the history and mathematical analysis of phase problems from the point of view of the researchers who first encountered them may be followed in the technical journals, about 1920 ff. Looking over this early material is an inspirational reminder that while new products come and go, the science, mathematics, and engineering which lie behind them remain of lasting value.

### BIBLIOGRAPHY

1. Close, Charles M., *The Analysis of Linear Circuits*
2. Hilliard, J. K., "Notes on How Phase and Delay Distortions Affect the Quality of Speech, Music and Sound Effects", *(To page 62)*

### Some Effects of Phase Shift

<table>
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<th>PHASE SHIFT (θ) vs. FREQUENCY (f)</th>
<th>FREQUENCY RESPONSE</th>
<th>SIGNAL ARRIVAL</th>
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<td>θ</td>
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<td>Retains form.</td>
<td>Ideal length of wire. Delay line. Ideal electronic reproducing equipment*. Phase compensated lines or systems.</td>
</tr>
<tr>
<td>θ</td>
<td>f</td>
<td>Delayed (varies with freq.).</td>
<td>Distorted.</td>
<td>All-Pass networks.</td>
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<tr>
<td>θ</td>
<td>f</td>
<td>Delayed (varies with freq.).</td>
<td>Distorted.</td>
<td>Real transmission lines*.</td>
</tr>
<tr>
<td>θ</td>
<td>f</td>
<td>Delayed (separate signals).</td>
<td>Distorted.</td>
<td>3-way loudspeaker system with unequal distances from speakers to listener but otherwise ideal.</td>
</tr>
<tr>
<td>θ</td>
<td>f</td>
<td>Delayed (separate signals).</td>
<td>Distorted.</td>
<td>2 microphones on one recording channel*. Tape print-through. Echo.</td>
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</table>

1. Amplifiers, crossover networks, transducers, etc.
2. Re phase distortion in a long, uncompensated line: "When carrying on a conversation over such a circuit as this, distortion of the voice waves makes understanding difficult, while peculiar ringing sounds are very noticeable." B. S. T. J., Jan., 1923
3. The old Mercury Records 1812 Overture has an aural example of this simple kind of phase distortion in a discussion of some of the problems encountered in recording cannon-firing sounds (this discussion is on the record).
Otari MX-5050
"Mini-Pro"
Tape Recorder

Compact professional tape deck; 10½-inch reel capacity; XLR outputs & line inputs, phone jack Hi-Z unbalanced mike inputs; 15 & 7½ ips or 7½ and 3¼ ips; 2-track record/play and 4-track play, or 4-track record/play and 2-track play; available in 4-channel version with second play head as ordered; serial #17506063D; reported 3-10-76; price $1500; Otari Corp., 981 Industrial Rd., San Carlos, Ca 94070.

Initially reported in a "Quickie" report two issues ago, the MX-5050 was found at that time to be superb mechanically but rather disappointing sonically. Since that time, we were able to establish that the mediocre sound—judged by playing tapes made on other recorders—was due mainly to the MX-5050's having been set up to a "standard" equalization tape that was different from the Ampex "standard" tapes we (and most prerecorded tape manufacturers) have always used.

Since then, we obtained a copy of the adjustment-location "map" for the 5050, and reworked its setup adjustments according to the Ampex standard curve. And suddenly, it was a different tape recorder! The thinness and dryness we had observed when playing old, familiar tapes (Ampex standard equalization of course!) was virtually gone. This unit is now worthy of serious consideration by the perfectionist.

As we mentioned in that preliminary "Quickie," the 5050's transport is a joy and a delight. It is rugged, rock-solid, and obviously built to take long, hard usage. It handles tape superbly, it runs silently, it winds beautifully and it is easy to thread and to edit tapes on (which the Revoxes are not). It even has a professional-type splicing groove (like the Edi-Tall blocks) machined into the top of the head, with markers indicating the locations of the head guides relative to the cutting slot, so you can mark the cutting spot at either guide without having to get direct access to the play head. There is also a 4-digit index counter and a motion-sensing "logic" circuit which allows you to take the transport out of fast shuttle speed directly into Play mode without first hitting the Stop button or tearing the tape apart.

The electronics, too, show all the earmarks of a professional design. High-level input and output connectors are Cannon-type XLR receptacles, unbalanced but with provision for balanced-line transformers, and the mike inputs are phone jacks. The latter may seem amateurish to some audiophiles, and indeed it is when the mike preamps are low impedance. (Phone plugs often introduce some resistance into the circuits, and while the amount of resistance is negligible in a high-Z circuit, it can cause noise and loss of level in a low-Z circuit). But most professional mixers these days are in fact fitted with...
phone jacks into Hi-Z mike preamps for the
simple reason that professionals are just as
picky about the input-matching transformers
they use as they are about their mikes. They
want to select their own transformers, and
there are a number of them available in
that XLR-to-phone-jack configuration, at
prices ranging from $11 each up to over $50
each.
There are separate (concentric but not
coupled) front-panel controls for both mike
and line inputs, allowing you to mix. There
is a so-called Selective Reproduce facility
that allows either tape track to be played
back via the record head, so that a second
track can be taped in exact synchronism with
fessional recorders to have the electronic
setup adjustments (for such things as record
bias and playback equalization and level)
accessible through the front panel. Some-
times the playback adjustments — which
should not require attention when you
change from one recording tape to another—
are relegated to the rear or bottom of the
electronics chassis, and only the adjustmen
that have to be made for different recording
tapes are front-accessible. This is the ap-
proach followed by Otari, with one odd ex-
ception; The Standard-Record-Level adjust-
ment, which is strictly a playback adjust-
ment, is accessible from the front panel,
while the adjustment that determines the

The splicing-block head cover.
The white arrows and 90-de-
gree slot are located directly
over the heads; the left and
right white lines show the lo-
cations of the two end tape
guides.

the first. (If the play head were used for
this purpose, the sound of the first track
would be heard a fraction of a second after
the tape had passed the record head, so the
second track would be laid down with a
slight delay.) Output level can be selected
in either of two modes, by means of a front
panel slide switch (one of the only potential-
ly-troublesome parts we found in the deck). One
mode selects what is designated as
Standard Reproduce Level, which is preset
internally and delivers a metered Zero VU
out from a Zero-level tape signal. The other
mode allows the output signal to be control-
ed by the front-panel playback volume con-
trol. At this point, we encounter one of the
design oddities in the MX-5050 that left us
wondering what its (Japanese) designers
had been thinking about: The playback level
control is inoperative when the Source/Tape
buttons are set to monitor Source; signal
monitoring is at SRL output level in either
SRL switch position. This means that, if
you need the playback volume control to
maintain proper monitoring level during a
recording session, you cannot compare the
Source with the Tape playback, for there
may be marked disparity in level. Perhaps
there was a good reason for this, but we are
curious to know what it is.

There was another oddity on the 5050
which puzzled us. It is customary in pro-
recording level going onto the tape for a
given VU-meter reading (the sensitivity ad-
justment) is, inappropriately, located among
the playback adjustments—at the bottom of
the deck and accessible only by removal of
the bottom plate. However . . . because of
the protruding length of the XLR connectors
at the rear of the deck, it cannot be laid on
its back without crushing the output cables.
(Neither can it, at any time, be operated
horizontally unless set into a raised base or a
shelf cutout below which the cables can
hang.) In order to adjust the sensitivity of
a tape to conform to standard Zero level, and
to ensure that Source and Play levels will
match, it is necessary first to remove all audio
cables from the rear, lay the unit on its back,
remove the bottom panel (by means of four
Phillips-head screws), and expose the under-
side of the chassis. Fortunately, there is a
built-in 1-kHz oscillator which, at the push
of a front-panel button, injects a 400-Hz test
signal into the line inputs. This can be used
to adjust, first, the bias current (front panel),
than the Sensitivity (chassis bottom). With-
out the built-in oscillator, though, getting at
the Sensitivity adjustments would require
laying the unit on its back propped up on
a couple of bricks or something to clear the
XLR plugs. Silly! There is no reason we can
see why the SRL adjust, which is a playback
function, could not have been located under

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the chassis with the rest of the play adjustments, while the Sensitivity adjust took the SRL pot's place behind the front panel.

Speaking of bias adjustment, we found the MX-5050 to have adequate bias-current reserve for slight overbiasing of a typical low-noise high-output tape (such as 3-M 206), but there was not enough reserve to peak-bias the highest-coercivity tapes like 3-M 250. There are in fact very few professional recorders (and no audiophile ones that we know of) capable of using 3-M 250, and only about one or two (we are told) that will be able to cope with chromium dioxide.

It is not so much a matter of delivering adequate bias current—relatively minor design modifications would enable many recorders to do this. The major problem with these extremely high-coercivity tapes is not so much their bias-current requirements as their erase-current requirements. It takes about 20 times more power to erase a tape than to bias it, and most erase heads won't take 20 times 3-M 250's record-bias current without overheating—a condition which tends to make the tape adhere to the head, causing anything from severe scrape flutter to outright squealing of the tape.

Even though we were able to peak-bias 206 tape, and had enough bias reserve to overbias it slightly (as most professionals prefer to do, because it reduces distortion), there was not enough boost range on the Record Equalization adjustments to get a flat high end when overbiasing even by as little as $1/2$ dB.\(^2\) We were obliged to leave the record equalization pots wide open and back off on the bias current settings in order to get flat over-all high end from the tape. This setting coincided with the peak-bias adjustment (maximum output) and thus yielded maximum S/N from the tape, but distortion was not as low in the Otari's tapes as it probably would have been could we have operated it with a slight overbias.

We suspect that the problem of inadequate record EQ range was directly related to the equalization incompatibility that had caused the poor sound we observed when first auditioning the deck. As delivered, the playback response from an Ampex-standard tape was tipped up at the high end (See curves), which would mean that for a given record bias, less HP boost would be required. As far as we are concerned, though, if this machine is to compete with the Revox units—which is suggested by its price—it must have the capability of properly reproducing pre-recorded tapes (as well as other home-recorded ones in the audiophile's library), and that means hewing to the Ampex standard equalization curve. So, the unit needs more gas in its record EQ adjustments.

While we're on the subject, we noted another questionable aspect of the 5050's design—one which would not impair performance but would add a small but unnecessary amount to the cost of the unit. There are two playback level adjustments in the unit (not counting the front-panel play-level control), and these are simply in tandem in the playback section. One, it would seem, is wholly superfluous.

Another questionable design feature in the 5050 is the color of its head cover. Not normally a consideration beyond the purely esthetic, this is important here because the head cover includes a splicing channel for tape editing. The cover is black anodized, which makes it almost exactly the same color as the back of many high-performance recording tapes. Thus when two lengths of tape are in the splicing channel, with ends angle-cut for splicing, it is difficult to see where the ends are, and virtually impossible to see when they are just barely touching one another, which they should be for a decent splice. The head cover—or at least the tape channel in it—should be white or natural aluminum in color, and hang the esthetics!

We did not test the MX-5050's recording capabilities when initially received from the manufacturer. Results were so disappointing from tapes we already had on hand (See Curve A) that we just didn't bother. The sound, as suggested by the curve, was excessively bright and toppish, with a slightly overblown mid-bass range and a very dry sound over-all.

After readjustment to our Ampex standard tape, the playback response measured as shown in Curve B. It was then necessary to readjust the record equalization, and Curve D shows the resulting over-all record/play

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1. Coercivity is the measure of the magnetic field strength which is needed to reverse the polarity of the magnetizable "domains" in a tape coating.

2. "Overbiasing by $1/2$ or 1 dB" does not mean using 1 or $1/2$ dB more bias current than is needed for peak output from the tape. What it means is that the bias current is increased, beyond the point of peak output, until the output from the tape falls off by 1 or $1/2$ dB.

Slight overbiasing minimizes distortion and reduces the severity of dropouts due to surface irregularities, without impairing s/n or overload capability. The cost of overbiasing is a slight loss of extreme high frequencies, which can be offset to some extent by increasing the HF boost while recording.
response. It should be noted that the 5050, like all professional recorders, has what many audiophiles would judge to be rather restricted high-frequency response at each operating speed. This is a result of design tradeoffs which swap improved head room for extended high end, less tendency toward dropouts, and improved s/n ratio—all qualities which are of more importance to professionals than an additional 2 to 3 kHz of high-end range. Wow and flutter were found to be very low—below the level of conscious audibility on even the most demanding program material (piano, reedy organ stops), although the manufacturer's own specs suggest that lower flutter at 7.5 ips might give a somewhat more "solid" feel to the sound, while some speed variation might be barely audible at 3-3/4 ips. (Our sample did not have the 3-3/4 ips speed.) Apart from the physical layout details that we questioned earlier, the only aspect in which we could really fault the 5050 was a subtle dryness, verging on a very fine-grained quality, to its sound. This, we were interested to note, was there, not only in the playback from its own (as well as other) recorded tapes, but also from the signal going into the recorder and straight out of the Source monitor. This would suggest that, if the record circuits are introducing anything audible, it is being swamped by some sonic peculiarity of the playback electronics. We were also rather taken under this operating condition until 25 Hz at the bottom and 20 kHz at the top. Oddly, something in the deck seemed to compensate for this, for the over-all record/play response was better, leading to the unique observation that, at least in terms of frequency response, the Tape playback from the 5050 sounded a shade better than the signal heard with its Source/Tape buttons in the Source position.

The 5050 is priced roughly midway between the Revox A-77-III and the Revox A-700. We have not tested the latter, but have been told by several critical recordists who have compared it with the Otari that the Revox's sound is a shade more transparent and seems to have somewhat better bass detail. We were able to compare the 5050 with a properly-functioning A-77-III and can report that the Otari was a bit more transparent than that unit, and had a perceptibly flatter low end. (Most A-77s tend toward a subtle heaviness through the low end—impressive but not entirely natural.) But neither Revox unit can, in our estimation, touch the Otari for ruggedness of construction and impressiveness of appearance. The A-700 is an improvement in this respect over the A-77, but both of them still look to us as if they belong in the kitchen rather than in an audio system.

As it now stands, the Otari MX-5050 is a honey of a recorder, with sound that is difficult but not impossible to fault. There are however, as noted, a couple of things we would like to see changed. We would like all record-setup adjustments to be accessible without removing any panels or laying the machine on its back. We would feel more secure if the straight-through response were within ½ dB from at least 30 to 16,000 Hz. We would like the electronics to sound at least as good as the better solid-state preamps that are now available, for it is prob-

![Measured frequency response of our sample MX-5050. A: Ampex playback as received; B: Ampex playback after readjustment; C: Monitor amps; D: Over-all record/play.](image-url)
ably too much to ask that they could equal the better tubed preamps. With those changes, this could be the first choice for the serious recordist. As it is now, it is well worthy of his consideration, but is not a clearcut winner in all respects.

(Manufacturer's Comment on Page 32)

Yamaha C-1
Preamplifier

Solid-state stereo preamplifier/equalizer; AC-powered; $1800. Serial #1259. Yamaha International Corp., P.O. Box 6600, Buena Park, Ca. 90620.

One of the most versatile preamp units we have ever come across, this can do just about anything one could ask of a preamp. It has stereo inputs for three phono cartridges, a microphone, three tape recorders (with 3 Tape Out connections), a tuner, and two Auxiliary sources. There is provision for switching to record from any tape deck to any other, and you can tape from one deck to another while the rest of the system is being used to listen to another program source. There are level-set potentiometers on each input, so you can balance them all out for identical gain to eliminate volume changes when you switch sources. There is a built-in oscillator that selects frequencies of 70 Hz, 330 Hz (close to the musical E key on a piano keyboard), 1kHz, and 10 kHz, as well as pink noise for checking things like speaker phasing and room acoustics which are best not attempted with sine waves. Besides a pair of conventional variable-slope tone controls (hinging at 500 to 2,500 Hz), there are a pair of “equalizer” controls providing humping or dipping action over a range of about 2 octaves with center frequencies at 70 or 300 Hz and 2k or 4k Hz. There is a high-pass filter chopping off below 15 or 70, and a low-pass filter selectable for 8 or 12 kHz cutoff. Both are 12 dB/octave slope, and both can of course be switched out.

The tone controls are all switched, in 2-db steps, via velvety-smooth, almost-lascivious-feeling step controls, and the balance control has a center-position detent. There are two peak-reading meters with delaying circuitry for slow decay, to facilitate reading the peak indications, and log-offset correction to provide a direct-reading range from +5 to -50 dB without range switching. There is even facility for connecting the meters to an external source such as a power amp or tape recorder. And, wonder of wonders, the main volume control’s dB calibrations actually coincide with what the meters show, all the way down to zilch; channel tracking in the volume control on our sample was within 1/4 dB down to 12 dB attenuation, and still within 1.5 dB at 50 dB attenuation.

There is a built-in headphone amplifier that can drive all but the lowest-efficiency phones. (Fine for, say, a Koss PRO-4aa but not adequate for Stax SRX-IIIIs.) There is a three-position muting switch, selectable for normal operation, 20 dB output attenuation, or complete output shutdown but with continued operation of the meters and headphone outputs.

There are also a couple of features which struck us as being less than well-advised. Two of the phono inputs are equipped with load-selector switches, which is a nice if dubiously useful addition. But since all cartridges that could be used with the C-1 require 47k to 68k ohm loading, we cannot see the utility of the 30k, 41k, 47k, 53k, 59k and 100k ohm termination offered by the C-1. We question, also, the inclusion of a loudness-compensation switch on any preamp this ambitious, for we have never before found one that works the way it is supposed to, and this one is worse than some, causing an irksomely obvious increase in brilliance along with a modest increase in boominess. Most designers are now aware that the high-end upturn observed on Fletcher-Munson-type
equal-loudness curves is due in some measure to upper-frequency loss in the hearing of some of the subjects whose hearing was measured. (Most of us normally lose high end with age. The medical term for the condition is presbycusis.)

While we’re in a mood to cavil, we must also lodge a complaint about Yahama’s styling on the C-1. We thought their CT-7000 tuner was one of the most beautiful-looking components we have seen (and one of the best performers to boot!) Well, the C-1 is certainly impressive-looking, but whoever chose to use gray lettering on a charcoal-black panel should have gone back to school for a psychology refresher. The legends are all but illegible except with bright illumination, and even then you have to squint to decipher some of the smaller ones. Why, we ask, couldn’t the C-1 have been finished in natural aluminum with black lettering, as is the CT-7000? They might then look co-ordinated when placed next to one another on a shelf.

Needless to say, with all the knobs and gadgets to tangle with, plus the superb feel of the controls, we found the C-1 a joy to use. Which is, we freely admit, one reason we were inclined to be more irritated by its sonic imperfections than we might otherwise have been. The fact was that, almost from the moment we fired it up, we were aware of a slight veiling and two-dimensionality to its sound, and the more we listened to it, the more acutely aware of these qualities we became. Bass was very deep and solid but a mite dry, highs were open and beautifully crisp but, again somewhat dry. And always, there was a rather dark, slightly oppressive veiling.

The problem seemed to be equally shared by the phono preamp stages and the high-level section, for it was about equal (although less) when either was in the preamp unit was compared with the original sound source via bypass tests. We did observe one very interesting thing, though: The C-1’s sonic character seemed to complement that of Yahama’s B-1 V-FET power amplifier remarkably well. The latter has a slight tendency to lighten the sound; the former darkens it slightly, and the net result is remarkably musical over-all, although still (we felt) less third-dimensional and less limpidly transparent than, say, the Audio Research SP-3A-1/Dual 150 combination (which in turn has slightly less-firm low end and a slightly softer extreme high end).

Summing up, then, we would say this is a superb unit in all respects except sonics, in which department it is excellent but not unsurpassed.

(Audio Research

Dual 150

Power Amplifier

Two-channel tube-type power amplifier, 150 watts per channel, $2685, serial No. 671030-17, reported 5-21-76. Audio Research Corp., 2843 26th Ave. S., Minneapolis, Mn. 55406.

We mentioned in the last issue that we were becoming increasingly disturbed by “a certain manic quality that is creeping into this pursuit of sonic perfection.” We were referring then to a manufacturer’s announcement of the imminent availability of a speaker system weighing over 1,000 lbs per channel, but we could just as well have been speaking of this behemoth from Audio Research.

The Dual 150 looks like a piece of professional broadcast equipment. It contains 8 output tubes (6550s), three slow-speed (but efficient) cooling fans, two front-panel meters for monitoring AC supply line voltage, output power in each channel, and (by switch selection) the state of adjustment of the bias of each output tube. Its front panel is a ¾-inch-thick slab of aluminum, it is equipped with two beefy carrying handles, and the whole thing weighs in at a gut-busting 115 lbs! It is probably safe to say that more than half of that weight comes from one of the most massive power supplies ever built into a tubed amplifier, and indeed that power supply can, on initial turn-on, draw enough line energy (almost 3,000 watts) to pop a 15-Amp house fuse or melt practically any control unit’s “convenience AC power” switch. For this reason (and also, presumably, to extend the potential sales area to European countries), the D-150’s AC power switch has five on positions, for line voltages of 240, 220, 120, 110 and 100 respectively. If you live in the US, you note the incoming line voltage as monitored by the meter when the switch is Off, then advance the voltage selector to 220 for 10 seconds, to partially charge the power-supply storage capacitors. (It is the almost-instantaneous charging of these capacitors that causes most amplifiers to draw their greatest amount of AC power during the fraction of a second following turn-on.) Finally, turn the switch to the setting that is nearest to but above the voltage you originally read on the meter. For example, if the meter reads 112 volts with the D-150 off, you should end up with the switch in the 120-volt position. The 110-volt setting would be closer to the line supply voltage, but would result in slightly excessive
operating voltages that would seriously curtail component life. (A 5% excess does more damage than a 10% deficiency.)*

The D-150's power consumption will vary from moderately high (around 600 watts) when idling, to around 1000 watts under full power. A RC recommends powering the D-150 from its own wall AC outlet, through a heavy-duty extension cord if necessary. We concur in that recommendation. If your preamp's AC cord and plug appear to be unusually heavier-duty than conventional lamp hardware, though, you might try powering the D-150 from one of the preamp's unswitched outlets, if these are not fused in the preamp (or if the rear panel rates the outlets at 25 amps or more). Check periodically though to make sure the AC plug to the preamp is not heating up; if it is even perceivable warm to the touch, we would advise going to the trouble of connecting the 150 directly to the wall outlet.

The D-150 is rated at 150 watts per channel, which sounds piddling in comparison with what a mere $700 will buy you in a solid-state amplifier. The figures are not however directly comparable in terms of listening experience for, like many tubed amplifiers, the D-150 overloads so gracefully that it sounds like a good 300 watts per channel. We clocked the output from our relatively inefficient FMI J-Modular speak-

*If the relationships here have you confused, remember that the output voltage that a power transformer feeds to a component (for a given AC line voltage) is the result of the ratio between the number of wire turns in its primary (incoming) winding and its secondary (output) windings. Thus, if it is required to deliver 480 volts output from a 120-volt AC supply, it will have a step-up ratio of 4:1. If we then need provision for operating from a 110-volt line, we must switch in 37% more turns of wire into the primary in order to get 480 volts from the secondary. Now, if the actual incoming-line voltage is 112 and we switch to the 110-volt setting, it may appear that we are selecting a lower (and therefore safer) voltage setting than 120. But we have actually increased the transformer's turns ratio and, hence, the amplifier's power-supply voltages. The correct setting would be the one higher than 110, which will be 120.

The D-150 looks like professional equipment and weighs like most professional audio components. The handles are a help, but not very much.
the distinction of being the most revealing speakers we know of, a single D-150 was clearly superior to biamplified D-76As. It was also the first amplifier we have found that did as well with electrostatic speakers as with dynamics. In the best systems of either type, the depth, transparency, definition, naturalness, openness and low-end solidity have to be heard to be imagined. In short, we find it difficult to imagine how this thing could be bettered at any price. Even if it is, ultimately, we are convinced that the D-150 is destined to become a classic, in the manner of those early Marantz power amplifiers whose performance has never really been substantially bettered until, twenty years later, the D-150 came along.

