By the time you read this (probably a month after it is written, judging by the speed with which the U. S. mails second-class matter on its appointed rounds), Capitol records will have announced the first bit of really good news for the high-fidelity perfectionist in years: the release of imported disc pressings—taped, cut, and stamped in Europe. London has been importing for years—all the Londons you buy are pressed by Decca in England. But this will be the first opportunity we will have of sampling the products of some of London's overseas competitors.

Some time ago, we mentioned the fact that the British EMI releases of the same works that Angel was releasing in this country had considerably better sound than the domestic versions. Since then, we have auditioned some more EMI discs, and while we have run across a couple that were pretty sad-sounding, we confirmed our initial impression that the majority of these discs do have cleaner sound, wider range and quieter surfaces than their domestic counterparts. Now, with this initial release of about 800 imported discs to choose from, STEREOPHILE readers will be able to find out for themselves what we've been talking about.

Capitol was very unhappy about what we said about their Angel releases, according to a letter from their legal department. But we suspect that they are going to be even unhappier when the record critics in American publications start reviewing the imported discs. We can guess what the critics will say.

Most of these imports will almost universally be criticized for "overly distant, hazy, unfocused, boomy, muffled, ill-defined sound." We can predict this with almost 100% certainty, for the simple reason that practically none of our critics have even so much as raised an eyebrow about the increasing shilliness and thinness of our own domestic discs. No until Dynagroove, with some of the most shockingly strident sound ever committed to discs, did any of the record critics suggest that, perhaps, these discs might be a little too brilliant. The fact that practically all our domestic discs have tipped-up high ends has not penetrated to these people at all, but when the first Capitol imports start coming in, no critic worth his salt is going to be able to miss the fact that they do have less highs and more deep bass than our domestic releases.

We are willing to bet, though, that virtually every record critic will assume that the domestic discs are right and the imports wrong, and will crow triumphantly about the advanced state of the recording art in the U. S. Before they climb out too far on a limb, though, we hope they will pause for a moment to consider (1) how cleanly the imported discs reproduce in the inner grooves, without the assist of Dynagroove techniques, (2) how similar the "boomy" bass of these disc sounds to the bass from a good tape reproduced on professional equipment, and (3) how much quieter the surfaces are on these discs, when compared to domestic ones having the same dynamic range. Their surfaces should not be compared with those of Dynagroove discs, because anyone can produce quiet-sounding discs by reducing the dynamic range and raising the average level to the point where the disc must be played at a lower volume control setting.

We commend Capitol for making this move to bring better-quality discs to us, even at the risk of making their own discs sound rather sick by comparison. But we do hope the European firms producing these discs will have the courage to stick by their guns despite the roasting they will get from most of our record critics, because these imports are the last hope for the disc medium as a source of high-fidelity program material. If their manufacturers succumb to the temptation to tailor their discs to the American norm, it will no longer be possible to buy discs that can do justice to a really good high-fidelity system. If, however, the imports manage to establish themselves as the standard by which domestic discs are judged, it is entirely possible that the RIAA curve may again come to have some meaning, and that the money spent on good phono equipment may not have been wasted after all.
The Home Recordist...

**Hobbyist or Hoodlum?**

by Philip C. Geraci

Legal treatises by laymen are always suspect, because the writer, unlike a lawyer, has no moral or ethical obligation to defend his opinions in court. Because of this, however, the layman is in a unique position to examine the status of contemporary law in a given field and to draw from it conclusions that a lawyer would hesitate to commit himself on. Mr. Geraci’s article was checked by several attorneys, all of whom agreed that it was a valid interpretation of the law as it now stands, but none of whom would venture a “legal opinion” as to Mr. Geraci’s conclusions.

We present this, then, not as a primer of Dos and Don’ts for the home recordist, but as a discussion of some of the legal technicalities that could cause a recordist trouble or could make a seemingly risky act perfectly legal. Mr. Geraci, the layman in question, reminds us that, just because there are few laws affecting home recordists specifically, you could establish a new one by winning or losing a court case. Either way, it would cost money, so you’d better get a legal opinion before taking a questionable point before a judge.

BACK about 1953, when the first of the “sophisticated” home tape recorders began to appear, I had an idea for a nation-wide club of tape enthusiasts who would record events indigenous to their localities and exchange the tapes by mail. To launch my brainstorm, I wrote letters to the editors of all the publications catering to the then-fledgling high fidelity market. Some were printed, and soon I began to receive replies. Before very long I was corresponding, by letter, with home recordists from all over the United States and Canada, and from as far away as Japan and Australia. Some readers sent tapes, some of them with fascinating collections of exotic sounds.

It was my plan to build a library of tapes by copying those I received, erasing them, and recording gems from my own collection before mailing them back. Ultimately, I planned to mimeograph lists of offerings, with names and addresses, and mail the lists to “members,” so they could arrange swaps among themselves. As a resident of Washington, D.C., I expected that my contributions would consist primarily of music, most of it recorded off the air.

The Budapest Quartet, National Gallery Orchestra and the National Symphony Orchestra frequently were aired by WGMS, Washington’s good music station. I also looked forward to recording, live, the Air Force Orchestra concerts at the Watergate, the Army and Marine Corps bands on the steps in front of the Capitol, and the choral groups which perform frequently in churches and schools throughout the area.

My concept of the legalities of such a tape exchange doubtless was that of the average amateur. I knew it was unlawful to sell recordings made from discs or copied from radio. But since profit never was a goal of my tape exchange, I innocently assumed that was all that mattered.

I was just out of college, immersed in my first job, dabbling in photography and high fidelity, and buying records as fast as I could afford them. I was attending graduate school at night in pursuit of a master’s degree, and the topics I had selected for my thesis was law and photography. Two events made me change that topic. One was publication of a book by a photographer-lawyer that pretty well covered the subject. The other was a telephone call.

Exploring the legal hazards of photography had taught me caution. If my tape exchange was to proceed unhindered, it seemed prudent to get permission from the radio stations before I began recording, purely as a formality.

I telephoned WGMS. As soon as I had the station manager on the line, I revealed my plan for a tape exchange and said that I was just calling to let him know in advance that I planned to record so there wouldn’t be any question about it. And I thanked him very much.

He was flabbergasted.

When he finished talking, so was I.

I was informed, politely if brusquely, that if I recorded anything from WGMS and attempted a widespread distribution, it wouldn’t matter whether I sold the tapes or gave them away, I could prepare for a legal battle.

I asked how. He said by injunction. I asked if it was “against the law” to record from radio. He said no, but it would be against his interests for me to do anything with the tapes except listen to them in my own home. He said he even disapproved of that, but didn’t see how he could do anything about it.

And that was that. WGMS was only one phase of my tape exchange plan, but it was the source of most of the music I had hoped to record. Still, there were other stations. Perhaps they would react differently. They did. Some station managers said I could record commercials and news broadcasts, but nothing else. Others objected to recording of any sort. None of them said, “Yes, we definitely will prosecute.” But none of them said they wouldn’t, either.

With the off-the-air phase of my tape exchange thoroughly scotched, I studied the alternatives. I telephoned the Air Force Orchestra and stated my request — for permission to record, either in their studio during rehearsals, or at an outdoor concert. After some hesitation, I was referred to the Pentagon. Instead, I called Army Band headquarters. An officer heard me out, then suggested I call the Pentagon. I called the Marine Band headquarters. I knew in advance what the officer-in-charge would say: call the Pentagon. I didn’t bother calling the Navy Band, but I did call the Pentagon.

The Radio and Television Branch of the Public Information Division,
Department of Defense, serves as a mouthpiece for all of the service bands and orchestras. The office makes or interprets administration policy, and sits in judgment on requests such as mine. I explained my case, and received a mildly encouraging response. Instead of a blunt "No," I was asked to put my request in writing.

The reply came from the office of the Assistant Secretary of Defense, Washington, D.C. It was carefully worded, neither granting nor denying the permission I sought. It pointed out in vague phrases how the Defense Department exercises "no control over the activities of a private citizen within his home," and went on to quote from legal documents which, the letter said, might have some bearing on my request. Ultimately, it passed the buck to the Register of Copyrights, across town, with the comment that many of the works performed by the service bands are protected either by statutory or common law copyright. It took another phone call to confirm my suspicion that the letter really meant, off the record please, "No." Much of the music played by these groups was copyrighted, in one way or another.

I retreated to the church choirs and choral societies. But before calling them I telephoned Paul Hume," at the Washington Post and Times Herald, to ask which groups he would recommend recording. He wanted to know more. I told him about the tape exchange. His advice: Forget it! All of the groups "worth recording," he said, would be comprised of union musicians "on leave" for one performance only. Some of them would be service musicians, who would regain their union affiliation when their enlistment was up. Others would be borrowed from the National Symphony or from the "pool" of so-called pickup musicians found in every large city. The fact that they were performing in a church, free, wouldn't affect their permanent union affiliation.