Speaking of the potential longevity of tube equipment, we are told that a lot of dealers, pushing solid-state components, have been telling customers that the supply of replacement tubes is due to start drying up in a few years and that prices for them will start climbing precipitously as a result. We asked several tube manufacturers about this, and while one admitted that their future plans would be predicated on US consumer demand, four informed us that they had not considered discontinuing tube manufacture and could not foresee doing so as long as the present demand for them continued. One pointed out that their biggest market for amplifying tubes was in Europe and Asia, and said they would continue making them even if sales in the US came to a virtual standstill. That does not sound to us like the imminent demise of the vacuum tube.

Unfortunately, the price of the D-150 is murderous. Perhaps now, Audio Research can rest on their laurels for long enough to see if they can match this kind of sound from amplifiers that some of us can afford to buy. We must also point out that the D-150 has yet to prove its durability. It does run very cool—more so than many solid-state amplifiers—but only time will tell that story. We hope the story has a happy ending.

(Manufacturer's Comment on Page 32)

Yamaha International Corp., 6600 Oglethorpe Ave., Buena Vista, Calif. 90620.

Despite accruing evidence to the contrary, some Americans still see the Japanese as virtuoso copyists, whose greatest gift to the consumer is their ability to take a basically good idea (originally American of course) and convert it into an excellent consumer product. Countless transistor radios and Trinitron picture tubes have helped to shake our chauvinistic conviction, but if we were asked to name one Japanese manufacturer that has done most to undermine our view of the Nipponese as plagiarists, we would name Yamaha.

Even without considering the innovations they have brought to the design of motorcycles and musical instruments (pianos in particular), their ventures into the field of high fidelity have demonstrated the kind of inventiveness that we in the U.S. have traditionally cited as the Great American Mystique. This is not to say that every one of Yamaha's audio innovations has been an unqualified success. Some of them—and the loudspeaker shaped like an ear is a fine example—have been misguided and sometimes, to our way of thinking at least, a little bit nutty. But recently, nobody has been laughing at Yamaha's products. Their current line includes one of the finest solid-state tuners to come down the pike (the CT-7000, for $1000 less than the other state-of-the-art tuner), a superb receiver (the CR-1000), a most impressive-looking audio mixer at a budget price, and a speaker system whose beryllium-dome upper-range drivers represent a real breakthrough in manufacturing technology. And now, we have the vertical-FET power amplifier.*

Okay, so what's so grand about a V-FET? Or even a FET? To oversimplify for the sake of expediency, an FET—although a solid-state device—has more in common with vacuum tubes than with the usual bipolar transistor in that the factor controlling the flow of current through it is an electrostatic field rather than a flow of current. It is, in other words, a voltage-controlled device (as is a tube) rather than a current-controlled device. It draws practically no current from the stage feeding it, and thus provides a rather high input impedance—again, more like a tube than a transistor. And . . . its

Yamaha B-1
Vertical-FET Power Amplifier

Solid state; 180 watts per channel into 8 ohms; $1200; Serial No. 1773; reported 2-20-76.

* It must be noted that Sony Corporation also has a vertical-FET power amplifier, but the fact that both manufacturers announced their V-FET amps at around the same time would tend to confirm what both have claimed—virtually simultaneous but independent discoveries of the same thing.
distortion characteristics, and the character of its distortion products, tend to be more akin to those of tubes than of transistors.

The regular FET, however, is limited in its capacity to pass current. Figure 1, below, shows why. The path which conducts current is a thin sheet with the input at one end and the output at the other. The field effect "gating" action comes from a third element that spans the strip as a bridge spans a stream. The applied field can cut the current flow to nothing, but the maximum amount of current that can flow through the device is limited by the cross-sectional area (that is, the depth and width) of the conducting strip.

If we make the strip wider, the FET device becomes excessively large. If we make it thicker, the field can no longer penetrate deeply enough into it to provide full control and the gain (amplification) is reduced.

And that's what the V-FET solves. In the Vertical FET, the flow of current is not from end to end through the strip, but from top to bottom (Figure 2). Obviously then, the cross-sectional area passing current is vastly greater for a given size of strip, but whence, then, cometh the controlling field? From a tiny wire mesh, similar to the grid of a tube, embedded between the upper and lower surfaces of the strip. The current passes from the top electrode, through the interstices in the mesh, to the bottom electrode, and the controlling field, applied to the mesh, either limits the passage of current through the mesh or allows it to flow freely. And the maximum current flow can be high enough to produce scads of power to drive loudspeakers.

The B-1 itself is a somewhat bulky and substantially weighty device, tipping the scales (or rending your sacroiliac) at around 100 lbs. It is however surprisingly compact and dramatically handsome in appearance. The basic unit comes in basic dull black with a neat little brushed aluminum front-panel strip that mounts the AC power switch, a pair of "speaker level" controls (which actually provide about 6 dB of attenuation of the input levels), and two tiny LEDs that light when the unit overloads or goes into its thermal protection mode. There is however also available, for an additional $250, a UC-1 "control center," which is not a preamplifier but is a very-easily attached (it just plugs in and latches in place) front panel for the B-1 which adds a pair of peak-reading expanded-scale output meters, selector switches for up to six separate loudspeaker systems, and a pair of level controls for each set of the speakers. (There is also a speaker mute switch that kills whatever speaker is connected but leaves the meters operative.) The meters, while probably not unique, deserve some comment because they are the first such that we have encountered and may also be new to most of our readers. The peak reading aspect is self-explanatory. The meters are driven by their own special amplifiers which provide a very fast rise time and slow decay that holds the levels of transient peaks for long enough for the relatively sluggish meters to respond to them. The result, although not as accurate for peak indication as inertialess devices like LEDs, gives a close approximation of the actual peak-power levels that the amplifier is producing.

The expanded-scale feature is something that should have been invented a long time ago. If you have ever used a VU meter, you may have observed that the calibrations become progressively compressed toward the left (reduced-level) end of the scale (see figure 3). Since decibels are a logarithmic function of linear increments of voltage or current, this scale compression at low levels...
is to be expected, but it makes accurate
determinations of levels below -10 dB
exceedingly difficult. The B-1's meter-driving
amplifiers provide a reverse-log (antilog)
characteristic. The corresponding dB scales
on the meters are, consequently, tremen-
dously expanded through the lower range, so
that it is possible to read directly from the
meters any dB value from +5 to -50, with-
out using a range switch. The Zero-dB point
is at 100 watts and the +5 point corresponds
to 300 watts, which is presumably the clip-
ing point of most sample B-1s. In other
words, these meters make it possible to read,
directly, the dynamic range of most program
material that you're likely to encounter from
commercial sources, as well as the instan-
taneous output power from overload down
to below .001 watts! Very sexy, and useful,
too.

So, how does it sound? At the price, this
has got to be considered a top-line compo-
nent, and in direct competition with what is
generally recognized as the "state-of-the-art"
power amps. To us, that means the Audio
Research Dual 76A and Dual 150. We have
already discussed the merits and (less seri-
ous) demerits of the D-76A at some length
in previous issues, so we won't reiterate. The
D-150 is however a lesser-known quantity to
us, since we had a chance to listen to one for
only about 8 hours on a single occasion, and
the manufacturer has not yet (as of February
20) seen fit to loan us one. We can say,
though, that we were unprepared for any-
thing that much better than the D-76A. We
were, simply, unable to fault the D-150 on
any count (including flamboyance of price),
and remain convinced—even after that brief
a listen—that it is destined to become a clas-
ic. A week later, we fired up the B-1.

Our first reaction was that it was a dead-
ringer for the D-150. Bass was awesomely
clean, deep and tight, the middle range had
much of that liquidity and depth that has
attracted critical listeners to Audio Research
components despite their price and imper-
fections, and the extreme top had the softness
and sweetness which, too, has continued to
elude the designers of all but the best tubed
or solid-state amplifiers. And there was crisp-
ness—a razor-sharpness and detail which, at
least initially, led us to believe that here, at
least, was a solid-state amplifier that could
be judged a winner on all counts. But the

more we listened, the more we began to
wonder. There was none of the zippiness or
exaggeration of vocal sibilants or brushed-
cymbal sounds we had heard from other
solid-state amplifiers, yet that crispness began
to sound more and more to us like an unnat-
ural brightness—a brightness that has always
in the past gone hand-in-hand with high-end
zip and sibilance. Increasingly, we became
aware that the B-1 was changing the timbres
of many musical sounds, making them some-
how lighter in quality, in the same manner
that a slightly overspeed phono turntable
does the same thing (although in this case
there was not, of course, any actual change
in musical pitches). We were also becoming
aware that our collection of discs seemed to
be in worse shape than we had thought they
were. Surface noise seemed somehow a little
more irksome and "ticky" than we thought it
should be, and the final realization that some-
things was amiss came when we suddenly
observed, in one of those rare moments of
self-awareness, that we weren't listening to
the system as much as we used to.

On a hunch, we reconnected the ARC
Dual 76A, and breathed a sigh of relief. The
sensation was almost like changing from a
new pair of slick, tight dress shoes to an old
pair of loafers. The D-76A was softer at the
top and heavier and moosher at the bottom,
but it sounded comfortable. And it sounded,
to us, more like live music—the kind of sound
to which the audiophile's first reaction is
invariably "no highs." But there were highs,
and they sounded, as we said, "live."

These tests, it should be noted, were done

Figure 2. Electron control through a
vertical FET.

Figure 3. A standard VU-meter scale (top)
compared with the expanded-left-scale meter
in Yamaha's C-1.
on two sets of speakers: The FMI J-Modulars, whose tendency is, if anything, to sound a little muted, and on a pair of late-model Quad electrostatics. Both are normally capable of an exceedingly high degree of naturalness in reproducing musical timbres, and both revealed that odd “lightening” tendency of the B-1.

We had been told previously by Yamaha's national manager Stewart Greenberg that their B-1 power amp and their C-1 preamp seemed to exhibit a synergistic relationship in that they sounded better together than separately, so we tried the C-1 in place of our Audio Research SP-3A-1. There was no question but that both sounded better than we had felt either to be by itself, but while the C-1 took some of the edge of the B-1's reproduction of surface noise and mistracking, it also yielded less of an impression of depth and inner definition than we observed from the B-1 with the Audio Research preamp (or with no preamp at all, listening to tapes).

Trying, then, to put all of this into some sort of perspective, we would say that the Yamaha B-1 is, by itself, an excellent performer and certainly a triumph of innovative design, but there are other power amplifiers, some costing a bit less money, which we feel to be rather more natural reproducers of musical sounds. The millennium of power amps is not yet here.

(Manufacturer's Comment on Page 35)

Yamaha NS-1000 Speaker System

Three-way system consisting of beryllium-dome mid- and upper-range drivers and a cone-type woofer, 8-ohm impedance, 100-watt power capacity (signal), 14¾ in. wide by 26½ high by 12¾ deep, $475 each, serial #10492, reported 10-17-75. Yamaha International Corp., P. O. Box 6600, Buena Park, Ca. 90620.

Every engineer has known for years that, while beryllium has excellent physical qualities for use as a speaker radiator—light weight, rigidity, and a remarkable degree of internal damping—it is not usable as such because it cannot be stamped out like most other materials. It will not stretch, and any attempt to shape it simply causes it to split. The Japanese Yamaha firm, better known for its successes in motorcycle design than in audio design, has managed to score a First in audio by devising a way of producing speaker domes of beryllium, by depositing the metal on a suitably-shaped form and building it up to the requisite thickness by a process similar to that used for laying down the surface of a disc stamper on an acetate (vinyl chloride, actually) master disc.

It appears, though, that Yamaha may have a tough job of selling their 1000s to buyers, for everyone knows that metal cones sound metallic, and since the speakers are sold without grille cloth covers—the drivers are visible through wire-mesh covers—there is no concealing the fact that the mid and upper-range drivers on the 1000 are metal. Thus, most audiophiles who have listened to our 1000s have claimed to hear the metallic quality of those speakers. Interestingly, though, when some of them heard the same speakers, after having been told that other speakers standing next to them were operating, they no longer heard the metallic sound and were quite enthusiastic about what they heard. Strange, what a prejudice can do.

Our evaluation, after quite a number of hours of listening to a variety of program sources. Excellent over-all sound, slightly forward, somewhat brassy but not at all shrill or metallic, very smooth and extended at the top, rather like electrostatics, with excellent blending and homogeneity between the mid-range driver and the tweeter. As is often the case, though, when an unusually good upper range is matched to a good but not phenomenal woofer, there is an audible discontinuity there. The low end was a hair up at its upper end and gradually tapering down below that, and although the speakers were shaking the room at 35Hz, the output there was substantially below that at 100, and the upper end tended to make the lower range sound weaker on musical material than it actually is. Bass detail was however very good.

Stereo imaging was phenomenal—as good as from any system we have heard. We could stand to the left of the left-hand speaker and still hear the full stereo spread between the two speakers. They are also remarkable in that they reproduce depth and perspective about as well as any speakers we have heard. Only the IMFs and the Magneplanars are better in these respects, and not by much.

Finally, a caveat. These are like the Class-A speakers in that they are almost embarrassingly revealing of the electronics feeding them. They sound best with the best tube-type electronics, and excessively biting with most solid-state amplifiers. They also resemble the Infinity SS-1A in that they can become irritatingly strident if used in an acoustically bright listening room. Perhaps they are not everyone's cup of tea even in an average room, but they can produce some of
Contributing to the broad stereo spread and outstanding imaging of the NS-1000s is the mirror-image configuration of their drivers.

At around $1000 a pair, the model 1000's closest price competition is the Dahlquist DQ-10, which sounds entirely different—more distant, softer, and not quite as good in the stereo imaging department. We suspect the Dahlquist would do better in a bright room, the Yamaha in a leader or duller one. In a neutral one, we think we prefer the Yamaha, but you'd best make your own choice for yourself.

(Manufacturer's Comment on Page 35)

**G.A.S. Thaedra Preamp**


Our first sample of this was returned to the manufacturer before we had completed our tests on it, and was replaced with the latest version (ours is Serial #500108). Enough time elapsed between the time we shipped back the first sample and the time we got around to auditioning the second that we are unable to report on any sonic differences between the two. We are prepared to report that the present one is the most deeply satisfying of any solid-state preamplifier we have tried to date (as of May 22). *

Admittedly, it is not the virtuoso of versatility that is, for example, the Yamaha C-1 (which can do practically anything short of dispensing draft beer), and it is not one of the prettiter preamps—striking but hardly pretty! But it does all the things that one normally expects a preamp/control unit to do, and does them in exemplary fashion.

For example, most serious audiophiles now recognize that one of the worst drawbacks of the currently-popular (we are tempted to say “faddish,” but we won’t) moving-coil cartridges is that they require a bootstrap input booster of some kind in order to drive adequately a standard phono-cartridge preamp stage, which means either a transformer (which introduces harmonic, phase, and frequency distortion) or an outrigger “head amplifier” in that part of the system where distortion is most conspicuously audible: Ahead of the phono stage. The fact that some other recent preamp designs have included a built-in head amp does not change the fact that there is still that additional stage of amplification—and of distortion, no matter how slight—ahead of the regular phono preamp stage. Well, GAS does it differently.

Thaedra has a “head amp” input, but instead of being located ahead of the main phono preamp section, it is itself a completely separate extra-high-gain phono preamp. Under the circumstances, it was not too much of a surprise to us to find that every moving-coil cartridge we tried with Thaedra sounded better in every respect than it ever has before. (The fact that an optimized Shure V-15-IIIG spherical can sound as good as any high-priced moving coil we have tested will probably not impress readers who are already convinced that moving coils are the only way to go.)

We don’t normally comment on volume-control tracking unless it is unusually good or bad. We comment here because it was better than any we have encountered to date: Tracking error (channel difference) was less than 1/2 dB over the entire operating range of the control! The only preamp we have encountered that had comparable tracking was the Yamaha C-1, reported elsewhere in this issue.

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* We should add that, as of June 25, after having auditioned all the other preamps covered in this issue, we still feel the same way.
Sonically, we found Thaedra difficult to fault. What came out of it was a virtual replica of what went in, and the only imperfections we were able to observe—a subtle thickening of the sound, an exceedingly subtle grayness, and a very slight loss of depth and inner detail (in comparison with no preamp at all)—were all in the nature of deficiencies rather than exaggerations and were thus found to be very easy to live with. It surpasses—not markedly but quite perceptibly—the Audio Research SP 3A-1 in every aspect of performance except inner detail, depth and liquidity. (That liquidity or crystalline transparency that we observe in the better tube stuff has been attributed by some to a consonant* form of distortion. We say Nay to this, for it is present to the same degree when there is no preamp in circuit at all.)

Our only complaints about Thaedra are in the nature of quibbles. The stepped volume control changes the level in what sound like 2-dB steps through its most-often used rotational range (12 to 3 o'clock). And although 2 dB is really a very small level change when it occurs across the spectrum (a change of 1/2 dB in frequency response can sometimes be perceptible), there is a certain perversity of human nature—our human nature, at least—that made us wish at times that we could adjust to a spot precisely midway between two available settings. If this is suggestive of a mild neurotic compulsion of sorts, then so be it; nobody ever pretended that audiophiles are normal.

Secondly, there is no provision for switching out or bypassing the tone controls, which provision may or may not have improved the sound perceptibly. And finally, high-level input impedance (around 40,000 ohms) is low enough that it could cause some distortion and low-end thinning from certain tuners and tape recorders. For example, no tubed components we know of were designed for that low a load, but since tube-type tuners and tape machines are already on the verge of becoming museum pieces, we don’t really feel that to be a serious consideration.

Readers considering the purchase of Thaedra should be forewarned that, because many of its transistors are Class-A-operated, it is normal for it to get quite hot after an hour or so of use. Just make sure it is installed where there is an unobstructed flow of air to the bottom panel and from the center of the top panel.

Since this is priced as direct competition for the Audio Research preamp, it has to be directly compared with it, and the fact is that (as often the case) there is no winner and no loser. Thaedra has tighter, deeper low end (What's the matter with the SP-3A-1's low end, anyway?), crisper attacks on sharp transients (hard percussion, etc.), an impression of somewhat more high-end airiness, and controls that are—but for the volume-control thing mentioned previously—a tactile and functional pleasure to use. Plus, of course, that superb head amp, for moving-coil freaks. The ARC is still not quite equalled for liquidity, depth, and inner detail in complex program material such as full orchestral tutti and massive choral passages. To us, the ARC also persists in having a degree of musicality—an intangible “rightness” in the reproduction of acoustical musical instruments (which are still the sole valid criterion for fidelity)—that no other preamp we have yet encountered (or have heard of) can match. Our advice: If you don’t get to hear live acoustical instruments more than a few times a year, you will probably prefer the sound of Thaedra. If on the other hand most hi-fi reproduction you hear sounds more or less dry or astringent to you, you’ll almost certainly prefer the Audio Research.

We’ll add one observation in closing: Everyone has known that, eventually, someone would design a solid-state preamplifier that would at least equal, if not surpass, the ARC. This one, we feel, is its equal, although rather in the manner of MacIntosh apples versus Winesap apples. Whichever you feel to be the best is purely personal, and we don’t

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* The opposite of dissonant.
think you would like The Apple-Eater's Guide to tell you which you should prefer. So we won't.

(Manufacturer's Comment on Page 33)

Shorties

The Speaker Stand

Placing a loudspeaker right in a room corner accomplishes two things. It makes the adjacent walls and floor act like a horn, boosting the efficiency with which the speaker radiates bass, and it excites just about every standing-wave resonance that the room can support. Research by the BBC led them to the conclusion that the smoothest, tightest bass is obtained when a loudspeaker is placed as far as possible from all room boundaries, but the practical fact of the matter is that few loudspeakers have sufficient bass-radiation efficiency to produce adequate low end when located in the center of the room (even if such a location were practical in terms of listening, which it isn't). With most speakers, a compromise location is best, and this implies a placement near but not right at the boundary between two or three of the room surfaces.

There are many times, though, when it is not esthetically desirable to place the speakers a couple of feet away from the rear wall, but when placement against the wall produces too much standing-wave activity. The solution here is to raise them slightly off the floor, and that's where these little Dinguses can come in handy. The photo shows what they look like. The legs are 10 inches long, and the platform serves merely to hold the legs in place. (The legs support the speaker, the platform bears no weight.) The stands are shipped disassembled, with two different sizes of platform to hold the legs in a 10 by 12-inch or 8 by 9-inch rectangle. Assembly is very easy, and the completed base is remarkably strong and stable, with the capability of holding a speaker of virtually any weight. Their size obviously implies use with bookshelf-type speakers, but there is no reason why one could not use two pairs of them to support a very sizable system.

The stand kits are sold in pairs, and the cost is $27.50 per pair, from Support Systems, Inc., 2845 Hangar Rd., Memphis, Tenn. 38118.

Quad 405

Current-Dumping Amplifier

This is something we don't see too often: an entirely new approach to power amplifier design. As Quad points out in their literature for the 405, Class-A operation of transistors provides the lowest distortion, but drastically limits the amount of power an output transistor can deliver without overheating. In "current dumping," a low-powered, low-distortion Class-A amplifier is used to control the amount of current passing through a pair of heavy-duty "dumping" transistors, and it is the latter which provide the driving power (100 watts per channel) for the speakers.

The idea is ingenious, and while we cannot fault it on any theoretical basis, we must admit that the first amplifier embodying the principle has proved a bit of a disappointment. Our initial reaction on first hearing was that here was one solid-state amplifier that had neither hardness nor sizzle at the high end. It did not take us long, though, to observe that 405's high end errs in the opposite direction. It dulls the extreme highs—the ones that give air to the sound of strings and crispness to the sound of hard percussion. We were not surprised however to find that frequency response measurements failed to reveal the cause of the high-end dullness.

Other observations: Bass was somewhat sparse and a bit shy of impact, suggesting the possibility of some low-end (subsonic) filtering. Inner detail was fairly well reproduced, depth was not very well rendered, and the over-all sound had a vaguely astringent quality to it—the antithesis of richness or warmth. For $410, we feel it is possible to do better than this. Perhaps faster "dumping" transistors might help.

*Most transistor amps use Class-AB output operation, in which each of a pair of power transistors handles part of each signal cycle, but shorts the other half during the other part. Imperfect synchronism between the two halves causes the familiar "crossover distortion" which accounts for most solid-state sound. In Class-A operation, each output transistor draws current though the entirety of each signal cycle, eliminating the crossover transition but doubling the amount of time current is drawn (and thus tending to cause the transistor to heat up more).
Quickies

FMI/Pro-Musica Phono Unit
Initially one of, if not the, best phono units we've tried, this may not be what we had hoped for. Our sample developed a pronounced mid-range (around 200 Hz) rumble after a few months' use, and the tone arm (which could have sustained damage unbeknownst to us) developed acute lateral-pivot binding. A second ERA turntable that we tried—a new one, had the same kind of rumble although at a much lower level.

Caveat emptor, at least until further notice. Incidentally, in connection with this unique unit, see "VTA" in this issue's "Miscellany" section.

db Systems Preamp
We've done some listening to this $425 mini-preamp (no tone controls, no A-B mode, no AC convenience switching) and would rank it sonically somewhere between the Dyna PAT-5 and the Audio Research SP-3A-1—which is a sonic par with G.A.S.'s Thaedra but with nothorases near the versatility. The final decision on the ranking of this one must wait until the next issue of the magazine. We should add that some buyers feel the db to be better, sonically, than the Audio Research.

Formula 4 Tone Arm
The most promising-looking tone arm we've eyeballed yet, this is a viscous-damped unipivot arm with adjustable mass! This could allow the low-end resonance of practically any cartridge to be set precisely below the signal-modulation range (20 Hz) and above the disc-warp and motor-vibration range (8 to 10 Hz). First user reports have been ecstatic except for one normally-unflappable user who complained that he was having the Devil's own time setting the thing up. The price is around $140 from the few US importers (the arm is English), and we'll have more about this next time.

Bravura Preamp
Not tested yet, but reader reactions to this have been very mixed, to put it mildly. Some users have described it as the finest solid-state preamp around, second only in performance to the Audio Research. Others have reported that operation of the channel balance control can send subsonic impulses through the system, and that the preamp will oscillate at full output under certain conditions, with the potential for wiping out tweeters.

We're expecting one momentarily for testing, but this is one we would definitely not advise buying until we've had a chance to do some investigations of our own on it.

(Manufacturer's Comment on Page 35)

Microacoustics Cartridge
Already obseleted by a later model (which we just received), ours was a bit hard and sizzly at the high end. If you were to buy one, it probably wouldn't sound this way anyway, so we'll reserve comment for the next issue.

G.A.S. Son of Ampzilla
Surprise! The son is better than the daddy! Sweeter highs, noticeably better inner definition, and comparable low-end solidity. All it lacks in comparison with Ampzilla Sr. is the impact and ease at high listening levels—not surprising in view of their comparative power ratings. Right now, this is probably the best buy in terms of sound versus money in the solid-state power amplifier field.

Stax Preamplifier
Rather high-priced for the average audiophile, but this offers excellent sound, about midway in most respects between an exceptional Dyna PAT-5 and an unusually good db Systems preamp, plus a bonus for Stax headphone enthusiasts: the ability to drive the phones to full level directly from the preamp, without a separate power amp. The unit is ideal for live-recording enthusiasts who like to use the Stax phones for monitoring but are fed up with lugging around a dual-35-watt power amp plus headphone power supply with which to drive them.

Our sample had an odd and apparently infrequent problem: Conspicuous hum through the phones under certain unpredictable conditions and unaffected by the volume-control setting. Curable by connecting the preamp to some ancillary electronics, not to others. Also curable by "grounding" to the listener's person.

No tone controls, but tape-monitoring facilities provide the option of adding an external equalizer, noise reduction, etc.

Recommended Ancillaries
For the advanced audiophile who has everything except finishing touches, we recommend: The dbx 119 expander/compressor for existing recordings and other applications, the Russound QT-1 switcher/patcher for ultimate ease in changing system hookups, the Disc-

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Record Reviews


Elgar has had a major revival on disc overseas which continues unabated at the moment. Pity that we hear so little of his music in his country except for the Enigma Variations and the Pomp & Circumstance Marches. Oh yes, we do get a Gerontius now and then and, very occasionally, a great rarity such as The Music Makers which the Mendelssohn Club of Philadelphia gave last fall. The Elgar symphonies have been well-served on recordings, though. Barbieri, Barenboim, Boult, and now Solti have recorded both of them. The Second Symphony is a massive work for full orchestra in the true style of the Edwardian age in which it was conceived. Solti and the LPO do it full justice. No wiry strings on this one, and the brass—lean and penetrating—cuts through the rest of the orchestral fabric. Decca/London have done a good job with this one recorded in Kingsway Hall in February, 1975. That room, from what I could tell during a recording session for the Delius opera Koanga in 1973, is not nearly as reverberant as the ballroom in which the Philadelphia Orchestra has made most of its recordings. Yet it records well. Lovers of the Romantic symphony will not be disappointed with this sprawling work. For neophyte Elgarians, I’d suggest starting with the First Symphony before approaching the Second.

WM


Surprise! This Ernst Toch “In Retrospect” album is my first candidate for the year’s ten best recordings.

Ernst Toch was born in Vienna in 1887 but, after living many years in Germany, finally came to Santa Monica, Ca., in 1935 and became a U.S. citizen in 1940. He died in Los Angeles in 1964. The Violin Sonata is a rich, romantic work which Toch himself called “Brahms’ Fourth Violin Sonata.” Could be, but there is originality here with influences of others. I kept hearing Delius throughout the early portions of the piece. Miss Shapiro and Mr. Berkowitz give the Sonata a definitive reading if there is such. Crystal’s sound and balance are exemplary. A winner for all concerned.

Toch created a “spoken chorus” idiom in 1930 for a Berlin music festival. The Geographical Fugue is an amusing play on place names, the first of which (Trinidad) had to be substituted in English for the original Ratter in the German-language version. Toch’s 1963 notes on the piece are included on the sleeve, along with generally excellent notes by Lawrence Weschler, the composer’s grandson. The L.A. Camerata Chorus gives an outstanding performance of the work, every word clearly heard and every inflection perfectly phrased. (A deleted performance by the
Abbey Singers on U.S. Decca was not as good nor was a live performance I heard some 15 years ago by a university group.) The 1961 Valse revived Toch's earlier experiment with this choral technique. Amusing, clever, it should bring a chuckle to all. The piano pieces so splendidly played by Mr. Guzuellini are sometimes also amusing. Three Little Dances (1961) were composed in honor of two dancers—a black woman and a white man. Thus the first dance is written entirely for black keys, the second for white, and the third for both. Having raved on thus, I am obliged to report that there was some pressing rumble in spots which does a great disservice to this wonderful album. Since Crystal records must be pressed in rather small batches at a time. I would hope that this flaw will not be consistent. At any rate it is a minor consideration considering the wealth of pleasure to be found here. More Toch, please! WM


EMI/Angel have come up with demonstration quality sound on this one. The "Sea Interludes" have stood well on their own as a concert piece, and previous recordings have been by Britten (Decca/London) and Giulini (EMI/Angel). Previn's earlier Sinfonia da Requiem with the St. Louis Symphony has recently been reissued on Odyssey, but that version, good as it is, must defer to the new reading and sonics. There are timpani thumps on this disc that literally bolted me upright from my chair! The dynamic range is tremendous! Bravo to Previn for some of his best performances on record and to the producer and engineer. Guess who? Christopher Bishop and Christopher Parker, respectively. I did not audition the English EMI version of this, but find it hard to believe it could be significantly better. WM


If you liked Schuller's Joplin and other rag recordings as much as I did, you know what you're in for here: excellence in every way. Williams College, which owns the Whitemen collection of original scores and parts, kindly made available his music so that authentic Whiteman versions of Coquette, Happy Feet, My Blue Heaven, Sweet Sue Just You, San, After You've Gone and 9 others can be re-created. The sound of the 1920's band is truly an American phenomenon, and this disc certainly fits into our Bicentennial celebration in its own way. Joe Venuti was an original member of the Whitemen forces, and appears here in San and Happy Feet in solo violin sections. All verses to songs as well as choruses are given—always a revelation to most of us. A wonderful record superbly recorded that deserves wide circulation. WM

ORFF: Carmina Burana. London Symphony Orchestra & Chorus; St. Clement Danes Grammar School Boys' Choir; Sheila Armstrong, soprano; Gerald English, tenor; Thomas Allen, baritone, André Previn, conductor. Angel S-37117 (Stereo/SQ).


The Previn is terrible in every way. Poor sound, weak chorus (at least it comes over that way), slow tempi. A missed boat if there ever was one. On the Tilson Thomas version, the choral singing (Robert Page, chorus master) is superb; no wonder it won the Grammy for the best choral record of 1975. But the conducting is often very fast and it's a wonder the chorus can get out those words at some of the breakneck speeds taken. Balance is always good, and the recording excited me with the piano and drum thumps at the beginning and with its shimmering gong. Soloists are good on both versions, but perhaps a nod to those on Columbia. The old mono Orff-supervised version (Angel 35415) directed by Wolfgang Sawallisch was very exciting. Let's hope it is reissued on Seraphim! WM


Robert Noehren here plays the complete "Little Organ Book" minus the sung chorales that frequently are given before the organ settings (cf. Rilling's Nonesuch version). The instrument is one of Noehren's own in the First Presbyterian Church of Buffalo, New York. The instrument was installed in 1970 and I had the pleasure of hearing it played by Dr. Noehren and Gillian Weir at the American Guild of Organists convention in Buffalo that summer. From my memory of those
Noehren’s may not one side. The Philips honest. occasions, I can say the Orion sound is quite honest. In fact so honest that there is at least one chorale in which some mixture seems to be quite out of tune, but for one out of 45 selections this is a minor quibble.

There is some distortion at the end of side three that is not a pressing flaw. Dr. Noehren informs me it was discovered in the master tape after everyone had packed up and left Buffalo. Orion decided it was minor and not worth scrapping the disc for, and it was impossible to return to redo that small section. Noehren’s performance is good and he is not afraid of the big sound. Some registrations may irritate other Bach “specialists” but I liked them. Organ record collectors will want this one despite the minor flaws.


The Academy scores again as does Philips with this collection of Rossini overtures, some of which are not often heard. Another candidate for year-end kudos. A small ensemble such as the Academy can cleanly present these bubbling, delightful pieces so that everything is clearly heard. Not so, usually, with 100-piece orchestras belting the things out as loudly as possible. I enjoyed these over and over again through my Stax SRX-III headphones. Equipment such as that allows Philips’ perfectly balanced sound to envelop you with a rare feeling of satisfaction and pleasure. The familiar “Barber of Seville” should be so heard in the opera house! Szell recorded some fine performances of Rossini overtures for Columbia some years ago and these were my favorites for big orchestra readings. But this new disc is now my unqualified favorite, period.


Before the Scott Joplin craze, we had Gottschalk cropping up on numerous discs. Eugene List and Alan Mandel recorded much of the Gottschalk oeuvre in print. Now with the American Bicentennial upon us, we have Davis in “Great Galloping Gottschalk, America’s First Superstar.” Superstar he was, and so is Davis here who really should be doing more recording. The playing is just thrilling—those fingers dance their way through terrify-


This collection is one of the finest I’ve heard in the genre. All the works are by Gabrieli except a single one each by Bassano and Monteverdi. London alternates choral and brass selections to give the ears a rest; most records of this type become tiresome after half a side.

These performers are uniformly outstanding. The choir’s intonation is never in question, and the full forces together are quite thrilling in such richly harmonic passages as can be found in Gabrieli’s Audite principes or Salvator noster. The Philip Jones Brass Ensemble is about the best in the business these days and they have made many handsome recordings. A fine disc, but the review pressing had a wee bit of rumble at the beginning of side one. Gorgeous overall sound, separation, balance in a properly reverberant acoustic without muddle. No texts or translations supplied for the motets.


I looked forward to hearing the music on these records very much, partly because most of it is “new” and not otherwise available, and partly because I am quite familiar with the fine work of Mertine Johns, who has been active in Philadelphia oratorio and opera for many years.

Somehow the low budget that must have been behind this production seems to have
Crotchetts & Minims

Lazar Berman, 45-year-old Soviet pianist, recently dazzled critics and audiences in several solo and orchestral appearances during his first U.S. tour. Fortunately, Berman will be back in the US in November to start a tour of 50 concerts. To prepare yourself for this virtuoso, try the Columbia/Melodiya reissues of the c.1958 recordings of the Liszt Transcendental Etudes, Spanish Rhapsody, and Hungarian Rhapsody No. 3 (M 33928) and the Sonata in B Minor, Venezia E Napoli, and the Mephisto Waltz No. 1 (M 33927). The sound on these is less brittle and harsh than on the Melodiya originals. (The former set once circulated domestically in '60s as MK 2238, mono. No notes on the artist, who is merely listed as L. Berman!) The new DG discs have even better sound: Liszt/Rachmaninoff (2530 678) and the Tchaikovsky First Piano Concerto with Karajan and the Berliners in a surprisingly moderately-paced, albeit musical, performance (2530 677). And if you must have every snippet of Berman readily available, Monitor MCS 2135 (fake stereo) has him on two bands only, doing the Prokofiev Toccata, Op. 11 and the rare Leon Jongen Campeador. • ERRATA DEPT.: In the last issue, the printer's gremlins in the C & M column managed to turn Wilhelm Krumbauch into William Krumbauch and indicated that I was so under the influence at Newport that I couldn't spell the name of the bubbly stuff! Also—The Nonesuch Mahler Sixth (HB-73029) is real stereo, recorded at a live performance. JGH was thinking 1956 when he inserted the bit about it being mono. Shame!* • HNH Distributors Ltd., 820 Davis Street, Suite 330, Evanston, IL 60201 have added Caprice and BIS (Sweden), Harmonia Mundi (France), CRD, Lyrita, and Vista (England), and Entr'acte (USA) to its stable along with Unicorn. Happily, these labels are showing up in larger retail stores. Golden Crest News, Vol. 6, Issue 1, reiterates much of what we outlined in our correspondence with Bill Schwann re availability of recordings. For a free sub to this newsletter and GC catalogs, write to Golden Crest Records, Inc., 220 Broadway, Huntington Station, N.Y. 11746. • That elusive Dimension DC-1 disc of Noehren playing Bach has been repressed in limited numbers. Order from Jon Stoll, 2247 S. 76th St., Milwaukee, WI. 53219. $6 postpaid. • Peter F. Ross, Music Director for Sine Qua Non Productions, Ltd., informs me that their recording projects have expanded considerably so that SQN is now a leading independent producer and not just a supplier of promotional items for the bookstore trade. There are licensing agreements with ABC/Command and British Decca and others, and their first American artist is harpsichordist Sylvia Marlowe. Some releases have seen the light of day for a long time on various labels, but there are others which are new to the U.S. SQN 7739 offers the only available performance of the Bach Magnificat with the Christmas Interpolations and SQN 1472/2 gives us Ristenpart's Bach Orchestral Suites. Recall that his Nonesuch set of the Brandenburgs is a classic. In the brief time I've had to audition some of these budget discs, I've noticed that the sound is generally clean but bass-shy, and the pressings are superb. Only in the crowded reissues of the Steinberg Beethoven Symphonies do I notice any tendency for slight inner-groove distortion, but then the originals weren't anything to brag about either. Complete catalog from SQN on request from One West Street, Fall River, Ma. 02720. Good bargains for younger listeners! • And so, cheerio for now! WM

* I am covered with rue! JGH
mitigated against achieving a total success. Mrs. Johns offers a variety of songs by Caccini, La Guerre, Pauline Viardot, Poldowski, and others, and although she is fine in the "Impression Fausse" of Poldowski, her upper range sounds a little tired at times to me. Selections from Lili Boulanger's cycle, "Clairières dans le Ciel" looked appealing, but Berenice Bramson's rather shrill voice is not my type. Her piano accompaniment by Roger Rundle is poorly balanced, and one strains to hear it. This is the case elsewhere on the four sides of the album. The Tailleferre Quatuor (1918) is a welcome piece, nicely played by The Vieuxtemps Quartet. Much other music is offered also, but the inconsistency in the engineering and performances are not up to usual Stereophile standards. Still, repertoire hunters may find something of interest here, and there are biographical notes on the 18 composers included in a large booklet that obviously took some research to put together.


This double album, available only through the Shrine Store, is a double dazzler! Marilyn Mason is one of this country's finest recitalists and teachers who has commissioned more than 20 works for the King of Instruments. None of these are presented here (too way-out for what is essentially a souvenir album?), but we do have solid, musical performances of Bach's Toccata and Fugue in D minor (BWV 565) (yes, it's the warhorse!) and Toccata, Adagio and Fugue in C (BWV 564); Dupre's Deux Esquisses; Alain's Trois Danses; and other works by Van der Horst, Le Clerc, Pergolesi, and Lidon.

Miss Mason handles this huge Möller instrument with ease and calls authoritatively on its registers to give us characteristic, musical performances of the various schools represented. The Lidon Sonata De I Tono Para Organo Con Trompeta Real is his only played work, and here it is thrilling as heard with the tune on the bronze Pontifical Trumpet against the full organ. The Le Clerc Magnificat (18th century) features the Shrine Men's Choir under Joseph Michaut, which chants the verses alternately between the organ sections which are particularly attractively registered here. The choir itself is only adequate. The entire production of this album is handsome, and the double sleeve includes many photos on the inner leaves. The sound is among the best to be had today of an organ, and my pressing is flawless. Bravos to Glen Glancy and Stan Ricker, the mastering engineers. My only quibble is that a complete stoplist for this organ is not supplied. I'll play this one often.

BACH: Brandenburg Concertos. English Chamber Orchestra, Raymond Leppard, conductor. Philips 6747 166 (2 discs).

The Brandenburgs have not suffered from poor recordings, but rather an embarrassment of riches. Schwann-I now lists some 20 versions of all kinds, and there are others. The present set is stamped with Leppard's personal cachet on the warm playing from the English Chamber Orchestra. Leppard is known for his idiosyncratically, personal interpretations of Baroque works, but this is not the case here. But we do have an English stamp on the music, if there can be such a thing, as opposed to a German one such as we hear from a Ristenpart or a Münchinger or a French one from a Paillard. In this case Leppard also performs as harpsichordist and conducts from the keyboard. I liked the warmth of the First Concerto with the mellow horns and spiky strings, although I cannot forget the wondrous sound of the horns on Ristenpart's version for Nonesuch.

The ECO gives us an essentially modern sound rather than the ancient-instrument approach. Leppard is particularly fine in the Second Concerto, and John Wilbraham's outstanding trumpet work is worth the price of the album alone. Leppard's keyboard work is heard to advantage in the Fifth Concerto, the harpsichord cadenza being especially fine and well-recorded. The instrument is perhaps an English one too (Goff or Goble?), its silvery sound nicely balanced with the ensemble. One may note that this set of Brandenburgs uses harpsichord continuo throughout, rather than using an organ for some concertos. None other than David Munrow is one of the two recorder players with the ECO, and he is heard clearly in the second and fourth concertos.

Philips again provides superb engineering on this set. It never fails to amaze me that this company will compete with itself in rival versions of the same work. They are obviously smart enough to realize that there is room for different artists and approaches, so why settle for only one? Scant jacket notes in three languages.

RAVEL: ORCHESTRAL MUSIC: ALBUM FOUR. Le Tombeau de Couperin, Menetru (To page 28)
The small labels continue to proliferate, and surely the most eclectic of them must be Desmar, an independent company located in New York City. Most small companies usually offer recordings of solo instruments or small-scale chamber works because of budget considerations, or they license tapes at relatively low cost from European firms. Desmar offers the solo and chamber stuff, albeit of very high quality, but extends its catalog into the "historical" recording realm and, get this, Leopold Stokowski and the National Philharmonic Orchestra of London. Maestro Stokowski at age 93 has here recorded the Rachmaninoff Third Symphony for the first time in his long career (DSM 1007); he includes also the Vocalise, Op. 34/14 in its version for orchestra.

Stokowski's reading is a strong one, individualistic as expected, but without some of the gross distortions of musical line that have marred some of his recordings in recent years. The sound Desmar gives us is not as lush as we would like for this orchestra; compare it with the RCA and Decca/London recordings which are so outstanding. The clarity is there, but with a rather wry high end in a fairly warm acoustical environment. Still, the disc is an important one, and we can hope that orchestral recordings will continue to figure in Desmar's budget. New to the Schwann-I Catalog is the Strauss Quartet for Piano & Strings in C minor, Op. 13 featuring the Los Angeles String Trio (Kathleen Lenski, violin; Paul Polivnik, viola; Jeffrey Solow, cello) and Irma Vallecillo, piano. Straussians will love this beautiful work, full of those rich harmonies found in the large orchestral scores but heard here in cleaner detail (DSM 1002). Good balance, but the upper strings are a shade steely. An alternative performance is on Argo ZRG 809 by the Cardiff Festival Ensemble and coupled with the Reger Piano Quartet, but at review time this disc had not yet been released in the U.S.

Solow and Vallecillo team up in a cello/piano recital, "French Masterpieces for Cello & Piano" (DSM 1006). This one is splendid! Following superb performances of the St-Saëns Sonata No. 1 in C minor, Op. 32 and the Honneger Sonatine comes the premier recording of the Debussy Intermezzo, a score whose manuscript is owned by Gregor Piatigorsky. Once in print (with some errors), the work was withdrawn by Piatigorsky in deference to Debussy's widow, who claimed her husband had not wished this early work to be published. Mr. Solow, with the aid of a photocopy of the manuscript, here gives us a perfect rendition of this rarity. The rich piano sound, warmly balanced with the beautiful cello tone, qualifies for our highest praise.

Violinist Endre Granat and pianist Harold Gray offer two fine sonatas: the Paderewski A minor, Op. 13 and the Busoni No. 2 in E minor, Op. 36a (DSM 1004). The Busoni is having a "run" of sorts with a recent version appearing on Delos; several other recordings have been deleted, but there is L'Oiseau Lyre SOL-296 that features Hymen Bress in both Busoni sonatas. The present performance on Desmar is a strong candidate for top billing, and the rarer Paderewski, certainly worth having, may be the clincher for prospective buyers. Highly recommended.

Fernando Valenti, the ubiquitous harpsichordist, pops up with two sonatas by Antonio Soler (DSM 1001). This is the sound of the "big" harpsichord and is cleanly but very closely recorded, at a very high level, reminiscent of Mr. Valenti's mono Scarlatti Sonata recordings on the long-defunct Westminster label. Fine performances, but too clangorous, and exhausting to my ears.

Claudio Arrau is having a major renaissance in the recording studios these days for Philips. He recorded five of Liszt's Hungarian Rhapsodies for Columbia in 1951 and 1952 but those were never issued. Now Desmar has released them (on a benefit recording for the International Piano Archives) in remastered mono that sounds very good for its age. Arrau used an early edition of these works, and certainly plays them with as much authority as anyone else. His clear fingering results in stunning runs in No. 10 and particularly fine rhythm in No. 9. No. 13 is a superb whoop-de-do in the grand manner. The mid-range may be a little tubby on this one, but performance by a master prevails here (DSM 1003).

Finally, the Gala Concert for International Piano Library, December 9, 1974, appears on DSM 1005. (The IPL is now called the International Piano Archives). Thirteen pianists played singly and in various combinations, in an oft-humorou program. Bolet, Lupu, Borge, Bachauer, De Larrocha and others all perform. Of special note are Garrick Ohlsson's reading of the Chopin/Balakirev version of the Romanza from the E minor concerto, and Victor Borge in a serious mood dazzling us with the Friedman/Gaertner Viennese Dance No. 1. The sound is good for
DESMAR (From preceding page)
a live recording, and the disc certainly will be a collector's item. For $1 you can send to the IPA for a copy of the original London program booklet. All in all, a great start for Desmar. Catalogs may be obtained from Frank Burton (formerly with Phonogram) at Desmar Music, Inc., 17 St. Lukes Place, New York, NY 10014. Discs retail at $6.98 and may be obtained directly from Desmar, although international distribution seems unusually good so far.

RAVEL (From page 26)
The late Jean Martinon fortunately recorded much Debussy, St-Saëns, and Ravel before his untimely death. The present collection, all orchestrations of earlier piano works, finds Martinon and his orchestra in a happy mélange. The concert hall sound prevails here, without ghostly spotlighting of individual instruments. In Tombeau the lean strings and tight brass are a joy—perfect color and good balance and weight to the bass. The beautiful Pavane is lovingly phrased. Alborada is one of the most sparkling of orchestral scores and here the Orchestre De Paris shimmers with the balance of all choirs being perfectly set. The percussion is clearly defined, but not so grossly exaggerated as to rattle your dentures. Martinon lets his forces smolder, and then adds the necessary catalyst to cause them to blaze gloriously. The less-familiar Menuet and Barque round out a superb program. Martinon's ability to maintain tension until the right moment is a study in fine control in the latter work. Angel's sound and pressing were good on this one; a fine disc, and more evidence that Angel no longer deserves its reputation for third-rate sonics.

Telefunken gives us 12 of Handel's 16 organ concertos in this very welcome set. I thought I was familiar with these works until I heard Harnoncourt's approach and the stylish improvisations of Tachezi. Tempos are sometimes very fast, unusual staccato playing is heard, and much is made of dynamic shading. For once I felt the performers enjoyed themselves without getting bogged down in what was the proper, scholarly thing to do. A "Truhenorgel" (cabinet organ) without pedals is used for all except Op. 7, No. 1 which requires pedals. That instrument is an 1858 Viennese organ and is not as bright as the other small but pleasing instrument. These are not the huge cathedral-like monsters, however, that have been heard in large-scale readings of the works.
The First Concerto is very well executed, but Tachezi here (and only here) sounds a little bit erratic in his rhythm at times. The familiar Second Concerto features some extremely fast tempi and that staccato playing mentioned above. Occasionally in this work, the orchestra slightly overbalances the organ, but harpsichord presence is perfect, and the big sound in the concluding allegro, ma non presto is quite exciting. Gorgeous strings! In general, Telefunken has done a fine job with the engineering. Separation and balance are superb, and the bite of the lower strings is particularly good in the presto of the Fifth Concerto; the harpsichord and lower strings provide a perfect ostinato for the bright organ sound in the second movement of Concerto Eleven. All in all, a delightful presentation of these cheery pieces. Let's hope the other four concertos will be soon forthcoming.

WM

MOZART: Concerto No. 14 in E flat for Piano & Orchestra, K. 449; Concerto No. 15 in B flat for Piano & Orchestra, K. 450. Peter Serkin, piano; English Chamber Orchestra, Alexander Schneider, conductor. RCA ARLI-1492.
This single disc is a reissue from a recent 3-disc set that included the Concertos 14-19. I had not heard those performances, however, so this was my introduction to them. Of the six concertos Mozart wrote in 1784, the only one scored without winds is No. 14—supposedly a more intimate work than the others. In this performance intimate certainly does not mean we have a puny performance. Serkin and Schneider have worked often together at Marlboro and elsewhere, and both have a rather Romantic approach to Mozart; these are not dry performances. The English Chamber Orchestra sound is never dry and academic under anyone anyhow. There is lovely phrasing and dynamic expression from all concerned.
Concerto No. 15 is one of Mozart's "grand" concertos, and here it gets a vital reading. Serkin chooses to play his own cadenza of stylistically correct proportions in the first movement. The closing allegro, a rondo really, is a joyous romp. RCA sound here is very good if not of demonstration quality.

(To page 32)
Not long ago a friend stopped by on his way to buy a new cartridge to replace one he had bought only several months before. He claimed that his "old" cartridge no longer sounded clean or tracked properly. Since I knew he used his cartridge in a good arm and that he was not prone to abusing equipment, I asked him to leave his old cartridge with me to let me examine it. There was no damage. The cantilever was in good shape. The pole faces were clean, and continuity measurements were correct. But, after brushing off its stylus and inserting it into an arm there was no doubt that it did sound terrible. Yet before my friend returned from the store with his cartridge, I had his old cartridge playing as sweetly as it did when new.

The problem, which is not an uncommon one, was obvious after examining the diamond under magnification. The tip of the diamond was clean and properly rounded, but most of the shank of the diamond was coated with a substance which resisted all attempts to brush it off. The origin of this substance, sometimes referred to as sludge, may be hydrocarbons in colloidal suspension in the air, tobacco tar, residue from record cleaning agents, fingerprints, etc. Fortunately it can be found in the cleanest of households.

The best way to remove this sludge is with a small camel's-hair watercolor paint brush (size 1) moistened but not soaked with grain alcohol (available from most liquor stores). Clean only the stylus itself, paying particular attention to the sides and rear (facing the arm base) of the diamond. But don't overdo it. A few swipes across each side should suffice; excess alcohol may soften the adhesive that holds the diamond in place and, worse yet, may be drawn up by capillary action through the center of a tubular armature into its flexible mounting where it can do all sorts of irreparable damage. Don't be put off by the hazards, though. A little care will prevent any mishap, and will cure a condition that is not otherwise correctible. It cured my friend's problem; he is now the not-so-proud owner of two expensive, and operative, cartridges.

Maintenance and fine-tuning are important and often understated problems. A complete discussion would fill a book, but the following specific suggestions may prompt some of us to take a closer look at just what is going on in our audio systems.

In the case of cartridges, it is wise to be highly vigilant of their operation. Although I am not personally in the repair business, here is a list of cartridge problems I have come across, and their cures:

1. Sludge accumulation (alcohol),
2. Metal filings on the magnetic pole pieces (dry camel's-hair brush),
3. Crimped stylus shank (replace stylus),
4. Loose stylus shank in the suspension collar (replace stylus),
5. Inability to properly insert the stylus into cartridge body (replace stylus, or re-read replacement instructions),
6. Intermittent coil (replace cartridge)

It goes without saying that a good magnifying lens (10X magnification) or microscope, along with a high degree of dexterity, are of inestimable value when working with cartridges.

Most cartridge manufacturers recommend a specific value of load resistance for their cartridges to work into. This is generally in the range of 47,000 to 51,000 ohms; however the recommended shunt capacitance across the cartridge output may vary from 500 pf to as little as possible. Newer cartridges with CD-4 Quad capability call for minimal capacitance and, typically, a load resistance of 100,000 ohms. A number of listeners have found that the most adaptable and sonically superior approach to this varying set of requirements is to replace the leads between the arm and preamplifier with low capacitance cable, such as Belden 8421, and

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1. New records are often sludged up with a coating of so-called mould-release agent—a substance which facilitates the separation of the stamper surfaces from the moulded disc.
2. You can also use cigarette-lighter fluid or high-proof liquor like gin or vodka.
use adjustable capacitors (trimmers) at the preamplifier end when additional capacitance is required.

Finally, the tone arm should be very lightly swung through its normal arc of motion to be certain that there is no binding in the pivots. And while you are at it, why not check to make certain the turntable is level, because many of the delicate arm adjustments can be substantially defeated if it is not.

A major source of difficulty with all types of electrical equipment is the use of electromechanical switches and connectors. Poor connections do more than just produce noise or totally interrupt signal flow; they can be a major cause of unbalanced stereo channels, interments and distortion. That's right; distortion. You may never have thought of an audio connector as a potential source of waveform distortion, but it happens all the time. Here's how: When a contact becomes very slightly corroded (usually as a result of all those sulphides and chlorides in the air we blissfully breathe), it can start to behave like a tiny rectifier—passing current more readily in one direction than the other. This changes the wave shape of each alternate half cycle of audio signal passing through the contact, which is almost a classic example of distortion.

Unfortunately, the kind of connector that is most likely to succumb to this malfunction is the ubiquitous RCA phono plug/jack combination. Therefore even the most superficial treatment of maintenance procedures should include the recommendation to service these infamous items. Such servicing should include some or all of the following steps:

1) Tighten, slightly, the center conductor connector of the jack,
2) Tighten, again slightly, the outer conductor connector of the plug,
3) Clean all mating surfaces with either a light abrasive material or a swab dipped in trichloroethylene,
4) Inspect the mechanical connection between the phono cable and plug, looking for broken or frayed wires.

Now what about speaker leads. Using only two or three strands around that screw terminal is a definite no-no. And what about that time you lengthened or shortened your speaker leads by simply cutting the wires and quickly twisting the leads together and then slapping some tape over the splices? Chances are those wires inside the tape are quite sufficiently corroded to be rectifying some signal, and you are now aware of what that can do. Maybe this would be a good time to replace those old speaker leads with some new standard 16 or 18 gauge wire, with spade lugs or banana plugs securely affixed to each end. Remember that the full output of a 200 watt amplifier into a 4 ohm speaker amounts to over 7 amperes, and even a 100 watt amplifier will produce 5 amperes into 4 ohms.

For those of you who continue to be admirers of some of the older electronics, especially tube type, the problems of maintenance require special consideration. Some of the older units were not only excellent in their day, but would compare very favorably with many of today’s units if the older units were properly maintained. That may be a bigger "if" than you think. An expert on tube-type Marantz equipment told me recently that there is probably not a single Marantz TC preamplifier operating properly today unless all the coupling capacitors have been replaced, along with several rectifiers. The list of components with distinctly limited life is undoubtedly headed by vacuum tubes, but there are other types of components to be watched—High-voltage capacitors with inexpensive seals, consumer-grade electrolytic capacitors, very-high-value resistors (10 megohms or more) and selenium rectifiers. Replacing these components is normally a simple matter of substituting a new component, but care should be used when substituting a solid-state diode in place of an older type rectifier. Solid-state diodes have less forward resistance than most vacuum tubes or selenium rectifiers, and will therefore produce a higher supply voltage when they are installed. In addition, they apply their output voltage to the filter capacitors almost instantaneously, rather than gradually as when a tube rectifier’s heater warms up, and the combination of added stresses can pop the unit’s filter capacitors. Some measures should be taken to ensure that the supply voltage stays at its original value, and this should ideally be accomplished without introducing extra series resistance in the supply circuit, as that will offset the solid-state rectifier’s inherent advantage of low supply-source impedance (which gives better supply regulation). In other words, converting from a tube rectifier to a solid-state one may not be as simple as it appears; it may in fact involve some sophisticated design work which you may or may not be prepared to undertake. Series resistors may have to be used to bring the supply voltage back to original

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3. It has been found that a certain amount of tilt in the proper direction can supply the necessary bias (anti-skate) compensation to an arm that has no such provision itself. Ye Ed.
Two years ago, we ran off 1000 copies of a soft-bound reprint of our first 12 issues. It sold so well (there are less than 300 left) that we did likewise with our second 12 issues, which is also going over quite nicely.

(That one is down to 600 copies left.) Both are still available for $25 each, but Volume I may not last much longer. If you want these, we would advise ordering now.

Both are 8½ by 11" size (that's how we were). Volume I has 240 pages and spans the years 1962 to '66. Volume II has 290 pages and covers up to Spring '71.

Also available in limited quantities are original back issues dated Winter 71/72, Summer 73, Autumn '73, Winter 73/74, Spring 75, Summer 75 and Autumn 75. These are in virginal condition and sell for $1.75 each. See page 42 for ordering information.

We also have on hand a number of slightly creased but otherwise readable post-office bouncebacks (undeliverable for various reasons) of some other back issues which we'll part with for $1 each. If you're missing some specific issues, let us know which ones you need. We may be able to supply them.

Supply voltage specifications determine the operating point of any type of amplifier or preamplifier—tube or solid state. Some electronic equipment has built-in voltage regulation, but all electronic equipment can only operate over a limited range of primary AC line voltages — typically 110 to 120 VAC. Unfortunately line voltages differ greatly throughout the country. The moral of this is that, if you intend to obtain the specified performance from your equipment, you must be sure that your operating conditions are also in accordance with the fine print, and this always includes the line voltage. Low line voltage (in some areas of this country 95 VAC is not uncommon) usually means high distortion and low power output. High line voltage (in some areas 128 VAC is common) usually means overheating and reduced equipment life, if not outright, catastrophic breakdowns. While on the subject of the importance of a correct supply voltage, it should not be forgotten that the proverbial octopus arrangement of extension cords can result in a voltage drop which is a function of the instantaneous current drain. In other words, the dynamic primary voltage regulation will be poor, and this can cause problems of distortion and clipping on peaks.

If your line voltage fails to meet any of the above requirements, there are several steps to be considered:

1) Eliminate unnecessary extension cords,
2) When extension cords are required, use short cords of 16 gauge wire with high-quality, industrial-type connectors at each end,
3) Connect a high-powered amplifier to a separate house circuit,
4) Purchase a variable power transformer to manually adjust the line voltage. The popular Superior Powerstat model 21 costs approximately $25 and handles 630 watts; model 116B costs approximately $45, handles 1400 watts, and includes a built in socket and on-off switch.
5) If the line voltage is as low as 95 VAC, even the above transformers will not fully solve the problem; however a telephone call to your local power and light company may be sufficient to persuade them to install a new drop to your home or neighborhood—especially if you can convince several of your local friends to do likewise.

Before winding up this discussion of maintenance, a word about record maintenance.
If there are some records in your collection which have resisted all attempts to clean them, try the following. Borrow or buy the oral hygiene appliance known as the Water Pik. Fill it with distilled water and give those records a treatment. A word of caution though: the jet from the Water Pik is quite powerful and has a range of about 20 feet so this is definitely a basement or bathroom operation. When you are through, pat the records with a lintless towel to remove most of the large water droplets and then let them dry in the room air. The distilled water will minimize the water deposits, and you can finish off each side with your favorite dry cleaning device to remove dust that may have settled on the surface while drying. If the records have greasy deposits on them, precede the Water Pik routine with an old-fashioned soap-and-water scrubbing using a folded pad of velvet cloth, followed by a rinse under lukewarm water.

MOZART (From page 28)

Good balance and a rather warm room sound, but a shade more depth to it all would have added a little more bite to the string sound, particularly in the bass. The review copy had what is probably an odd flaw—something that caused the stylus to stick about 3/4" into Side B. I have not had this particular problem on any record in years.

WM

Manufacturers' Comments
On Equipment Reports
In This Issue

Audio Research D-150

We appreciate the Stereophile's review of the D-150; however, we disagree with the perspective. We still believe the D-76A is a line amplifier and a logical choice for most audio perfectionists.

When a state-of-the-art manufacturer contemplates putting a product like the D-150 on the market, several serious questions must be answered. For example, will a product like the D-150, which is beyond the financial capability of most audio perfectionists simply frustrate the consumer? Will the consumer decide that since he can't afford The Best that he might as well buy a cheap, temporary product and wait until The Best becomes affordable?

This question was raised at Audio Research when we compared the D-150 prototype to the D-76A. We felt that while the D-150 was superior to the D-76A, most Audio perfectionists would still view the D-76A as the more sensible choice.

One important feature on the D-150 is the front panel meter and bias adjustments. With these controls, the D-150's optimum performance can be easily verified. We realize that many D-76A owners are missing the full potential of their amplifiers because of improper bias adjustments. We encourage D-76A owners to have their amplifiers re-biased after a few weeks use at the line voltage at which the amplifier is normally used. If this practice is followed, we believe most audio perfectionists will find the differences in sound quality between the D-76A and the D-150 to be significantly reduced.

E. Wendell Diller
Sales Manager
Audio Research Corporation

REVIEWER'S ADDENDUM: We did not wish to give the impression that the D-150 had suddenly made the D-76A a hunk of junk. The 76A is still, in our opinion, the second-best power amplifier available for use with full-range electrostatics and other speakers that don't need the extra crispness and low-end control of a solid-state amplifier. Our main point, which we admit probably was a bit overstated, was that the difference between the D-76A and the D-150 is not at all subtle.

We have ascertained that the biases in our D-76A are correct, and the unit sounds identical to a second D-76A we compared it with, so it would seem safe to assume that it is functioning properly.

Otari MX-5050

Otari Corp. appreciates the very candid and thorough evaluation that the Stereophile magazine has given the MX-5050 recorder.

The MX-5050 was designed by a group of engineers who are noted for their capability in designing very stable and reliable audio tape duplicating and recording equipment. The performance of the product reflects their desire to produce a true professional compact recorder at a selling price half of that of all full-sized professional audio recorders. Certain compromises were required to maintain the size and price level established for the recorder. On the four-channel and eight-channel versions of the MX-5050, all electronic adjustments are accessible from the front or rear of the amplifiers without removing any screws or plug-in printed circuit cards. Again, size and cost factors prevented front and rear adjustments of all functions on the two-channel versions.
The microphone inputs are high impedance (50,000 ohms), unbalanced with 1/4-inch phone connectors. We offer low-impedance balanced microphone transformers as options with the MX-5050, but decided against standard built-in transformers because of the distortion characteristics of lower priced transformers. Most MX-5050 purchasers use the machine with separate mixers, which have their own balanced microphone transformers.

On the MX-5050, the Source/Tape monitor switch was designed to provide monitoring of the source signal and the off-tape signal. In the Source position we felt the user would want to read the level and hear the signal level being fed the recorder, unaffected by a variable output level control. That is why the Standard Reference Level, which indicates a "0" VU level, is provided in "Source" monitor. "Source" and "Tape" reproduce levels can be balanced at "0" VU with the "Monitor" level controls on the amplifier boards.

Otari Corp. feels that the protrusion of the XLR connectors beyond the rear of the deck may have been a design oversight, although most potential users told us they would operate the machine in the vertical position. Possibly one day the connector panel will be recessed farther than the present design.

The MX-5050 was originally designed for recordists who preferred superior headroom and distortion performance to greater high frequency boost. This is the primary reason for the limitations in the record equalization adjustments.

We are sorry that we allowed styling to overshadow functionality in the black anodizing of the built-in splicing block, but a critical user can lighten the black finish with some fine steel wool.

Later this year Otari plans to release a more expensive version of the MX-5050 with separate plug-in electronics where all adjustments will be accessible without removing panels and with a DC servo controlled capacitor for users who desire even more professional features than in our current model, in a two-case model with interconnecting cables.

Thank you for your thorough and critical evaluation of the MX-5050. Otari is confident that readers of the Stereophile who are serious recordists will find the machine an exciting experience to use.

Brian Tranke
Marketing Manager
Otari Corp.

REVIEWER'S ADDENDUM: We must take issue with two of Mr. Tranke's comments.

The justification for the limited record HF boost is a lame one indeed. As long as the Ampex playback standard continues to be a standard, any recorder should have enough range on the record equalization pots to obtain flat high-end response from the Ampex curve when the machine is biased to slightly beyond peak.

We would hesitate to attack the splicing-block channel with steel wool, even of the finest variety, because proper operation of the block depends on a very slight but precise undercutting of the edges of the channel, and we are not sure how much abrasion those edges could stand before they lose their undercut. We would advise, instead, using one of those fiber-glass erasing pencils that are available from any good-sized stationery store. This would allow the abrasion to be applied to the bottom of the channel without touching its edges.

G.A.S. Thaedra

I think you are correct in stating that, for the most part, the Audio Research preamp and Thaedra are different yet equally rewarding. The ARC is superb and, having held its high reputation for such a long time, has been a very stiff competitor.

As you pointed out, Thaedra is sonically better in some ways, especially in the low frequencies (due to the servo) and in the highs where it exhibits more airiness (due to its wider bandwidth). These are the areas which provide a great sense of impact—particularly the lows. I believe I can add more insight into the sources of the other sonic differences noted, but first, I would like to comment on some of the features you failed to mention and which I feel deserve consideration.

The low-frequency filter was designed to remove rumble that is present on a great many recordings and would otherwise cause IM distortion and wastage of amplifier power (better utilized for the musical information). It was decided that this filter must be passive so as not to add any coloration. Without it, the response of the entire preamp is flat to below 1 Hz.

The construction quality is superior to other audio gear. (For example, all internal plug-in pins and sockets are gold-plated.) The quality of the parts used is at least equal to that of the Mark-Levinson equipment (Sorry about that, Mark!), although there are more of them at lower cost. (Incidentally, the JC-2 is also a superb sounding preamp!)

Thaedra provides full monitoring and copying for up to three tape machines, whereas as the ARC does not. In addition, the cross-talk between any two inputs is at least -120 dB from 20 to 20k Hz when properly terminated. Since the output impedance (actual, not "source") is 60 ohms. Thaedra can drive directly virtually any low-impedance head-
phones such as the Koss PRO-4AA and the Yamaha HP-1. Thaedra is the only preamp in the world with totally separate, optimized pre-amp boards for conventional magnetic cartridges and low-output moving-coil types. Knowing that you are going to say that features have nothing to do with sound quality, I feel there are audiophiles who do desire features.

Now to your other nit-picks. As far as looks are concerned, beauty is in the eye of the beholder (although at this price I would certainly not use plastic knobs!). You are correct in reporting that the volume control has 2-dB steps, but I do not find 2-dB steps to be bothersome. But then, nothing's perfect, is it? I am glad you noticed the tracking accuracy of the volume switch; it is not a potentiometer with detents, but rather an honest-to-goodness multi-position switch with individual precision metal-film resistors between steps. You missed one of our strong points, though: If you had checked the 20-kHz square-wave response through the high-level inputs, you would have found absolutely no rolloffs or other aberrations at any setting of the level control. The same applies to the tone controls. Since they are exactly the same type of control as the level control, they are effectively out of the circuit in the Flat position. This eliminates the need for a tone cancel switch. Since the tone-control switches are in the feedback loop of the high-level amplifier, there are no additional stages serving only the tone-control functions, as there are in most other preamps (including the ARC).

To suggest that Thaedra is unique in having many Class-A stages, some of which run very hot, is incorrect. All preamps operate in the Class-A mode (with the exception of those using ICs, most of which have Class-B output stages). The difference is in the Class-A power level. There are 4 independent power-supply regulators which dissipate approximately 12 watts. In addition, the line amp for each channel operates at a quiescent level of approximately 4 watts. So Thaedra does indeed run warm.

One of the last points I would like to make is that one I feel is of extreme importance even though somewhat ambiguous. The noise level on phono is 7 times(!) — that is, 17 dB — lower than that of the ARC, I am surprised that you did not comment on this as you must surely have noticed. This unfortunately can sometimes be a mixed blessing. It has been shown in the past that when an "inaudible" noise field is mixed in with the signal, a quality of ambience is added to the sound, giving it a false impression of (for want of a better word) "lushness." When this masking noise field is removed, imperfections in the tape and discs become more apparent and consequently more objectionable. This might explain why the ARC supposedly sometimes sounds more musical although it is not as accurate. I have observed this effect myself, but I do not consider it important enough for me to give up accuracy. One must decide for himself which is the lesser of the two evils. I know how you feel about commercial recordings, about which I feel the same.

Finally, I am glad to see that you find some merit with moving-coil cartridges. If I did not feel they were worth it, I would not have gone to as much time and effort to design the head amp, which is specifically optimized for moving-coil cartridges. As you pointed out, the head amp is its own phono preamp stage. The JC-2 uses a combination of the JC-1 pre-amp in tandem with the regular phono preamp in order to accommodate moving coils. I am convinced of the superiority of the moving-coil principle, and I do hope you will evaluate the EMT again, this time through Thaedra. Although it is very expensive ($330) and hard to obtain, it is the very finest cartridge available. Incidentally, it has a spherical stylus.

The retail price of Thaedra is $899 West Coast and $909 East Coast and, who knows, maybe soon it will be a bargain.

James Bongiorno
President,
Great American
Sound Co.

REVIEWER’S ADDENDUM: We would not have said "features have nothing to do with sound quality" if you hadn't prompted us to, but since you did, we will. Seriously though, it is Thaedra's plethora of features that contributed to our "satisfaction" in using it. We are not at all certain that Thaedra is sonically superior to, or even sonically equal to, the dB Systems preamp or the latest (as-yet untested) Mark Levinson JC-2, but in terms of versatility and flexibility, neither of those is comparable to Thaedra. And in terms of so-called cost effectiveness—the measure of substantive return per dollar spent—it is our opinion that Thaedra beats out both the dB and the JC-2.

We are most impressed by the extremely low noise of Thaedra's phono stage(s), and admit that we did not notice it during our tests for the simple reason that our tests were done with fairly high-output cartridges (the Decca Export and the Shure V-15-IIG) into the regular phono inputs, and with very low-output ones (Grace, FR) into Thaedra's head amp. The low-output ones were of course completely unusable with the ARC preamp because of inadequate gain, even apart from the high hiss level. And with the high-output cartridges, hiss was totally inaudible from
either preamp at any reasonable listening level (up to 105 dB). The findings you cited, which purported to prove that removing an "inaudible noise field" from the signal would reveal sonic imperfections hitherto masked by "lushness," seem directly contradictory to findings cited by Dolby Labs to the effect that removing noise appears to reduce treble response and detail. We are not convinced of the validity of either argument.

We were taken aback by your statement contrasting musicality with accuracy. We were under the impression that, since accurate reproduction of musical sounds is what high fidelity is supposed to be all about, one term automatically implied the other. And while we can grant you the point that a truly accurate reproducing system will reveal the bad as well as the good qualities of a program source, we cannot agree with those (and we do not necessarily include Mr. Bongiorno among them) who argue that the system which reproduces mistracking and subsonic interference most clearly is per se the most accurate reproducer of music. Even though Stereo- phile and its variegated ilk are in the business of evaluating individual components, it behooves all of us to remember that it is the musicality of the sound which reaches our ears, not the accuracy with which sonic imperfections are rendered, that determines the fidelity of the reproduction.

Yamaha Equipment

Although no comments were received from Yamaha by press deadline, we were told that these should be soon forthcoming, in which case they will appear in the next issue. We ask readers to form no final judgments about the Yamaha components tested in this issue until the manufacturer has had his say in the matter.

Bravura Preamp

To be at the forefront of any field requires that some of the product's characteristics be significantly different from those of products which have preceded it. Occasionally, a whole industry must readjust itself to keep an eye toward a new parameter of concern. For example, the Bravura Stereo Preamp is very particular about the cartridge that drives its phono section. That cartridge must have a DC output resistance of between 0 and 2600 ohms in order for the BSP to operate properly. (Best operation occurs at approximately 1400 ohms.) Specifically, DO NOT USE a pre-preamplifier or any other device which has AC-coupled outputs or which has a DC output resistance greater than 2600 ohms at the BSP phono input. THE USE OF ANY SUCH DEVICE(S) WILL VOID THE WAR- RANTY AND RELIEVE NEXUS ENGI- NEERING OF ANY RESPONSIBILITY FOR DAMAGE TO PERIPHERAL EQUIP- MENT. If the BSP is used with the preceding precautions and considerations, and with the finest audio equipment, the listener will enjoy the ultimate audio experience.

The subsonic pulses could be elicited from the first samples of the BSP only by rotating either balance control very rapidly—a condition atypical of normal use. We have nonetheless modified the circuit slightly to eliminate the problem in current production models. We request that you return your sample to us for updating as soon as you receive it.

John R. Tuttle, President
Nexus Engineering
9116 Orland Pl.
Albuquerque, N. M.

REVIEWER’S ADDENDUM: We received it, listened to it (with a Shure V-15-11IG) for long enough to establish that it is at least on a par with the Audio Research, sonically, and shipped it back to Nexus.

Our sample, incidentally, arrived with a sheet of printed specifications but absolutely no warning as to the possible consequences of "misuse." Nexus informs us that all current shipments include a precautionary statement similar to that in the foregoing Manufacturer's Comment.

Quickies
(From page 21)

washer "Zerostat" for discophiles with static charge problems, Shure Bros.' SFG-2 stylus-force gauge, the dbx 157 for the tape-recording perfectionist, the Audiopulse One (now received and tested) for the advanced on-location tape recordist or quad experimenter, the Formula 4 tone arm (also tested) for the perfectionist seeking the best for the least, and the Gately SM-6A mixer for the advanced recordist who wants a dependable mixer for a reasonable price. Pending further investigation, we are temporarily advising against the Bravura preamp, 3-M 207 tape, the Pro-Musica/FMI phono unit, and DAK recording tapes. The Bravura and FMI/P-M are re- ported elsewhere in this issue. 3-M 207 tape seems to have inordinately high print-through, and DAK seems to have some problems maintaining coating-thickness uniformity, which affects high-end response at slow running speeds. More details next time around.
Better Recordings: A Progress Report

A Letter to Three Companies

As the first step in our campaign to bring about some improvement in the sound of domestic recordings, we have worked up a letter that will be sent to the three largest classical-record manufacturers whose products indicate that they need some assistance in the art of recording. The letter points out that (1) Domestic record manufacturers complain about poor sales of classical discs, while the sale of classics on imported discs continues to mushroom. (2) We are offering each of the three manufacturers the open-ended loan of a top-line reproducing system to afford them what will probably be their first opportunity to hear what their recordings actually sound like, and (3) We are volunteering our services, free, to assist them in producing, for test-marketing, at least one no-holds barred symphonic disc. It will cost the companies virtually nothing to work with us; all it will take is the desire to improve their product. If they are not interested, that will answer some questions, too.

We had originally chosen Angel, RCA and Columbia as the worthiest recipients of our letter, but since Angel’s recent releases are much improved and RCA’s imported releases are now very good, we are going to ask for suggestions from our subscribers. Please let us know: Which three companies do you feel ought to receive the letter?

Renditions for Radio

Two recording studios we have contacted have informed us that there are two different standards presented to them by their clients for recordings which are to be broadcast and those which are intended for sale in record stores. And if you think the ones intended for broadcast are better, you are 100% wrong. Typically, the stuff intended for radio-station use has (1) Grossly compressed dynamic range, (2) Extra reverb for extra “carrying power,” (3) Bass chopped off below 60 Hz, (4) highs chopped at 9,000 Hz, and (4) Peak limiting until it comes out your pizarras, to ensure that the latest “hot disc” is louder than the competish.

Disparate Standards?

Fairly recently, we sent a tape to a mastering lab to have a disc cut from it. The Revox A-77 recorder we used had measured to within ±0.5 dB from 50 to 10,000 Hz (actually very good for any tape machine) from the Ampex standard alignment tape. The recorder had also been set up so as to produce an over-all record/play response to within the same tolerances as that from the standard playback tape.

As is customary when submitting a tape to an independent studio for discing, we put alignment tones ahead of the program material on the tape: 15 kHz for head alignment, 10,000 and 5,000 for high-end equalization, and 80 and 40 for low-end EQ. These were precisely set to give Zero-dB playback levels from the carefully-adjusted recorder.

The discing studio in question—Nashville Recorded Productions, who will be cooperating with us on our upcoming disc-cutter tests—uses the STL (Taber Mfg.) alignment tape rather than the Ampex one, but STL had informed us previously that there should be no more than 1 dB of difference at 10,000 Hz between their tapes and the Ampex ones, and that the low ends were identical. In other words, Nashville should have found our tape’s test tones to be within 1 dB of their playback recorder’s high end, and virtually flat at the bottom. So what did they find?

They found our 10 kHz tone to be up by 5 dB and the 40-Hz tone down by 6 dB! And they were playing our Revox-made tape on a Studer, which was designed by the selfsame Willi Studer who designed the Revox!

Nashville was able to equalize our tape for flat over-all response, but that is beside the point. What is significant here is the fact that a tape made on one recorder, and which should have reproduced almost perfectly on a second machine, emerged completely out of whack. We have yet to find an explanation for this, and are wide open to suggestions from readers. We can rule out head alignment, though: Both heads in the Revox were aligned to the same standard, and the alignment tone on the tape allowed the Studer to be aligned to that tape.

How They Hear

Did you know that most disc-recording companies in the US, and some in Europe, use large JBL speaker systems for monitoring the sound of their recordings? Under the circumstances, it is a wonder that so many discs are as good as they are.

Two Mikes, and Why Not?

Recent formal research (in Europe, of course) is tending to support our long-standing contention that the correct way to record an orchestra is with two (preferably coincident cardioid) microphones and nothing else.
We do not however expect to see commercial record manufacturers adopting this abashedly simple approach to recording, for two reasons. First, how does one then justify the $80-thous-
and recently spent on the latest 60-channel mixing console with hot and cold running
reverb, EQ and panning on all channels? And how is a $50-thousand-a-year recording di-
rector going to feel about sitting back with his arms crossed through an entire symphony, just
watching a pair of needles jigging up and down? Unemployed, maybe?

Multi-Miking, and Why
All domestic and foreign symphonic recordings miked exclusively for commercial release
are multi-miked. (Many releases of broadcast performances are not.) Multi-miking, in case
you didn't already know, involves placing a separate microphone to pick up each group of
instruments, using so-called panning techniques to locate each monophonic signal
and augmenting the whole with two or three more-distant "ambience" or "general-pickup"
mikes.2

A major reason for multi-miking is because it is safe. Orchestra members in most coun-
tries are paid a premium for playing for recording sessions, whether for a "take" or for
experimentation with mike placements. So, instead of paying 100 musicians while trying to
achieve proper instrumental balances with two mikes, it is cheaper and easier to record
each instrumental "choir" with a separate mike, lay them down on separate tape tracks,
and finalize the balances in a reduction mix-down after the musicians have gone home.

That, at least, is the rationale often given by recording engineers for multi-miking. We are hereby offering, without a consultation fee, an alternative solution. Since the musicians are
paid the same amount regardless of how many recordings are being made of them, why not use each multi-mike recording session as an opportunity to experiment with different two-
mike pickups? The result, eventually, could be the kind of recordings we're all thirsting for.

Sonic Spectaculars
Some of you may have noticed the excellent survey article on sound-for-sound's sake discs
in Stereo Review this past Spring. It was so good that we decided to shelf our similar project for a while and have a go at it a couple of issues from now.

1. The output from a single mike has to be mono-
phonic, doesn't it?
2. Not counting any additional distant ones for rear-channel quad.

Symphonic Dances
Will the subscriber who mailed us an ex-
ccerpt of his tape of the Rachmaninoff "Sym-
phonic Dances" please contact JGH as soon
as possible? Your letter got mislaid and the
tape has no identification of source on it.

SQ Dichophony
I would like to apprise you of a most interesting discovery I made in the early days of SQ but whose time appears to have arrived
only now: listening to an SQ quadraphonic record played in the stereo mode through
binaural earphones gives an unmistakable impression of hearing a decoded quadraphonic program—the human head appears to act to
a notable extent as an SQ decoder.

This phenomenon occurs with any good pair of binaural earphones—currently I am using the AKG-K240. The SQ record is not
played through a decoder—it simply is re-
produced like any stereo record in the binaural earphones. Naturally, the more "discrete" the
SQ records, the greater the effect. For exam-
ple, if you play Side A Band 7 ("Channel
Identification Signals") of the SQT 1100
Quadraphonic Test Record, you hear the pink
noise tones walk around your head. The
Boulez/Bartok MQ32132 is equally startling
in this effect. And the Biggs Bach/Freiburg
MQ32933 will delight you with its spatiality.

I call the practice "SQ dichophony." I have found that perception of SQ dichophony varies from individual to individual but about
90% of those tested un-mistakably experi-
cenced it. It appears, therefore, that SQ dicho-
phony is bound to have a significant influence
upon the enjoyment of reproduced sound.

A good measure of harmony exists be-
tween what the German call "Kunzkopf stere-
ophonic"—listening binaurally with a dummy
head—and SQ dichophony. Those who seek
spatial effects through the use of dummy heads
will find an equal or greater measure of en-
joyment by listening to SQ records played
decoded into binaural headphones.

Now that we know of SQ dichophony, the concern of headphone manufacturers that
the growing popularity of quadraphony may require them to produce special headphone designs is groundless; rather, SQ dichophony enhances the utility of conventional high-fidelity "stereophonic" headphones.

Naturally, SQ dichophony cannot replace quadraphonic listening with loudspeakers—it is not possible to equate earphones with the live sensation of the quadraphonic space. But as a means of simple, low cost, personal, non-disturbing enjoyment of music, I feel that SQ dichophony represents a significant advance.

Benjamin B. Bauer
Vice President &
General Manager
CBS Technology Center
Stamford, Ct.

Volume I

Your volume I reprint is a joy! Congratulations and thanks. But a peculiar sensation is aroused very quickly when reading it: The realization that very little has actually changed in the audio field since you started publishing 14 years ago. A keen sense of refinement becomes obvious, but no miracles—very much like a maturing person at his best.

Bravo for Dynaco for hanging in there with consistent quality and refinements, resisting the temptation of multi-colored lights and superfluous "features." My old SCA-35 still comes out of the closet when my Citations go into the repair shop.

The longevity of the KLH Nine is also remarkable. Gradually, I too am becoming an electrostatic "freak." Nothing else can do as good a job of reproducing the nuance and delicacy that are a part of live music.

Barry Cohn
Brooklyn, N.Y.

We can think of some other components whose tenure in the audio marketplace has been remarkable, too: The Quad full-range electrostatic speakers, the Decca International tone arm, the Dyna Stereo 70 amplifier, Crown's tape decks, and the record-cleaning "Dust Bug" are some that come to mind.

On the other hand, there are components now that no one even envisioned in 1962; things like the Dolby NR system, quadriphonic decoders, the Magneplanar speaker system, and vertical-FET power amplifiers. We will admit though that we are not convinced that today's State of the Art is all that much better than the State of the Art 14 years ago. And we have many discs dating as far back as the late 1950's that are higher in fidelity than the stuff we've been getting recently from RCA, Columbia and Vox.

Yes, things have changed since then, but whether or not they have really improved is questionable.

Dolby Level Tape

Can you, or any Stereophile readers, give me the name and address of a source of a reel-to-reel 7½ or 15-ips level calibration tape for an external Dolby unit?

I bought my unit from Lafayette in August of 1975, and they were out of stock on calibration tapes at the time. As of January 5, they were still out of stock. Meanwhile, the Dolby unit, still unused, sits on the shelf gathering dust. I tried virtually every electronic supply house, audio dealer and record store in both the Long Island and Albany, NY areas to no avail.

Can anyone help?  

Martin J. Walker
Troy, N.Y.

*Just because you have a Lafayette Dolby unit, there is no reason you cannot use one of the calibration tapes sold by just about every other manufacturer of outboard Dolby units.

Since Advent Corp. (195 Albany St., Cambridge, Ma. 02139) always seems to have their Dolby calibration tapes in stock, you might try writing to them for price and order information.*

Canadian Cassettes

Please be so kind as to provide me with the name and address of a firm in Canada from which I can obtain recorded Dolby cassettes that are duplicated in that country.

Sam Alexander
52-54 65th Pl.
Maspeth, N.Y.
11378

Sorry, but we don't have the answer to that one. Can any readers help Mr. Alexander?

Cavil With Columbia

This is a copy of a letter I sent to Andrew Kazdin, producer for Columbia Masterworks. I sent copies to Stereo Review, High Fidelity and The Absolute Sound, in the hope that publication of the letter will encourage others to write to Mr. Kazdin (at Columbia Records 51 West 52nd St, New York, N.Y., 10019), and will (I hope) elicit some kind of public comments from him. But I'm not holding my breath.

Dear Mr. Kazdin:

I subscribe to the International Preview Society series of records, and a recent release
prompted this letter. It was a performance of Dvorak's Slavonic Dances conducted by Rafael Kubelik on Deutsche-Grammophon. I didn't care much for the performance; it was more frenetic than lively. But the sound! Utterly unbelievable!

Fantastically clean, lucid and detailed, yet not so closely miked as to lose the orchestra's over-all homogeneity. The dynamic range was extremely wide, and the low end elicited bass notes from my speakers that I had no idea they could reproduce. Detailed, clean, and tight too—not boomy. I could close my eyes and there I was, in the hall.

I have never heard a single Columbia record that even remotely approached this level of sound quality!

Compared to what D-G, Philips and Unicorn turn out, Columbia Masterworks are terrible. Over-close miking is rampant. The sound is often dry, hard, and generally lacking in any real sense of perspective or "air" around the instruments. There is sometimes harshness and edginess, especially on many of the later Bernstein recordings. And although your surfaces are generally quiet, my copy of the new Carmina Burana is surprisingly noisy.

I know you can produce a first-class pressing, because I have many of the older Musical Heritage Society records that were made by Columbia's Special Products division. The real question is, can you make a good recording? With record prices up to 7 and 8 dollars, I for one am becoming increasingly upset by the great disparity in sound between American and European records. Columbia is not the only offender, but it is far and away the worst and the most visible.

High-fidelity sound reproduction exists, not as an end in itself, but to serve music. Do you care so little about the music you record that you don't mind how badly it is presented?

The questions I raise are not rhetorical; I'd like some answers!

William Sommerwerck
Baltimore, Md.

Mr. Kazdin, queried by us about Mr. Sommerwerck's letter, declined to reply, dismissing the complaints as not worthy of comment. This is exactly the attitude we see as being largely responsible for the lamentable quality of American recordings.

We disagree with Mr. Sommerwerck on one point: Columbia has, we feel, produced some excellent recordings, as has RCA, but both companies' products seem to share the same interesting aspect: The bigger the "names" involved, the more flagrant are the manipulations of the sound. For example, Columbia could turn out superb recordings of Bruno Walter conducting the "Columbia Symphony Orchestra" (an ensemble hired from the pool of available musicians, and rehearsed for a specific recording session), but did shocking things to the tonal and instrumental balances of recordings by Ormandy and the Philadelphia Orchestra and by Bernstein and the New York Philharmonic.

Readers have told us that Angel Records, when accused of sonic malpractices, at least offers the courtesy of responding to the complaints. (Angel's recent efforts have in fact been improving to a remarkable degree.) Columbia and RCA, we are told (also by readers), seem to take the attitude that anyone who would question their practices is being irreverent.

If The Shoe Fits . . .

I thought your "Miscellany" item in the last issue where you used your shoeless, starving family as a cheap ploy to enlist more subscribers was in shockingly poor taste.

For a publication with the high standards and the reputation of yours to stoop to such a pathetic effort to elicit sympathy from your readers was shameful and embarrassing. I trust that it was merely a lapse of good taste and not a sample of the direction your publication will be taking in the future.

Donald Planter
West Chester, N.Y.

As one of the freeloaders you were talking to (Mr. Planter is still not a subscriber), we hope we curled his toes! The truth often has the appearance of bad taste, particularly when it is a truth one does not want to know. The Holt family is not living on the border of poverty, but neither is it living as high on the hog as are some of our readers who, like the outraged Mr. Planter, take advantage—at no cost to them—of our experience and judgment to avoid making costly mistakes in their purchases of top-line components.

dbx for De-Dolbying?

Will the dbx noise-reduction unit work well as a decoder for Dolby FM broadcasts? You didn't cover this point in your dbx report.

W. S. Vincent
Salisbury, Ct.

No, the dbx will not decode Dolbyed signals for one simple reason: The dbx compresses and expands the entire audio spectrum, whereas the Dolby B compresses and expands only the high-frequency range. We
thought we had covered that in the report, but perhaps we didn’t make it clear enough. So, we will reiterate: Dolby and dbx are not compatible with one another in either direction. Period!

Polarity Markings

My initial reaction to your item about phasing of loudspeaker cables (Summer/Autumn ‘73, Page 27) was that you were full of crap. There are all sorts of standards about the identification of cable polarities by color and marker, but when I tried to find one for audio specifically, I couldn’t. You may be right, then. There may not be a formal standard for cable color in audio, in which case you did have some justification for setting up your own arbitrary standard.

It strikes me, though, that the only reason for your choice of a standard is that it would be easy to remember. ("... raised is up, and up is always more plus than minus.") If a simple mnemonic device was all you needed, why not "Up is down"? Thus, a raised seam on a wire, or a ridge on a plug, would represent "down" or Negative polarity.

James L. Cross
Waterbury, Ma.

Okay, then how does a wire that is marked with a spot of red paint figure into this? Red is obviously more “up” (i.e., is lighter) than black. Do you advocate red for negative and black for positive?

We still feel that our method, as bass-ackwards as it seems to some people, still makes the most sense.

We must reiterate, though, that this is an audio standard, and not an electrical (i.e., house-wiring) standard. For details on the latter, consult the National Electrical Code.

Deteriorating Capacitors

I recently replaced all the electrolytic capacitors in my Citation I and II preamp and amp and got a very marked improvement in the sound. Some of the capacitors were about 9 years old, the others 4. Can you tell me how long electrolytics will last without deterioration? (I have seen estimates ranging from 3 to 10 years.) I think your readers might benefit from an article about electrolytics, since they apparently — along with tubes — are the only hi-fi components which deteriorate with age and use. Some of your readers may be able to secure clearly superior sound from their present equipment simply by replacing the electrolytics, as I did.

Walter Diehl
Great Neck, N.Y.

It is almost impossible to predict how long electrolytic capacitors will last in a given circuit location before needing replacement, but we would be willing to guess that 5 years is an outside limit. There are however, as mentioned in Walter Key’s “Keynotes” column in this issue, other things besides tubes and electrolytics that go to pieces over a period of time. Because of this, there are very few people who really have any concept of how good some of the older components were, because they are comparing the old ones in a state of deterioration with the current ones in new condition. We have heard several stories about completely-overhauled Marantz components from 10 years ago that sound comparable to some of Audio Research’s efforts of only a year or so ago.

More Word, and Harsher ...

On page 40 of the Winter 1973/74 issue of your pride and joy, you “replied” to my letter (“A Word from the Acidic Underground”) in a manner which clearly illustrates the meaning of the term “non-sequitur.” The point in question was one of musical taste, not technical knowledge. If you really do get that many letters from “acid rock freaks,” perhaps it might be in the Stereophile’s best interest if you didn’t try so hard to alienate us, for contrary to your blatant implication, an affinity for “acid rock” does not preclude knowledge and reason. I suspect however that you don’t know whether it was “acid rock” or your own favorite kind of music that was used to destructively test your recommended components. I’m sure I could just as easily blow up my equipment with Saint-Saën’s Organ Symphony as with Black Sabbath, and I could blame you, but then I’m an intelligent, educated audiophile rather than one of your fictitious, mindless “acid-heads.”

You’re damned right we “just won’t lie down,” either to take your irrelevant insults or to be buried under your precious “classical” works. Walter Carlos has shown that even the great classical masters can be improved on, and need not be sacred. Every composer, performer and listener throughout the course of history has had limits placed on his musical experiences by the limits of his own body and the limitations of the tools with which his body creates a musical experience. Not until we music engineers of the future get the financial backing to connect
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**Why Not?**

If you subscribe to our views, why not subscribe to our magazine? Our undercover investigator tells us there are still thousands of you clods out there who borrow each issue from friends, and to you we say "Shame!" Freeloading may be very much in these days, but when a report in Stereophile can save you anywheres from $100 to $1000 by steering you away from mediocrity and toward the best buys for your money, it should be worth a measly $12 to help keep this worthy rag in business. We do carry dealer ads, but subscriptions are still almost our entire source of support. Without that support -- and that means your support -- there will be no more Stereophiles to borrow or to buy. And consider for a moment how you would feel if your only sources of information about components were the other audio magazines you now read? If that idea doesn't much appeal to you, then don't just sit there on your freeloading fanny; do your bit to help us continue to do the thing that has given Stereophile its reputation as the most dependable and most authoritative publication for audiophiles in the US. There's a subscription coupon on the next page for readers who like to clip coupons. Or, you can simply mail your check for the proper amount with an enclosed note indicating whether you wish your subscription to start with the current issue or the upcoming one.
a high-speed digital computer to an electronic music synthesizer will man's imagination be the only limit to the music he can produce. And when we connect our brains directly to that digital computer while "under the influence," you'll still be trying to ignore us as we turn the art of making love into the most exquisite form of music composition, alias "making beautiful music together." And when everyone can afford to produce their own real-time audio-visual experiences to enhance their "turned-on" love-making, the distinction between your "classical" favorites and my "rock" favorites will seem trivial, if anyone bothers to listen to or preserve any of our recordings.

Stanford Research Institute has already developed a computer system which can recognize 7 different brainwave patterns corresponding to 7 different words (Up, Down, Right, Left, Near, Far, Stop) that a person can use to direct, by his thoughts alone, the actions of a TV camera. I hope to be the first to connect a synthesizer to a computer, but if I don't someone else will. Naked hippie weirdo dope fiends are taking over the world, and there is nothing you can do about it! This one has a BS in engineering and, so far, programs computers for a living. The vocation I'm preparing for doesn't even exist yet (computer musician)—it's still only a part of my dream world. Maybe I should do something practical, like start a magazine called "The Quadiophile"—dedicated to "acid rock" freaks.

Actually, we were under the impression that the whole "acid rock" scene, as typified by the listless long-haired hippie with the burnt-out mind who could sit, stoned, for three hours grooving on colored beads and 115-dB hard rock, had become a thing of the past. Evidently, it hasn't.

We admit, we have been bigoted about it, for several reasons. First, among all audiophiles, acid-rock freaks led the pack in terms of both listening volume and tolerance for unutterable amounts of distortion. Mr. Kirsten's description of himself as an "intelligent, educated audiophile" would seem to make it clear that he is not the typical acid-rock type. If not, though, we wonder why he leaped to the defense in response to our put-down of acid-heads in the magazine.

It wasn't just their tolerance for distortion that turned us off, either. We aren't uptight about trips, but we feel so strongly about

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sound that we are exceedingly uptight about what people who listen at so-called acid-rock volume levels (115 dB and up) have been doing to their hearing. We wonder what kind of acuity the hard-rock nuts of today will be bringing to Mr. Kirsten's visionary music of tomorrow. Or will that computer-controlled music synthesizer be programmed to ignore as irrelevant all frequencies above 5,000 Hz?

We are intrigued by the possibilities of your orgasmic computer-composing idea, and have no doubt but that the resulting sounds would be, let us say, unique. But we must reject what is clearly a premise of yours, namely that the result could be considered to be music. Music is not just any noise that you choose to call music, nor is it definable as sound which evokes a visceral response. (A fire siren or a cooing baby can do that.) Music must—no matter how your "naked hippie wierdo dope fiends" may abhor the idea—have some rhythmic and tonal organization. (And it is their rejection of order, above all else, that guarantees that those NHWDFs will never take over anything.)

The fact that we prefer "classical" music to most rock is our own problem, not yours. You don't have to buy any of the recordings we like, and a good reproducing system will do as much for a good rock recording as a classical one. But you are not going to convince us that ANY contemporary music is equal in worth to a "classical," because none of it has been around for long enough to show whether its appeal is to basic human tastes, or whether it is merely a manifestation of a transient public mood. Certainly, the music of the future will have its roots in much that is being written today, and some contemporary compositions will probably still be giving pleasure to listeners 100 years from now (listeners, we might add, who will be considered reactionary old farts by the youth of their time), but just because you get more sheer visceral enjoyment from Black Sabbath's "Paranoia" than from Mahler's First doesn't make it a Great Masterpiece. Remember that it isn't antiquity alone that makes a musical work a "classical;" it is the ability of that work to be enjoyed by people far removed either in time or in cultural background from the composer of the work. It has a universality of appeal which transcends time and place.

There are other reasons why we prefer so-called "classical" music. First, we were not taught to despise it in school. Second, much of it moves us emotionally, yet there is enough complexity and organization in it to engage and stimulate the sapiens aspect of our humanness. Thirdly, we like the classics because their sounds are not electronic, and do not—at least at performances—come to us colored by electronic distortions. Finally, we enjoy the classics because the sound of those acoustical instruments is so damnably difficult to reproduce and so rewarding when reproduced well.

Surface Noise!

It is quite true that our Department of the Environment occasionally uses the symbol that you are using for your cover picture. It appears that certain road surfaces in combination with certain tyres and speeds cause an unnerving howling sound which makes one believe that the car is about to disintegrate, the sign being intended to reassure the panic-stricken. The sound approximates to 1 kHz reference signal but is extremely high in harmonic distortion content and therefore does not provide any really useful service to the audiophile, as does for example the useful white noise reference of tyres on a wet road.

Paul Messenger
Features Editor
Hi-Fi News & Record Review
Croydon, England

Stylus Polish

I am curious about something that was demonstrated to me at a local B&O clinic. The representative put both a used B&O SP-12 and a new Shure V-15 Type III under a microscope to demonstrate the superior polish on the diamond of the B&O. The Shure was noticeably rough, even "grainy" in appearance. I now think that perhaps all new styli may be a little rough when new. If this is true, how much playing time is needed to polish them, and should this be done on records which are not critical to one's collection?

Robert G. Schmitt
Honolulu, H.

Many European pickup manufacturers tout the superior polish of their styli, but we have not seen the claim either verified nor debunked.

A diamond should not have to be "broken in" by groove abrasion to achieve its optimal polish, but it is possible that a certain amount of final polishing may go on for the first 20 to 100 hours (depending on contact pressure) of use. Theoretically at least, record wear will be slightly accelerated during this period, but we are dealing here with specifications which, to our knowledge at least, have never been backed up by any controlled investigation. It must also be borne in mind that, when examining a stylus under a microscope for polish, you should examine only
those parts of the tip that will be contacting the groove. Some stylus manufacturers do not bother to polish any other part of the stone, because additional polishing is irrelevant.

Low-Cap Cables
If anyone has need of low-capacitance shielded cables, I've been making them on a custom basis for a couple of months. The cost is $5 per 1-meter (about a yard) pair using Belden 8421 or 8417 and Switchcraft RCA-type plugs. The 8417 has better shielding and is thus better for tone arm cables. Length is up to the customer, although substantially longer cables cost more and of course have higher capacitance. Send me your requirements and a price quote will go out by return mail.

Buck Williams
0527 SW Idaho
Portland, Ore.
97201

More Goofs
Since you published a list of goofs from past issues, here are a couple more:
1. In your winter (4) 1973/74 issue, on page 48, you say that a preamp uses 12 watts per hour.*
2. In the last (Autumn '75) issue, you talk about molecules in the solder. Solder consists only of atoms of lead and tin. Since they are not bound chemically it is incorrect to speak of them as molecules.
M. R. Achter
No address given.

Touche.

Unclear Imagery
It would make it much easier to understand your equipment reports if there were fewer descriptions such as "tone coloration rhymes with "rah."" Now, my first guess as to what is meant by this is that there is a frequency-response peak at about 250 Hz. If this is correct, why not just say "frequency response peak at around 250 Hz"? On the other hand, if my wife says "rah," then the peak occurs at around 500 Hz. If my boss says "rah" he is probably peaking at around 180 Hz.

Furthermore, I don't see how descriptions of sound such as "sweet" or "liquid" or "polite" can possibly mean anything. After all, if you can describe a sound as "ripe," can we then expect in future to see adjectives like "fast," "cannibalistic" or "pontifical"? Seriously, I realize that translating subjective impressions into objective terms is a knotty problem and has been discussed often in your magazine, but I would like to encourage you to be a little less poetic in your descriptions. Perhaps it would be a good idea to define such descriptive words in a glossary in each issue for readers who lack such vivid imaginations.

Keith Edwards
Detroit, Mich.

We use references to vowel sounds in our reports, rather than to frequency peaks, for the very reason you inadvertently pointed out: They are not definable in terms of frequency-response peaks. If you can sing, you can make any vowel sound over a wide range of pitches (frequencies), and it will still sound like that vowel.

It is almost certain that resonance is the major cause of the vowel-like coloration that most loudspeakers have, but we suspect the resonant conditions are considerably more complex than a single peak at or around a specific frequency. And it seems to us that a description of the coloration in a loudspeaker should be of more value to a reader considering the purchase of that speaker than the simple statement that it has a peak at such-and-so frequency.

You're right of course when you say that it is difficult expressing subjective impres-

* Power is defined as the rate at which energy is developed or expended, and thus already includes the factor of time. A watt is equal to the development or expenditure of 1 joule of energy per second. Thus, to say "watts per hour" is like saying "feet per second per minute." Ye Ed. & Publ.
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sions in objective terms, but we have explained our terms several times in past issues of the magazine and see no need to waste space in each issue with a glossary. Actually, you can figure out most of the terminology for yourself if you will just be a bit less uptight about it and let yourself react emotionally to our "poetry." For example: "Sweet," referring usually to high end, is the opposite of bitter or sharp, as in "razor-sharp highs." I.e., "sweet" means pleasant to the ear as to the tongue—soft, gentle, consonant. "Liquid" is a quality of crystalline clarity, like a completely grainless photograph. "Polite" in a loudspeaker is the inability to be coarse, raucous or blatant even when the music demands this. We have never described anything as being "ripe," but we do use the term "ooer-ripe" to mean excessively rich—lusciously juicy, which live music sometimes is but not usually.

Pat, Pat, Pat

I think a few compliments are in order for the Editor and Staff of the Stereophile. Anybody who has not noticed the tremendous improvement in quality, quantity and frequency of the Stereophile simply isn't very observant. I can well appreciate the long hard hours it took to make these great improvements and I think you and your co-authors deserve acknowledgement for a job well done. I agree that petty arguments about competition are not very relevant, as all serious audiophiles read every publication they can find. This does bring up the subject of trends for the future though, and I would like to state my feelings regardless of their controversial nature. I urge you to make Stereophile the best, most frequent publication that you can, and charge accordingly for it. There are a surprising number of cheapskates around who spend thousands upon thousands of dollars for their pet hobbies and then wail prodigiously whenever anybody talks about charging a few more dollars for otherwise unobtainable inside information. I am a member of an antique car club which is loaded with people who cry when membership dues are raised, but never stop to think of where they would find parts without the publications. Obviously nobody likes inflation, but I would hope you receive a fair return for the hard work that goes into an effort like this.

I hope you expand the program-source reviews. We are at the point where that is obviously the weakest link in the chain, and all the Commercial Mag record reviews are worthless to us. They tell us about the good performances, but neglect one little point... the sound! I wonder if we pooled our resources if there would ever be the hope of a direct-cut Symphonic work. Keep up the good work.

Bob Unterbrink
Lexington, Ky.

Thanks. Encomia are always welcome. Considering the time that has elapsed between the last issue and this one, I'm not sure we have improved all that much in publication frequency, but it's true that raising the price would allow us to pay for some services we are now having to do ourselves, and thus get this rag out more often.

We are in fact going to be forced to hike our rates in the near future, simply because everything (and particularly postage) costs quite a bit more now than it did when we last raised our rates two years ago. Our circulation is continuing to grow quite rapidly, but the increased income from that source is still not enough to allow us to finance this operation as munificently as it should be in order to do all the things we hope to do with it in the future. (See various references to our future elsewhere in this issue.) For example, we are learning, after more years than we like to think about, that one person plus a handful of volunteers cannot hope to put out a 70-page magazine like this every 3 months. We need some full-time assistance, and that means cash for which to pay for it. Amen!

Why So Godawful?

I had always assumed that the crummy sound I was getting from discs was the result of imperfections in the disc medium itself, and have been saving for several years to buy a good open-reel tape deck so that I could abandon discs for good. Now I'm not all that sure of myself.

A friend introduced me to those fantastic Sheffield discs of Lincoln Mayorga and I still find them hard to believe. They are real. All the crud and haze I was trying to get used to are gone, and I find it hard to believe I am not listening through a direct-wire connection to the recording microphones. Then I had an opportunity to borrow a Teac deck and a bunch of commercially-recorded tapes, and I got another shock. Except for the lack of occasional tracking problems, most of the tapes are inferior to their equivalent discs that I own. The non-Dolbyed ones are hissy, the bass on most of them is muddy, and they too seem to be coming at me through a hazy veil.

I concluded what a lot of other people have concluded: It isn't the discs that are the problem, it is tape. The final shock came shortly thereafter, when I borrowed some of
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Hear the Fulton J Modular System, the musical speaker with phenomenal and highly articulate bass, the Beveridge full-range electrostatic speakers with built-in direct coupled tube amplifiers (this design has solved the problems which plagued electrostatic speakers), and the sensational English import, the Lentek Monitor, a ten-foot transmission line design with incredible imaging. These are three of the world's finest speakers.

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the tapes that the Teac owner had made from live performances. Although done with only two microphones, they were just unbelievably realistic! They sounded alive — moreso in fact than the Sheffield discs, which by comparison seem rather flat and lacking in perspective.

Now, my question is, if original tapes can be that good, and discs can be that good, why in Hell are most discs so Godawful? Do you have any ideas on the subject?

Preston H. Lewis
Tampa, Fla.

We have only just begun to dig into the situation, and have already turned up some little gems of information that are shedding some light on what it is that ails commercial recordings. We are sharing them with our readers on page 36 of this issue and, since we are still digging, we expect to have even more such revealing tidbits for your enlightenment in future issues of the magazine. We may not be influential enough to be able to move mountains like RCA and Columbia with one mighty push, but we are committing ourselves to what may become a very protracted erosion of the archaic traditions that seem to mitigate now against the possibility of our ever hearing a disc that sounds remotely like the orchestra (or whatever) that produced the raw materials for the final disc. (Phew!)
No doubt, some of our readers are going to resent the inevitable diminution of our previous emphasis on home reproducing equipment, but we can assure them that, if it is better sound they are seeking, it is in the software, not the playback hardware, where the greatest gains stand to be made. We can also assure them that, if they stick with us, they will find future developments in the magazine to be at least as interesting as what we have been concerning ourselves with previously.

Shunning Turntables

I cannot understand why it is that you refuse to recommend what are clearly the best turntables available (the Technics SP-10, for example) and keep trying to find the ultimate turntable among the $199.95 bunch. Your recent endorsement of a dealer-assembled phono unit would be more understandable to me had it not included one of the cheapest, lousiest turntables around: The Era.

Not only does the Era have belt drive, which became obsolete years ago, it has a cheap little clock-type drive motor that isn’t even isolated from the pickup! It lacks the torque to maintain speed with a Dust Bug, and the one I have has shockingly high rumble.

Walt Johnson
St. Paul, Minn.

As long as rumble and speed variation are inaudible and don’t cause system problems, we do not give a hang how inaudible they are, or what kind of drive system is used to obtain that level of performance.

When we received our sample of the FMI/Pro-Musica phono, the presence of the turntable was not audible. Neither did it generate sound-muddying subsonic rumble, as do many of the direct-drive types. But it was, as you say, deficient in torque.

Unfortunately, problems did develop after some months, as reported elsewhere.

Recommended Rachmaninoff

I am writing to recommend to Stereophile readers a recording that deserves to be heard but, because it is on an Angel disc, is likely to be passed up by your reviewer William Marsh. I refer to the Previn London Symphony performance of Rachmaninoff’s Symphony No. 2 on Angel S-36954.

This release is important on several counts. First, the Symphony is played in its original (1906) uncut version, restoring coherence and convincing structure to a work that had been rendered meandering by the extensive cuts on previously-available performances. Secondly, the performance is ravishing — particularly moving in the 3rd movement Adagio. Finally, the sound is as good as anything I have heard on disc: deep, solid bass, crystalline highhs, and tremendous impact with fine inner detail. This record was well received in the other journals, and anyone who reads only Stereophile should know about it.

T. Craggs
Richmond, Va.

William Marsh agrees, on the basis of the HMV version (ASD-2889), but has not heard the Angel one, and neither has Ye Ed at this time.

Sizzle and Transparency

You mention in your preface to “Recommended Components” that things added to reproduced sound are of more concern to the musically-oriented listener than things subtracted. Agreed. However, electrostatic speakers, which everyone agrees are the most transparent and have the best “attack,” add an artificial sizzle to the sound. In fact, I think you have so long associated this sizzle with transparency that when you praised the tweeter of the Hartley Concertmaster, you must call its fine sound “subtly sizzly” as a compliment. It’s been a while since I sat in a concert hall, but I don’t recall any subtly (and certainly no blatantly) sizzly flutes, oboes, harps, cymbals, violins or bells. Not even when sitting right in front of the percussion in a band.

Also, in your essay on transparency in the Summer ’71 issue, you compared this quality to “a single drop of dew, a sparkling clean crystal goblet, and a perfectly exposed and grainless photograph.” Overlooking the inevitable inaccuracies of analogy, it seems to me you are missing the prime consideration: the sound of music—indoors or out—travels through air, a dry medium in concert situations. Seeing through glass and seeing through air are subtly different. Glass gives a more liquiddly transparent reality than is really there, especially to the more distant perspectives. True, I too am awed by the sound of the Quads and the KLH Nine, but is their sound really more honest—a better approximation of airborne sound—than, say, the AR LST (the only AR with sufficiently open sound to bother discussing)?

One of the reasons so many photos have grain is because a great many photographers feel a “perfectly grainless photograph” to be too liquid a reality—not at all what they (you or I) saw before pushing the shutter. Not many of Ansel Adams’ best works are “perfectly grainless.” There is a slight ("sub-
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tle") coarsening to better approximate the dry, tactile air through which the images were seen. Renaissance painters had to learn the same lesson, from the lucid, detailed, rich, jewelled colors of the Middle-Ages illuminations and the Van Eycks to the airy dissolves of the Mona Lisa. I am not sure we should treasure lucid sound as pure rather than just lucid. The accompanying electrostatic sizzle is, like tape hiss, certainly an unwanted addition to the sound. The “snap” of a live performance, yes; the sizzle of electrostatic reproduction, no. It is here where the earlier ARC Magneplanars were so near to being perfect—the most awesome-ly, dryly natural and three-dimensional system I have ever heard. If the top end of the violins and winds had had a shade more bite and the bells and cymbals a bit more shimmer, it would have been the equivalent of hearing through to the source, without the distortion of that most liquid of solids, glass. It represented true transparency, if one disregards the window image, rather than a clear transluency. It was the space and shading of air, of reality itself. Is lucidity, in these terms, so to be valued as the sole reality?

Warren A. McKee
Warren AFB, Wy.

We’ll argue that!

First of all, “sizzle” is not an inherent characteristic of electrostatic tweeters. Some do it, some don’t, and of those that do, the reason is often not the fault of the tweeter, but is the audible result of the amplifier’s inability to remain stable with the rather difficult load that an electrostatic imposes on it. To criticize the tweeter for this is the same as criticising a Nikon lens because it won’t fit an Instamatic camera.

Your essay on transparency was a superb exercise in rhetoric but it struck us that you were indulging in semantic games. When we speak of transparency, we are speaking of the clarity with which an imaginary window passes sound. An unclear window may add a haze (smear) to the sound or may break it up into particles which are either fine-grained (“gray”) or coarse-grained (“gritty”). Transparency is merely the absence of smear, grayness, or grittiness.

“Dryness” is best understood as the audible equivalent to what happens to a seashell when kept out of water. The colors are dulled, the surface appears rough, and the beauty is gone. The term has nothing to do with whether or not we listen to music under water, though. Your example of the painters and photographers who add “slight coarsen-

ing” to their renditions is irrelevant, because those people are interpreting their subject matter, not attempting to reproduce it literally. If you want your reproduced music interpreted for you, buy Columbia or early-Dynagroove RCA discs.

It’s your privilege to love the Magneplanars, although the latest versions of them, with the improved transient response, may not be as close to ideal as you had hoped they would, for some now have more high-end “sizzle” than do many electrostatic tweeters.

Shorties

Hip! Hip! Hooray for the Short Report! It hits the nail on the head without wasting a lot of deathless prose on the idiosyncrasies of equipment installation, yet is more satisfying than any “Quickie” can be.

Vincent Mogavero
(No address listed)

Quickies

Let’s have more quickies, and stop wasting space discussing the niceties of equipment. There is simply too much happening these days to allow you to cover every new, interesting product in the kind of depth you used to aim for. More “Quickies” means more products covered, and that’s what I want to see.

Tony Levin
Minneapolis, Minn.

Longies

What is happening to the in-depth discussions of equipment that you used to have in Stereophile? When I am planning to put several hundred dollars into a component, I want to know more about it than that it sounds good and is Recommended in the B Category. Quit trying to test everything that comes out; concentrate on the few items of interest to the perfectionist, and tell us everything about them you can find out.

Ben Blocker
Cambridge, Ma.

There, People, is our dilemma. Reader opinion seems equally divided between the three schools of thought, so we are faced with the non-choice of pleasing one-third of our readership and frustrating the desires of two-thirds of you.

Our course of action is obvious: we will continue to carry a few full reports on pro-
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There are a few qualifications: Since it takes time to individually test components, we need 48 hours' notice before testing yours. We can't adequately test cartridge performance unless you let us test it in your tonearm—no one can (but we do check stylus shape and mounting as a matter of course). And you can't expect to get this kind of service and then bargain down the price to ten cents above wholesale.

We also recognize that there are lots of audio perfectionists who trust their ears far more than any instruments. If you're one, then just walk on in, and give the instruments a pat on your way back to our listening room. There's nothing there that didn't satisfy our ears before we even plugged it into our instruments.

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ducts that warrant lengthy discussion, short reports on ones that can be adequately covered in that way, and “Quickies” for ones that will either be discussed in detail in a later issue or do not warrant further consideration.

**Pickup Ratings**

Your comment about the performance of the Shure V-15-IIIG spherical cartridge in the Grane 707 arm (“a superb matching of components”) underscored a point you have alluded often to in Sterophile but have never to my knowledge come right out and stated: Namely, that it is not practical to discuss the performance of a cartridge without relating it to the tone arm. Under the circumstances, shouldn’t you recommend (in your “Recommended Components” listings) pairings of arms and cartridges rather than just separate models in different quality groups?

Arthur Woodbridge
Tenafly, N.J.

**Amplifier Ratings**

The Absolute Sound isn’t your competitor: Sound Advice is! Their first two issues have really raised hackles because they had the unmitigated temerity to compare what is going into the power amplifier with what is coming out of it, rather than just listening carefully to the over-all sound. With all your high-quality tapes on hand, you are in an ideal position to run bypass tests. Have you? What have you found?

William Sommerwerck
Baltimore, Md.

The preceding two letters have something in common: Both are, in effect, taking contradictory stands on related issues which we, quite frankly, did not wish to become involved in. Now that we are, we will do our best to explain our stand on both questions.

It is of course true that every phono cartridge will perform at its best in tone arms which best complement them. For example, stylus compliance should be matched to total effective moving mass (arm plus cartridge) so as to place the low-frequency resonance below the range of audio modulations, above the range of disc wraps, and at some frequency in between which does not coincide with the frequency of the turntable drive system’s major vibrating mode. If this would seem to imply that the ideal arrangement would be one where the arm, cartridge and turntable are matched, then so be it. That is in fact the ideal arrangement. Were we to attempt to do this in our “Recommended Components” section, though, we would either have to recommend one or two phono “systems” per quality group, or go to an even more complex system of notation to indicate which arms should go with which cartridges with which turntables. The result would probably be enlightening, but we are already getting too many letters complaining about the complexity of our “Recommended” listings.

At present, we do recommend arm/cartridge/turntable pairings that we have found to be unusually good, and have also identified ones we found to be incompatible, and that, it would seem, is the best we can do. Or would our readers prefer that we list “Recommended Systems” in which, inevitably, some of their favorite components would have to be omitted for no better reason than space limitations?

So, what does that have to do with Sound Advice magazine’s amplifier tests? Simply this: The same sort of interrelationship that exists between a cartridge and its tone arm also exists between an amplifier and the loudspeakers it is driving. And there is not, to our knowledge, any way of bypass-testing a power amplifier that can reveal how well it controls a loudspeaker.

Since a speaker represents a rather complex, often highly reactive load for an amplifier, while a resistor is the most flattering “load” the average amplifier can have, an amplifier’s performance with a resistive load (as used by Sound Advice) will in no way reflect how the amplifier will behave with a loudspeaker load.

In order to conduct a “straight-wire bypass test” on a power amplifier, you must have some way of listening to the test signals. I.e., you need transducers: headphones or loudspeakers. Typical loudspeakers or low-impedance phones need power to drive them, which is no problem as long as you are using them to listen to the test amplifier’s outputs. But what do you drive them with in the bypass mode, to enable you to listen to the input signal going to the amplifier? The output from a preamp or tape recorder wouldn’t drive either one to adequate listening levels.

There are three ways around this. One is to use a second, “standard” power amplifier to provide the input signal for the tests. (Figure 1). Then, in the bypass mode, loudspeakers can be driven directly from that second amplifier. In the “test” mode, it will feed only the amplifier being tested (via a resistive load of the proper value to “simulate” a loudspeaker load). It is only necessary then to add a potentiometer to the test amplifier’s inputs in order to set its gain to exact unity, so that the levels going to the transducers will be

52
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identical in both the test and bypass modes.

The second way—one of the two used by Sound Advice—also uses a second “standard” power amplifier to drive loudspeakers, but locates this following the amplifier that is being tested (Figure 2). The bypass test then involves switching the standard amplifier’s inputs to sample either the signal going into the phones without loss of low-frequency response.*

Now, what’s the basic flaw in all three of these arrangements? Simply that none takes into consideration a very important fact: namely that no amplifier will perform into a resistive load in the same manner that it performs into a loudspeaker load. A resistor pro-

The third method, also used by Sound Advice, substitutes sensitive, high-impedance headphones for loudspeakers, thus allowing the original input signal (to the test amp) to be heard directly, without the intercession of a second amplifier (Figure 3). Their input signal for all tests was, incidentally, a professional tape recorder whose 600-ohm transformer-coupled outputs were capable of driv-

vides uniform loading, with essentially zero phase shift, across the entire audio range.

What about the arrangements Sound Advice used (Figs. 2 and 3)? Here there are no changes in operating conditions from Bypass to Test, but the amplifier in question never works into a loudspeaker at all! The bypass comparison is valid, but the test conditions are unrealistic. So again, the test is invalid. Any further questions?

(More letters on page 56)

*We should clarify here a common source of misunderstanding about preamplifiers. Many hi-fi preamps are rated at 600 ohms output impedance (some are rated even lower), but it is rarely noted that these are ratings of effective source impedance only. They are not usually designed to operate into a load of the same impedance, and any attempt to terminate a 600-ohm preamp output with 600 ohms will usually result in increased distortion and attenuated bass. The situation is inversely analogous to that of a power amplifier whose outputs are designed to be loaded by an 8-ohm loudspeaker but whose effective source impedance (a function of damping factor) may be a fraction of one ohm.
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Letters (From page 54)

The Economics of Audio

It occurred to me while reading your excellent publication that the eugenics of audio has, at last, produced the epitome of the Great American Dream: The copy shall cost more than the original. For the (list) price of a Class A System, it would be possible to bring into my home each Sunday for a year a local (University of Pittsburgh) String Quartet, once a month alternating a Chamber Orchestra or Sextet, including refreshments. Checking with a Travel Bureau, as another alternative, one could elect a trip to Vienna for the concert season. More practically, one might select a season's subscription to the Pittsburgh Symphony, the Philadelphia Symphony, the necessary airline tickets, and a very nice Class C system.

I have often wondered about the economics of the audio trades. I understand the need for rapid amortization when a small firm operates in an area of rapid obsolescence like hula hoops and state of the art audio, but I still question the pricing practices of many firms.

Earl J. Stevens
Pittsburgh, Pa.

So, indeed, do we! We are in fact beginning to wonder if the audio industry—or at least its "top-line" echelon—isn't in the grip of some kind of megalomania, the latest manifestations of which were the unveiling (at the Summer '76 CES Show) of a $2,000 straight-line tone arm and a $2,000 power amplifier rated at, would you believe, 15 watts per channel!

The Weakest Link

As a 30-year hi-fi Buff and, as a professional, as a manufacturer of mixing consoles and importer of Ortofon Disk Cutting equipment, your editorial "The Weakest Link" raises a number of interesting points of which your readers may not be aware.

The technology to cut records way beyond anything presently exists does exist, and only the record companies' desire for more time per side and desire to outshout the competition keeps them from delivering this product.

1. The cutting of mid and high frequencies requires very little room on the record. Cutting of bass frequencies requires a lot of room. Twice as much room is required to cut the same level at 30 hertz as at 60 hertz. Therefore, most records are cut with a 50 or 70 hertz hi-pass (low cutoff) filter inserted to minimize the amount of record space needed to cut the low frequencies. By doing this the record companies can put 27 to 30 minutes per side on the record rather than 17, to 20 minutes.

2. Fidelity requires that the LP record not be cut much inside a 6-inch diameter, or loss of high frequencies will result. Using diameter equalization to overcome this loss results in excessive treble velocities leading to tracing distortion. Yet how many records do you own which are cut right up to the label in order to squeeze another couple of minutes on the side?

3. The power needed to drive the cutterhead increases as the fourth power of the frequency. That is to say, eight—yes eight—times as much power is required to cut a 20 kHz tone as to cut 10 kHz tone. Since only until a couple of years ago, cutting amplifiers were generally limited to 60 watts, so that cutting extreme highs at full level was virtually impossible. Therefore to cut a "hot" record, which was louder than the competition, it is common practice to use a 12 or 15 kHz low pass filter and boost the highs at about 8 kHz to make up for the loss of the extreme highs. For rock music the filter was often set at 10 kHz. Fortunately, the new 500-watt cutting amplifiers and regulated treble filter should slowly eliminate this practice as this new generation of equipment eliminates the necessity to use these fixed filters and the resulting boosting of the middle highs to maintain overall balance.

With this technological background, let us look at some old records. In the mid 50's Westminster introduced their LAB series. These records came with a booklet describing their technical features and the reasons for the choices of the various limits. These records had the following specifications.

1.) MAX VELOCITY 14 /SEC: (Well within the limits of existing cutters, cutter amplifiers and pick-ups.)

2.) 5% MIN. DIAMETER: (No diameter equalization required, thus minimal tracing distortion.)

3.) 216 LINES PER INCH: (No squeezing, therefore full bass and no pre or post echo.)

4.) 17 MINUTES MAX PER SIDE: (Therefore lots of room for the bass.)

Except for the fact that these 20-year-old records are mono and the surfaces are not up to modern standards, they still sound better than any modern record. Full, rich, live concert bass and clean highs.

In the Summer of 1953 I helped Paul Weathers record and cut a demonstration record. This record was intended to show off his then-revolutionary capacitor pick-up. The record was cut at half speed, the same technique now being used to cut CD-4 records. Even today, 23 years later, this record sounds "live", again with rich bass and clean highs.

For a long time those of us in the business who did on-location recording on our own
A bigger and better layout

Ideally, audio equipment auditions should be held in rooms not unlike your own listening room at home. An average living room with curtains, rugs, stuffed chairs and other furnishings is an acoustic environment DRAMATICALLY different from the typical sleek, modern, sparsely furnished but equipment-packed stereo showroom.

You won't find a "stereo supermarket" with racks upon racks of components at the DKL SOUND LAB. Instead, you will find a tasteful selection of fine audio componentry demonstrated in comfortable LIVING ROOM surroundings that accurately simulate actual home situations.

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- MAOJI - tube amplifiers
- QUATRE - electronics
- RABCO - turntables
- REVOX - tape decks
- RTR - electrostatic speakers
- SHEFFIELD - Direct-to-Disc® Records
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- STAX - electrostatic headphones, tonearms, pre-amps
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We're moving...

The new location opens July 1st

Business at the DKL SOUND LAB has increased tremendously. In a short 18 months, we've completely outgrown our original location. Now we need lots more room. Our NEW location offers this PLUS:

- a larger, more comprehensive selection of top-quality components (new and used),
- greatly expanded laboratory testing facilities,
- much bigger service quarters,
- larger, more efficient shipping dept. for our many out-of-state customers,
- 3 complete and separate sound rooms for personal, uninterrupted auditions/consultations.
equipment thought we could obtain much more natural sound using only a pair of good tubes than the record companies obtained using their 16 mike set-ups with associated pan pots. Opinions are one thing; verification by scientific testing is another. In early 1972 Carl Coceu of Radiodiffusion-Television Belge, Brussels, Belgium, published an article in the Journal of the AES (Jan/Feb 1972, Volume 20, number 1) telling of recording a symphony orchestra simultaneously on a 16-track recorder in order to get 8 different stereo programs using a variety of mike set-ups. He then used a panel of 64 listeners to evaluate which of the mikeset-ups were the best. Surprise! The standard record-company pan-pot, multiple-microphone set was judged far and away the worst, and ORTF cardioid pair (17 cm apart at an angle of 110° slightly behind the conductor) was judged the best. The XY, Stereosonic, MS, and NOS mike setups were judged to be about equal and in between the other two rankings.

Therefore I, for one, must conclude that the record companies believe that what the consumers want is almost directly the opposite from that which would result from state-of-the-art engineering practice. As long as the record companies believe this to be the product which will sell, then that's the product we will get. Remember: the product is not engineered for your $4,000 system, but for the $199 "wonder boxes."

In closing I would like to note, with all due respect to Mayorga/Sheffield, that their releases do not represent current state of the art, even though their records are certainly better than most current releases.

Edward J. Gately, Jr.
President,
Gately Electronics, Inc.
Havertown, Pa.

Tubes or Transistors

I'd like to make some comments regarding James Bongiorno's Manufacturer's Comment (to the Ampzilla report) and JGH's reply in the Summer '75 issue of Stereophile.

The development and availability of the transistor appeared to open vast new possibilities in sonic accuracy. The high open-loop gains made possible by transistor design should have allowed for large increases in feedback and correspondingly large reductions in steady-state harmonic and intermodulation distortion. In fact, transistor amplifiers did display close to two orders-of-magnitude improvement in these steady-state errors over the much more constrained open-loop-gain vacuum tube amplifiers available, even today. But why then did the vacuum tube designs sound better? And why did the greatly improved parameters of the transistor units bear so little correlation to what was heard?

The answer is that these successful efforts to reduce steady-state distortion created new, hitherto-recognized forms of distortion. Transient intermodulation distortion, difficult to detect by instruments, turned out to be the real culprit. Vacuum tube designs aren't entirely free from TIM either, but because of the vastly greater open-loop gains in transistorized devices, and a peculiarity of solid state devices, the TIM in these amplifiers was considerably worse and produced significant degradation of audible sound quality. This audible difference arises because the vacuum tube overloads in a "graceful" manner (i.e., it produces even-order harmonics), whereas the transistor overloads with an abundance of 'hard' or 'edgy' odd-order harmonics.* Since TIM occurs when the initial voltage-gain stages overload during the transient (the signal hasn't yet reached the output stages yet, so the feedback hasn't arrived back at the input), the overload characteristics of the amplifying device continually affect the sound quality even though at steady-state, these stages appear to be operating well within overload limits. Furthermore, because of their lower voltages and impedances, transistors are required to handle much larger current densities than their vacuum-tube counterparts. And since the transistor output stages must handle the highest current densities, they are orders of magnitude slower than the earlier voltage-gain stages. In vacuum tubes, however, this delay is minimal since they are low-current field-effect devices and the input and output stages are similar in speed of response. To summarize, transistor designs are far more likely to saturate because their output stages respond more slowly than their inputs, and when they do saturate, transistors sound worse than saturated vacuum tubes. Hence, the initial promise of transistor designs has been unrealized due to unforeseen problems which have arisen.

Once these problems have been recognized, their solution can be sought and, in fact, recent developments in solid-state technology have opened new design avenues, making it possible to produce transistor units with lower TIM and better sonic qualities than the best in tube designs, a reality that we at Synergetic Audio Ltd. have been working to achieve.

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* Even-order harmonics are those frequencies which result when the fundamental frequency is multiplied by an even number, as: 440 Hz X 2 or X 4. Odd-order harmonics are the result of multiplying the fundamental by 3, 5, 7, etc. Even orders sound rather pleasant to the ear; odd orders sound repulsive in a direct relationship to the multiplier. I.e., fundamental plus 7th sounds uglier than fundamental plus 3rd, Ye Ed.
Have you visited Lyric High Fidelity's Listening Room? If not you should come and discover what choosing audio equipment ought to be like.

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We invite you to come and experience these masterpieces. Listening Room hours are 10 A.M. to 6 P.M., Monday through Saturday.
Once these deficiencies which have sidelined transistor performance have been solved, the inherent advantages over vacuum tubes can become a sonic reality: the vastly improved phase linearity due to lack of transformers, the extremely high VA characteristic and stability into reactive loads, the faster rise time, and of course the freedom from aging, drift, microphonics, etc.

In particular, I wish to take issue with Mr. Bongiorno's statement that tube amps are superior for driving such capacitive reactances as electrostatic speakers. This is utter nonsense. Tube amps cannot provide the high VA characteristics necessary to drive capacitive reactances correctly and many, in fact, have such poor stability into such loads that they freely oscillate or ring badly. This is one area where transistor amplifiers will be clearly superior when the TIM is reduced in practice, as is now possible. Until now, all solid-state amplifiers and preamplifiers have been handicapped by the belatedly-realized TIM problem, thus obscuring the inherent potential of these units. The newest transistor designs, in particular those which are Class A, can and will sound audibly superior to the latest generation of tube amps, even to the most discriminating ear.

Jeffrey S. Polan
President
Synergetic Audio, Ltd.
163 First Street
Troy, NY 12180

Audio Alternative

Thank you for your review of my book “Audio Alternative,” which was both fair and forthright.

I have just two points to add: John Crabbe's “Hi-Fi In the Home” is distributed in the U.S. by TransAtlantic Arts ($7.95 list), and “Audio Alternative” is available directly from Tobey Publishing Co., Box 428, New Canaan, Conn. 06840 for $7.95 including postage and handling.

Mark Tobak
Bayside, N.Y.

Miscellany

Our Dure Circ. Dept.

The circulation department has informed us that, thanks to the sloppiness of a number of subscribers, that department must in future take a more hardheaded attitude towards people who (1) Fail to notify us of address changes, (2) Fail to include their previous address and Zip code when notifying us, or (3) Renew their subscription without bothering to let us know their check is for a renewal.

Thus, and henceforth: (1) If your address-notice does not reach us within 2 weeks before an issue is mailed, we must charge $1—payable in advance—to readdress and remail your issue. (The PO returns all undeliverables to us, and we have to pay for that as well as for two outgoing postages). (2) Address changes received without at least a previous Zip will be heaved in the dust bin and treated like a failure to notify. Please note also that it takes us longer to process an address change when you omit your expiration code (the number in parentheses in your mailing label), so if you don't have your last cover envelope on hand, you'll have to allow us 3 weeks to process a change. (3) Renewals that are not identified as such will be treated as new subscriptions, which means you will probably receive a duplicate copy of your last issue. If you use the subscription coupon from the magazine, just check the appropriate space, or simply write Renewal somewhere on your subscription check. We cannot reimburse or offer exchange credit for a returned duplicate copy unless it was our fault that a duplicate was sent.

Sorry about that.

A Call for Authors

Judging from some of the letters we receive, quite a number of our readers are both highly literate and technically informed—a rare combination in any field. Many have interesting ideas, some are doing original research into a few of the more recherché areas of audio, and it strikes us that a certain amount of cross-pollination of ideas would benefit everyone in the field. So, we are looking for articles, and will pay rather well for them. If you are interested in writing for us—and we set
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ALL-PASS (From page 6)

IEEE Transactions on Audio, March 1964, p. 23
3. Kuh, Ernest S., and Donald O. Pederson, Principles of Circuit Synthesis
6. Storer, James E., Passive Network Synthesis
7. Tuttle, David F., Jr., Electric Networks: Analysis and Synthesis
8. van Valkenburg, M.E., Introduction to Modern Network Synthesis

no restrictions on subject matter (except those dictated by relevance and good taste)—contact Ye Ed & Publ at our usual address and let us know what you have in mind.

We are also looking for three regular contributors, to do a column on amateur tape recording, one on system maintenance, troubleshooting and testing, and one free-wheeling and far-ranging column on anything that strikes the writer’s fancy.

NOTE: We are not seeking a replacement for Walter Key, who has been doing a fine job with his “Keynotes” column (and could anyone else come up with such a commodious name?), but that’s an example of the kind of thing we’re looking for.

Society Doings

Since it is becoming obvious that some of the U.S. Audio Societies are involved in activities that could advance the state of the art, we hope to institute a new department in Stereophile, comprising brief reports from the various societies as to what they’ve been doing, what (if anything) they’ve unearthed as a result, etc. Any society member willing to contribute such reports to us on a regular basis will be paid a flat reasonable fee for his contributions.

Incidentally, free space is available in our “Audio Mart” section to any Audio Club or Society wishing to advertise for members.

ARC Mod

Some SP-3A-1 owners may still not be aware of the latest, very simple modification to that unit. Here are the details: On page 34 of the preamp’s manual, locate two capacitors marked C-47. Disconnect one end of each capacitor from the circuit board, either by clipping the wire at the board (not at the capacitor) or, preferably, by unsoldering and lifting the wire clear of its hole.

On page 33, locate two resistors marked R-68, and treat them in the same manner as the C-47s, being careful not to heat them unduly with the soldering iron.

The final step is optional, although it too will add another small increment of sonic improvement. Back on page 34, locate two C-39s. Locate, beyond a shadow of doubt, their lead connections to the printed circuits under the board, and jump a short length of wire across those leads from each C-39. That’s it. The result is yet another subtle but audible improvement in the accuracy of the preamp’s sound.

Manufacturers’ Ads

We have already demonstrated that we could accept advertising from equipment dealers without losing our editorial integrity. How would you as a reader react to the idea of our accepting ads from manufacturers?

We would do this, if we did it at all, with two stipulations: That no ad for a specific product may appear in the same issue in which it is reviewed, and if an advertising contract is cancelled as the result of a review, we would report this fact in the magazine.

Taking manufacturers’ ads could allow us to take on enough staff to get the magazine unflaggingly on schedule, expand it considerably in coverage, and undertake some peripheral special projects we are considering, such as a line of specialized test and demo records for the audio perfectionist.

Let us know what your reaction would be, but please consider your answer before replying. We know the temptation is to go off half-cocked and scream “Sellout!” Please don’t. But do let us know how you feel about this, via a letter or post card.

Recommended Components Mod

Because of the number of changes which recent developments have necessitated, plus a number of complaints about the “complexity” of our “Recommended Components” section, the whole thing is being re-worked from top to bottom and sideways. The updated and, we hope, vastly streamlined version of that section will appear in our next issue which, we promise, will not take nearly as long to get out as did this one.

Two Deaths Aborning

Two grandiose schemes that we announced in the last issue have died stillborn. “Listeners’ World,” our sister-to-be publication, has been shelved for an indefinite period
An Alternative Approach to Audio

Perfectionist Audio isn't a supermarket. It's a few people who are "professional consumers," selling the equipment they'd buy themselves. We think it's an attitude that really makes sense. After all, when you go to any professional, such as a doctor or a lawyer, you are paying him to perform a service the way you'd do it yourself, if you had the training or time.

We've been into music for a long time—we are audiophiles, designers and professional recording engineers—and we've tried to select components in various price ranges that produce the most accurate reproduction of music for your dollar. We've chosen our products after listening to nearly everything that's available in this country and we think that if you're really into music, you'll appreciate Perfectionist Audio.

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  • DREADNAUGHT by Dunlap-Clarke • DECCA • DENOM •
  • FIDELITY RESEARCH • GRACE • KMAL • LINN SONDEK • M & K •
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of time because moneys that were to have launched it had to be diverted to another investment.

Our proposed release of a two-disc album of Arthur Honegger’s “Nicolas de Flue,” whose production was predicated on reader interest therein, has been flushed down the sluice for lack of reader interest. It is gratifying to observe the profound devotion to music expressed by so many people who will gladly pay $10,000 for a stereo system but not $14 for a bloody good recording of a premiere performance of an important work!

We are not referring here to those of you who sent checks on speculation. You we thank. Please let us know whether we should return your check or tear it up.

The Disc Cutter Project

We are no longer accepting applicants for our Comparative Disc-Cutter-Evaluation project; all 500 sets of discs are spoken for. The project was delayed an inordinate period of time because of the difficulty of obtaining some suitable symphonic material, but we finally got what we were looking for, and will be putting the master tape together as soon as this issue goes to press. Don’t send your money yet, though; we’ll send all applicants post cards, notifying them when the test discs will be ready to be mailed out.

VTA

If we’ve been keeping up with our reading, we know that the record industry, and photo cartridge manufacturers, standardized some time ago on a figure of 15 degrees for what is called VTA, or Vertical Tracking Angle. (That’s the angle between the disc surface and a line from the tip of the stylus to the pivot point at the rear of the armature.) Most cartridge manufacturers have been conforming, more or less, to this standard.

Lately, there has been mounting evidence to suggest that many if not most cartridges perform better with a substantially larger VTA. The Shure V-15-IIG, for example, sounds cleaner and more detailed with a VTA of around 20 degrees than with the 15 degrees obtained when installed according to the book—with the top of the cartridge parallel to the disc surface. (This angle is most easily obtained by shimming down the front of the cartridge until its side ridges are 85 degrees from the disc surface.)

Other observers have reported good results with some other cartridges with a VTA of 30 degrees! It also appears that, the narrower the stylus/groove contact area, the more critical VTA becomes. For example, one researcher found that, with a Shibata tip, there was a single “correct” VTA (which would vary from cartridge to cartridge) that was so critical that a deviation of a fraction of a degree caused an audible loss of quality!

We would advise experimenting along these lines with your own present cartridge. Careful adjustment of VTA, by ear, is one of the ways in which Pro-Musica has been able to get the Shure V-15-IIG to perform better than anyone had previously thought it able to.

Buy Imports!

Generally, the best sound is still on imported discs. So we call your attention to some sources of same, on pages 67 and 79.

Low-Powered Speaker Wipeouts

It may come as a surprise to many audiophiles to learn that there is just as much likelihood of loudspeaker damage from an underpowered amplifier as from an overpowered one. The reason? When an amplifier clips, the sharp edges of the clipped waveforms have tremendous amounts of high-frequency energy in them, and can easily burn out many tweeters.

Typically, a tweeter—particularly one designed to cross over at 7 kHz or above—has a power-handling capability far lower than that of the rest of the speaker system, because the musical energy at high frequencies is normally a small fraction of that through the middle and low ranges. Amplifier clipping is therefore likely to far exceed such a tweeter’s power rating, and the result is a burnout.

Moral: It is as unwise to use too feeble an amplifier as it is to use too potent one.

The Low-Cap Cable Puzzle

As we mentioned a couple of issues back, we tried substituting low-capacitance shielded audio cables (12 pf per foot) for the conventional ones (36 pf per foot) that we had been using previously between the preamp and power amp, and found (as had the readers who first brought this to our attention) that
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there was an audible improvement in high-end snap and openness. We are interested to note that, since then, such cables have been advertised as being available from some commercial sources (Discwasher, Switchcraft).

We had of course attributed the improvement in sound to the extension of high-end response which would be an inevitable result of reducing the total capacitance between the signal path and the cable shield ground, and we likened effect to that of increasing a preamplifier's high-end response from a totally inaudible 30 kHz to an equally totally inaudible 100 kHz. Now, we're not so sure.

The point at which an audio cable starts rolling off high end is the point at which the reactance (that is, the resistance to the passage of AC) of its total capacitance equals the output impedance from the preamp. This can be determined from the simple formula:

\[ \text{Frequency} = \frac{5 \times 10^5}{3.14CZ} \]

where \( C \) = total cable capacitance in picofarads and \( Z \) = the output impedance of the preamp in ohms.

For a typical audio cable of 36 pf per foot and 3 feet length, total capacitance will be 108 pf. From the formula, we find that the frequency at which the high-end response is down 3 dB is—40 kHz! Not on your ruddy life! It is 1.47 megalertz! Switching to low-capacitance (12-pf per foot) cable would then extend the high-end rolloff point to almost 4.5 MHz!

Now, we have learned to be very skeptical about the supposed inaudibility of measurable differences, but this stretches our credulity a bit much. How, we ask, can a high-end extension from 1 to 4.5 MHz possibly be audible through a preamp and power amplifier whose high ends are dead by 100 kHz? There's just got to be something else going on here that we aren't measuring.

Without investigating any further at this point, we are willing to hazard a guess that we are somehow hearing audible effects of a phenomenon which has hitherto been of concern only to telephone and TV-network engineers: Line reflections.

It has been known for many years that every transmission line—and an audio cable is a very short transmission line—has a characteristic impedance, and that if a line is not fed into a load equal to that impedance, some of the signal energy will be reflected back along the cable. If there is a mismatch at the source end, some of that reflection will be reflected again and head back toward the load end.

No one has ever considered the possibility that this kind of thing could have any relevance to home audio systems. Audio cables are ridiculously short in comparison with a telephone line or cross-country coax TV cable, and electrical signals travel through shielded cables at upwards of 130,000 miles per second (or 666 million feet per second). It would take all of one 222-millionth of a second for a reflection to pass from one end of a 3-foot audio cable to the other, so that reflection would have to bounce from end to end 222 times to have an echo duration of even 1 millionth of a second.

Yet the impedance mismatch between an audio cable and a power amplifier can be substantial. A typical high-capacitance audio cable may have a characteristic impedance of 60 ohms, while a tube-type power amplifier may present to it a load of 470,000 ohms, and a typical preamp may have an output impedance of 600 to 1000 ohms. Could that much of a mismatch possibly cause more than 200 million repeated reflections? We very much doubt it, but can any of our readers come up with a better explanation of what is happening?

**Stereophile Stores**

We have heard some reports recently about audio dealers calling themselves "Stereophile." We should like to warn our readers that they have nothing whatsoever to do with the magazine of the same name. We are in fact asking you, if you know of any such store, to send us their full business name, their address, and also, if possible, the name of the proprietor.

**Angel's Redemption, and Others**

We are most gratified to be able to report that Angel Records seems to have straightened out their discing problems and are starting (At last!) to give us sonics which are, if not quite as good as their English EMI equivalents (and we're not sure many of them aren't as good), are at least so similar that the difference no longer warrants the extra cost of the imported pressings. This, it must be remembered, is true only of Angel's most recent releases, like the Britten "Sea Pieces" reviewed on page 23 in this issue. For releases more than 6 months old, the EMI imports are still by and large much better.

We are pleased to see that RCA, too, is now releasing increasing numbers of superb recordings. Their only consistent bummer these days are the Philadelphia Orchestra ones which, it should be noted, are the only ones being taped in the US. (Music Editor William Marsh was in fact told, while in England recently, that the Philadelphia Orchestra tapes are "remixed" there for British release. Hmmm!)

In other words, the only remaining major domestic record company that still doesn't seem aware of how bad most of their discs are
Is Your System Better Than Your Records?

If you've ever asked yourself that question after listening to a particularly bad recording, then Airborne has something to offer you. The list on this page consists of some of the best imported pressings available. Upon request we will send a more complete listing of the many fine imports we have for your selection.

1) BACH: The Art of the Fugue; Academy of St Martin, Marriner, 2LPs $13.18
2) BEETHOVEN: Nine Symphonies; Chicago Symphony, Solti, 9LPs and bonus LP $54.95
3) BEETHOVEN: Symphony No. 5; Vienna Philharmonic, Kleiber $6.59
4) BERLIOZ: Fantastic Symphony; Chicago Symphony, Solti $7.99
5) BERLIOZ: Requiem; London Symphony, Davis, 2LPs $13.18
6) BIZET: Carmen; Regine Crespin, 3LPs $19.77
7) DALLAPICCOLA: Il Prigioniero; National Symphony, Dorati $7.99
8) DELIUS: North Country Sketches; Royal Philharmonic, Groves $7.99
9) DEBUSSY: Images Bks. I & II; Michelangeli, Piano $6.59
10) DUTILLEUX & LUTOSLAWSKI: Cello Concertos; Rostropovich $7.99
11) GRAINGER: Country Gardens and other works; Sydney Symphony $7.99
12) HOLST: Wandering Scholar/The Perfect Fool; London Symphony, Previn $7.99
13) HOVHANNESS: St. Vertan Symphony; National Philharmonic, Hovhaness $6.99
14) MAHLER: Symphony No. 1; Concertgebouw, Haitink $6.59
15) ORFF: Carmina Burana; London Symphony, Previn $7.99
16) PENDERECKI: Magnificat; Polish Radio Orchestra, Penderecki $7.99
17) RACHMANNINOFF: Symphony No. 1; London Symphony, Previn $7.99
18) SCHUBERT: Quintet in C, Op. 163; Tatrai Quartet $5.99
19) SIBELIUS: Symphonies 5 & 7; Boston Symphony, Davis $6.59
20) STRAUSS: Also Sprach, Till Eulenspiegel, Don Juan; Chicago Symphony, Solti $8.50
21) STRAVINSKY: Firebird Complete; Paris Orchestra, Ozawa $7.99
22) TANEIEV: Symphony in C; Bolshoi, Rozhdestvensky $7.99
23) TCHAIKOVSKY: Manfred; London Symphony, Previn $7.99
24) TCHAIKOVSKY: Symphony No. 5; Chicago Symphony, Solti $7.99
25) VAUGHAN WILLIAMS: Symphony No. 6; Bournemouth Symphony, Berglund $7.99
26) DELECTABLE ELLY AMELING: Mozart, Bach, Schubert & Wolf; only $3.99

OF HISTORICAL IMPORTANCE
27) The Art of Felix Weingartner; Mono 3LPs $18.99
28) Kathleen Ferrier & Bruno Walter: BBC Broadcast; Parts never before released, Mono 2LPs $11.99

POP SHOW INTERNATIONAL
29) Pink Floyd: Dark Side of the Moon $7.99
30) Klaus Schulze: Timewind (German Synthesizer Rock) $7.39
31) Psybo: Bernard Hermann Film Score $7.00
32) Fred Astaire: A Shine On Your Shoes $7.99
33) Frank Zappa & The Mothers: Freak Out, 2LPs $8.99
34) Van Der Graaf Generator: Still Life $7.29
35) Theodorakis: The Ballad Of Mauthausen; Six Songs Pafandouri $6.79

MAIL INFORMATION: There is a $1.00 postage charge PER ORDER. We have ample stock as we go to press but please allow us a little time if we have to replenish our stock. Make checks out and mail to AIRBORNE, 9093 Comprint Ct. Gaithersburg, MD. 20760 ATTENTION: Dept AJ
is, ironically, the firm that gave the world microgroove recording: Columbia. So, the news from the domestic recording front is, by and large, so good that we are reshaping our campaign for better domestic discs. The letter referred to on page 36 will still go out to several domestic firms, but not to the ones we had originally envisioned as the starting point for a betterment campaign.

Up She Goes Again!
We are very proud of ourselves for having held the line against spiralling inflation for three years (our last rate hike was in Winter 1973), but we can no longer ignore the fact that, despite a healthy circulation-growth rate, the costs of producing and mailing this estimable rag have been rising faster than our income. Anyway, you all know the story by now.

So, it is with mixed feelings that we are obliged to raise our subscription rate to $12 for 4 issues, mailed via Third-Class mail. (First-Class mailing will now cost an additional $3, thanks to several rounds of rate increases by the P.O.) And if $12 seems steep to you, ask yourself where else you’d go for dependable information about components you can’t try for yourself if you weren’t getting Stereophile?

From Dolby to dbx
We were fascinated to learn that dbx—the first real threat to the Dolby’s ascendency as The professional noise-reduction system—has now come out with a plug-in model which can, quite literally, replace the Dolby. Early in the game, Dolby labs made available a special rack-mount frame that allowed individual Dolby modules to be plugged in or yanked out for instant replacement or adjustment of malfunctioning modules, to eliminate “down time” for servicing or calibration. Now, dbx has taken advantage of this flexibility by providing instant changeover to their own system, which provides almost twice as much s/n as the Dolby.

Introducing Audiopulse
This is not the first-signal-delaying device that’s come down the pike, but it is by far and away the most successful of the lot. Like the others, the Audiopulse uses delay techniques to replicate (or, rather, to simulate) the ambient environment of live music, for reproduction through rear-placed speakers.

* Whether or not this could be deemed an unfair advantage depends on your feelings toward normal business competitive practices.
In the fast growing field of high end audio, new products hit the market in never ending waves. Once in a while we find some products worthy of joining the ranks of those which have stood the test of time.

Here are a few:
- Accoustat-X full range electrostatics
- Audio Research RPR-1 sequential relay controlled amp switching
- Dayton Wright's new XG8 Mk III Series II electrostatics
- DB Systems Preamp & Pre Preamp
- Great American Sound Company Thoebe preamp and Goliath head amp
- Keith Monks improved tonearm
- Mark Levinson LNC electronic crossover
- M&K Double Bottom End
- M&K X2B single Bottom End crossover
- Nakamichi 600 cassette deck, 610 mixer/preamplifier, 620 amplifier
- Nakamichi/ADS car stereo system
- Threshold Class A high power amplifier (patents applied for)

We stock the proven products of these manufacturers:
- Audio Research, Acoustical Mfg. Co. (Quad), Great American Sound Co.,
- Mark Levinson, Sequerra, Magnepan, M&K Sound, Nakamichi, Stellavox,
- Linn-Sondek, Decca, Grace, Keith Monks Audio Ltd., SME, Stax, Denon,
- EMT, Fidelity Research, Ortofon, Supex

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Hours: Daily ten to six, open Monday and Friday evenings til nine, closed Sunday
The idea is to produce a simulation of the way quadriphonic sound would have been, had not so many record manufacturers used it for sonic shenanigans. The Audiopulse can add a slight but definitely audible reverber to the front channels if desired, and allows the rear channels (or the front ones, if you use an external mixer for recording) to simulate with remarkable realism a live-performing environment ranging from a small night club from a close-vantage seat to a cathedral from a distant seat. It can even do a creditable job of placing a monophonic recording in a stereo environment. There are also two sets of output jacks which provide fixed periods of time delay, for PA applications or for audiophiles who want to experiment with 6 or 8-channel playback systems. More details when we get our own sample to play with. (We first heard it at a private demonstration at Barclay Recording, in Narberth, Pa.)

In lieu of a device as costly as this, hobbyists who wish to experiment with derived-rear-channel ambience but don’t want to mess up their front-channel signals are advised to consider using Dynaco’s “Dynaquad” device. Unfortunately, it can’t be used properly with any of Audio Research’s power amplifiers (because of their floating Ohm output terminals) or with a bi-amped speaker system crossing over below 1500 Hz.

These situations call for a separate stereo amplifier (of uncrirical quality) and an electronic-crossover-type version of the Dynaquad, also available from Dyna.

Stax FM Pickup

The Stax FM pickup, which received a state-of-the-art rating in a past issue, must regretfully be dropped from our list for no better reason than that it does not seem to be available. Audiopulse, the importer who was supposed to be handling the product, has been turning prospective buyers away with the explanation that the product is both scarce and trouble-prone. We knew that both were the case (and mentioned them in our recommendation), but were under the impression that the product could at least be purchased by persons who didn’t mind putting up with its behavioral idiosyncrasies in exchange for its potential performance. Now it seems that the pickup is indeed not available at all, So, it must come off our Recommended list. We’re sorry about that...

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when you switch in the tone controls? Well, you may be able to do even better than that, without modifying your preamp’s internal circuitry at all.

FMI’s Bob Fulton is credited with the discovery that an Audio Research preamplifier with its tone controls switched on sounds even better if you turn both the Bass and Treble controls fully counterclockwise. We can take some credit for discovering that this seemingly idiotic measure works with a number of other preamps that have provision for switching their tone controls out of circuit.

How, you may ask, can this be? Well, if you’ll look at the schematic of a typical preamp with defeatable tone controls, you will observe that the “Bypass” mode merely disconnects the signal circuits from the tail-end of the tone-control section and reconnects them ahead of the tone-control section. That section is now bypassed, but it is still being fed audio signal. (See diagram.) In other words, even though the signal we hear is no longer going through the tone control section, that

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CBS Quad

Readers who would like to know more about quadraphonic sound (and specifically CBS’s SQ Quad system) than they know now could do worse than drop a note to the CBS Technology Center and request their little 22-page booklet “Spatial High Fidelity Through SQ Quadrachonic (sic) Recording and Broadcasting.” Enclose a stamped, addressed 8½” x 4” envelope, and mail it to Information Services Dept., CBS Technology Center, 227 High Ridge Rd., Stamford, Ct. 06095.

We’re still not impressed with most of the quad reproduction we have heard, partly because all of the decoders we have heard tend to muddy up the sonic waters, and partly
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       DESIGNS, free for your raw transducers.
   E. IN HOME REVERBERATION CURVE + equalization
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       Our room is neutral, yours isn’t.
   F. PROPRIETARY CUSTOMIZED TONE ARM MODS
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SCULLY
MICRO ACOUSTICS
DBX PROFESSIONAL
MC INTOSH (MR-79,TUNER)
JBL PROFESSIONAL
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AND IT COSTS NO MORE
because too many quad recordings are a travesty of realism, placing the listener in the middle of the performing group instead of in the usual listener location. We think it is interesting that the diagrams in CBS's Quad booklets all show the musicians ranged at the front, and ambience or concert-hall reverberation coming from the rear channels, as was envisioned by the people (like CBS's Ben Bauer) who developed the SQ quadriphonic system. They were the idealists, who saw quad sound as a means for making reproduced sound in the home more realistic than ever before, rather than the vulgar sonic circus that has confirmed more than ever before the conviction of true music lovers that hi-fi and music are not just incompatible, but downright antipodal.

Other Tube Sources
Since we mentioned Paoli Hi-Fi Consultants as a source of Telefunken 12AX7 tubes at reasonable cost, we should also call attention to Dynamic Specialties, of 2261 Spring St., Redwood City, Ca. 94063, who offer a similar service.

Dynamic Specialties sells Telefunken ECC-83/12AX7 tubes for $3.50 each, and also makes available a number of other tube types from Telefunken, General Electric, Genlux and Sylvania. Prices available on request.

We were also contacted by yet another firm, Temtron (of 138-69 Francis Lewis Blvd., Rosedale, N. Y. 11422), which offers Telefunken 12AX7 tubes "at a price to Stereophiles" of $2.50 each. They also carry other Telefunken tubes and a variety of other brands.

Allison Warranty
The Magnuson-Moss Warranty Act of 1975 requires that all written product warranties be identified as either "full" or "limited" in coverage, and sets stringent standards for a "full" warranty. A recent press release from Allison Acoustics commits them to a full warranty by which they guarantee that all of their speaker systems will perform to within ±2 dB of their advertised specs for five years from date of purchase, or will be repaired at no cost whatsoever to the buyer. Allison's responsibility here extends even to reimbursement for shipping charges, which is highly unusual. And the warranty is transferable. The only thing that can void the warranty is if the speaker in question has been subjected to "abuse," which includes the degradations of unauthorized servicemen.

If that sounds rather like the warranty with which Acoustic Research has been gaining loyal customers for many years, we should remember that Allison Acoustics' president Roy F. was associated with AR for those many years. It's still the kind of customer relations we would like to see more of in this business. But could you imagine Detroit offering that kind of warranty? Hah!

Incidentally, Roy Allison was an associate of JGH's when both of us worked for High Fidelity magazine during the late '50s, before he joined AR. He was the staff specialist in loudspeakers even then. We've been promised a couple of Allison speakers in the near future for reports in the magazine.

Audio Mart

All ads submitted for "Audio Mart" must be accompanied by a remittance calculated on the basis of 10¢ a word for private insertions and 20¢ a word for commercial insertions. WE CANNOT BILL for "Audio Mart" ads. Ads which are to run in a series of issues must ALL be paid for in advance for all insertions; we will refund the balance if the ad is changed or cancelled prior to term

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DIRECT-DISC CLASSICAL—At last! Recordings for the audiophile who loves music. Enlightened mike techniques—no multiple mono—and the very latest mastering equipment ensure the best records ever! Write for Information to DirectoDisc Recordings, 755 Wisconsin St., San Francisco, CA.

Marantz 88 and 9 power amps, #3 xover. David Harms, 4030 Warwick, Kansas City, MO 64111, (816) 561-2410.

Soundcraftsmen 2217 Preamp, 1 year old, $300.00; ADC XLM II, Shure V15-III, $20.00 each. 1-301-838-7398.

IMF Monitor IlIs, Mint, latest crossovers. But with all other components original. Call or write for price of these glorious sounding speakers. R. Kube, 2213 E. Providence Dr., Matthews, N.C. 28105. 1-704-847-4705.


Revox A77 Dolby. Less than 25 hours use.
The most serious challenger to the SP3A-1 was solid state, had third dimension (even some oblique angle), was sonically superior to the other contenders, and cost $395.

You opened a window before closing the car door to save your ears from up to a 130-dB blast . . . .

Amps and preamps (tube and solid state) could have their life extended by a $99 plug-in "Life Saver" to keep low current in them so they'd avoid the off-on shock that equals several weeks of continuous use for some units . . . .

You ran your SP3A-1 with "tone" button out, contour at five o'clock, "bass" and "treble" at full counter-clockwise . . . .

You could start a "state of the art" J or E modular system for $79(side); extend the top to 40,000 Hz for $125(side), bass to 32 Hz for $110(side), to 22 Hz for $250(side); the E woofer had a built-in X-over for use as a single bass box for FMI 60's, 80's, 100's, Quads, Dahlquists, Magnepans . . . .

There was a dual meter bias kit for Audio Research Amps for $79 . . . .

There was a complete phono that gave "state of the art" sound without rumble or the 6-8 Hz signal of direct drive units that rob an amplifier's power even if you can't hear it, for $480 . . . .

Quad capability could be added to your system for $188 complete.

Brain pickers, we love you, but the number of phone calls has curtailed our ability to give the personal service our clients throughout the US and Canada have come to expect. We welcome serious written inquiries, but careful answers that provide a service take time. $15 will cover the time, our costs, and two ARK records with instructions for how to use them to tune your system. And it's good towards any purchase. If we didn't think we had something better, we wouldn't be here.

ARK, Audio Research, Decca, ERA, Fulton, Grace, Linn Sondek, Paoli, Shure, the Audio Pulse Digital Time Delay, and the Keith Monks Record Cleaner.

Dr. Johnson 3737 Moraga, #214, San Diego, California 92117

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just checked by Revox, factory perfect. 85 prerecorded tapes, mostly classical, some never played. Will sacrifice. Richard Kube, 2213 E. Providence Dr., Matthews, N.C. 28105, (704) 847-4705.


Pair AR-5 speakers with stands, refinished like new $210, Dyna Mk-III $70, Dyna PAS.

**MOST IMPORTANT NOTE**

Be it hereby declared that the newsletter which calls itself AUDIO MART is in no way associated with this department in STEREOPHILE.

3x with stepped volume control $70, Acro-linear 60 watt mono tube amp $60, Scott 130 tube stereo preamplifier $60, Dyna FM-1 tuner $45. Call 919-934-6860.

QUAD 33, $95. Henry Pratt, 2725 Chamberlain Ave., Madison, WI 53705 (608) 231-2183 (weekends).

STEREOPHILES, Summer 68 thru Summer 75, (13) $15 for all. Keene, 120 Gary Lane, Cocoa, Fl. 32922.

Modified Dynaco Stereo 70 (2), new $125 each. Dynaco PAT-5, 1 year old, recently tested. I. Pelse, 201-870-3025.

Sell or Trade: Heathkit IG-18 Sine and Sq. Gen.; IM-38 AC VTVM; IT-18 Transistor Tester. All assembled and factory calibrated. Combined use under 1 hr. Need Dyna 120 amp. or headphone amp. Charles Martin, 1812 S. Travis, Sherman, Tex. 75090.


IMF Monitors TLS-80's, 6 mo. old, must sacrifice, $1100 or best offer. SAE Mark 31B and case $175. Jerry Kulpa, (202) 554-4689.

Soundcraftsmen 2212 equalizer, purchased new Nov. '75, perf. cond. $260; Shure/SME tone arm 3009-II Imp. non-detachable shell $75. Greg Costa, 1521 E. 8th St., #19, Davis, CA 95616, (916) 756-7588.


Crown IC-150, seven months old, used four hours, $237, shipped U.P.S., D. Davidson, 3627 Howell, #244, Dallas, TX 75204.

IMF Studio III-A speakers, excellent condition, $625. Bruce Goettel, 1001 S. Western, Champaign, IL 61820. (217) 352-1428.

**THE AUDIO AMATEUR:** The quality constructor's quarterly teaches, publishes tested construction projects: transmission lines, electrostatics with 900w direct drive tube amplifier, electronic crossovers, mixers, preamps, 9 octave equalizers. Detailed equipment modifications, maintenance, kit reports. $9 year. Free Prospectus tells all: Audio Amateur, Box 1765S, Peterborough, NH 03458.

Quatre Power Amp $275; Dynaco FM5 factory-assembled Tuner $150; SME 3009 II, improved $90; ADC XLM II never used with warranty cards, $50. N. Shade, 4540 Freedom, Meridian, ID 83642.

Yamaha B-1 Vertical-FET Amplifier, never used, still in factory sealed crate, with full warranty, $1,000. RTR 180D speakers, new $300 pair Yamaha CR-400 Receiver, new $200, CA-1000 Amp $400, CA-800 Amp $300, Yamaha YP-500 Turntable with new Grado FCE+ cartridge $75, Yamaha HP-1 headphones new $45, other Yamaha equipment! Pat Miller, 17802 Eastex Frwy. Humble, Tx. 77338 (713) 446-7165.

**IMPROVE the high-end response of your system. I have Columbia lowest-capacitance cable #1395. Will sell for 18c per foot, pre-
paid, almost any length. Price includes postage and handling. Al Halstead, 217 Clinton Ave., Waverly, N.Y. 14892.

Dyna Mk III $50, Stanton 681A $15. Stereophile, Spring 1968 to present; Hi-Fi Newslet-

KOSS ESP9's $95, Tympani III T/M, AR XA
Turntable (in carton) $75. Marantz 3600 (carton and warranty) $330. E. Viotty, P.O. Box 440, St. Albans, N.Y. 11412. (212) 454-5895.

Well cared for—Ampzilla $550, ARC WA Bass Panels $600, ARC EC-3A crossover $500, 18" Hartley $150, Citation Twelve $175, Barzilay Design 10 cabinet $150, Koss ESP-9 headphones $90, Pioneer 3-
way electronic crossover $65. These little-used cartridges: Denon 103S $95, Supex 901 and RB pre-amp $125, B&O SP-15 $50, Supex switchable transformer $90. Doug Robinson, Waterloo, Neb. 68069 (402) 779-2589.

Used but Mint—Thorens TD-125 II (in custom mounting frame) $200; SME 3009 II (non-detachable) $80; Crown OC-150 output center (with case) $335; Crown IC-150 (with case) $275; Marantz 3300 (with case) $325; Marantz 250 (with case) $325. Shipping included. Call 1-301-838-7398 after 9 p.m.

Dayton-Wright XG-8 Mk I's, (half-price): QUAD 33/303; Sudgen C.51/P.51's (Class A); Sony ST500FW; Pioneer SE-700 elec-
trets; (all mint or new). Robinson, 1707-8888 Riverside, Windsor, Ontario (519) 945-8486.

Classic Combo to sacrifice: Linn-Sondek LP-12 Turntable with Decca arm, remote-

LATEST DATA ON CASSETTE DECKS. Helpful taping hints, blank tape comparisons, laws and regulations of taping, repairing your cassette deck. This is some of what you get with your subscription to CASSETTE QUARTERLY. Special charter subscription offer: $3.50 for one year. Send no money now; we'll bill you when you get your first issue. Send order to: CASSETTE QUAR-
TERLY MAGAZINE, Peterborough, N.H. 03458.

Quad electrostatics, two in excellent condi-
tion, $190 ea. Quad 303 power amp, per-
fect, $130. Paul Casper, Melbourne, Fla. (305) 723-5557.

Reduce cartridge mass 1½ grams using nylon screws and nuts. ≠4 x ¾", $1.25
pair, postpaid. J. Kempel, 150 S. Rolling Hills Dr., West Branch, Mich. 48661.

Two Group 128 omni condenser mikes, model 419-Z. These are significantly
 clearer, smoother, and more musical than the 140s reviewed by STEREO\PHILE. $550
or best offer. P.O. Box 6462, San Jose, Ca.
95150. (408) 258-1989.

TEAC 7030 TAPE TRANSPORT. Willing to pay a fair price for a working recorder for the transport. RABCO SL-8E with working motors (prefer unmodified). Contact Mel at P.O. Box J, Pleasants Gap, Pennsylvania 16823 or call 1-(814)-359-2742.

Audio Research D-51, $375, Dual 75, $550. ESR-6's, pair $175. Marantz 10-B, walnut case, $600. New AR table, $85. All guaran-

Infinity SPC with case. Perfect condition. $300. Tom Reilly, 2300 Scarff St., Los Angeles, Cal. 90007, (213) 748-4716.

HEGEMAN I, (1 pr.) used, mint . . . $200. One classic QUAD QC mono control unit and QUAD II power amplifier purchased in 1956. Good working condition. Shows little wear. . . . $125. Technics SL-110A with
SME 3009 imp. non-detach and Shure V-15 Type III cartridge. Used, mint. $295. All prices include shipping. Contact Mel at P.O. Box J, Pleasant Gap, Pennsylvania 16823 or call 1-(814)-359-2742.

WANTED

Marantz Model 9 power amplifiers. E. Viotty, P.O. Box 440, St. Albans, N.Y. 11412. (212) 454-5895.

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Kensonic Accuphase T-100; Dayton-Wright XG-8 Mk. IIs; Soundcraftsmen RP 2212; Quad AM-11; Quad AM-3; Otari MX-5050-2SH; Paragon preamp; Electro-Research
A75 power amplifier. Robinson, 1707-8888 Riverside, Windsor, Ont., Canada. (519) 945-8486.

Stereophile: Summer 1966 to Summer/ Autumn 1967 D. Rights, Box 248831, Miami, FL 33124.

HELP! Need Ill-I Sum (2) '71 issue or photocopy thereof. Was in Army then, issue was lost in forwarding, finks who edit this magazine don't have any more. Am grad student, broke, be reasonable. Contact Gene May WBBWCUK, Box 582, Ann Arbor, MI 48107; (313) 971-2019.

SOCIETIES

AUDIO FORUM: Group therapy for the hi-fi nut in the Atlanta area. Meets monthly. For details contact Damon Hill, 3261 Circle Oak Dr. NW, Atlanta, Ga. 30339, (404) 432-0245.

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