First I had been warned against recording music which was copyrighted. Now I discovered I couldn't record union musicians even when they were playing uncoprighted music.

Then a Washington newspaper published a report that broadcasters and record companies were seeking ways to keep home tape recordists from building up collections of free music by dubbing it off the air. The article quoted the chief of the Reference Division of the Copyright Office, Richard MacCarteney, as saying it "might" be possible for a record company to prove unfair competition in the taping of a broadcast or record purely for home consumption, on the grounds that this would "forestall a potential sale." Of course, he added hastily, this was not a "legal opinion," which was not at all surprising. Finding a quotable "legal opinion" in Washington proved to be extraordinarily difficult.

The article went on to say that a spokesman for "one major recording company" was seeking a licensing system where "the burden would be on the applicant for a tape recorder, to show that it would not be used to dupe records."

At this point my tape exchange appeared dead, at least for the time being. But on the other hand, while I had corralled many opinions, I had gotten precious few facts. Perhaps even the "experts" were unsure of themselves. That's when I changed my thesis subject.

In an attempt to unearth some facts, I sent a form letter to every radio and television broadcaster, equipment manufacturer, and otherwise interested party I could think of. I wrote the musicians' union, and soon had a two-page letter from James C. Petrillo, which said essentially that the union really didn't have anything to do with my question, it was between the "artists involved" and the recordist. So Hume had been wrong. But Petrillo's letter, too, was nibulous — full of ifs and usually.

I visited Capitol Hill, to talk with legislators. I stopped by the Federal Communications Commission, I saw lawyers at the National Association of Broadcasters, and I spent many days at the Library of Congress, searching in the law library for pertinent cases and conferring with Edward Waters in the musicdivision and Richard MacCarteney in the Copyright Office.

When I was finished, I was more than ever convinced that copyright would not be a bar to the average home recordist.

It is natural, my informants pointed out, for officials of a musicians' union or of a performing rights society (such as ASCAP or BMI), may someone from a record manufacturer or broadcast station, to seek to discourage any use of music which has not been paid for. The necessity is economic, vital to their interests and to those of their stockholders. But "seeking to discourage" is a far different thing from having the legal power to prohibit.

Essentially, two legal matters are involved in home recording: copyright and unfair competition.

The Copyright Act of 1909, several times amended in the 50-plus years of its existence, is the document that established the procedures whereby copyright is secured and enforced. The Act is United States Code 17, and the sections pertinent to music are sections 1 (e) and 2.

The key phrases are these: "the author shall have the exclusive right ... to perform the copyrighted work publicly for profit (that is mine) if it is a musical composition." In Section 2 the author is granted total rights, at common law, to any of his music which has never been published.

The distinction here is very important. The common-law doctrine of "total rights" gives the composer absolute control of his unpublished works, which means that nobody can record them, for any purpose whatsoever, without the permission of the composer. But when one of his works is published, and copyrighted, the composer actually loses some copyright protection, for all he can do then is exercise control over public performances of it for profit. Music that has been published may be recorded strictly for fun by anyone, without permission, so long as the tapes are not played in a public place operated for profit. Restaurants, for example, may not play background music without first securing a license from ASCAP or BMI, the performing rights societies which collect and dispense music royalties. Yet by some strange quirk, high-liability dealers, who deal far more on copyrighted music for their business than do restaurants (One can, after all, eat in silence!), are not required to secure a license or to pay royalties for its use.

Playing a tape in the Grand Central Station waiting room, of a work that is available as sheet music in any store, is clearly a case of public performance of a published work. But entertaining four guests in your home, by playing a tape whose original score was duplicated only twenty times by photostar, may or may not be the same thing. In such borderline cases, the legal definition of publication is left to the
udges, and as no such cases have reached the supreme court, the definitions differ in different states. Consequently a composer may retain total control of a composition in one state whereas, in another state, the music may be in the category of published repertoire.

There is a "compulsory license" provision in the Copyright Act of 1909 which states, in effect, that once a composer has allowed anyone to record one of his copyrighted works, he is obliged to give permission to anyone else who wishes to copy it. Anyone else may go then and do likewise, so long as he pays the composer 2 cents for each copy of the work that he makes.

So, let's say that John Q has written a song, and Calamity Records, Inc. has released it on discs. You're taping a party when one of your guests bursts into a bewhiskered rendition of it, for your tape. Does this violate the copyright? Yes, unless you send John Q his 2 cents. If you forget to send the 2 cents, and John Q catches up with you, all you have to do is pay him his 2 cents per copy. If you refuse, and he chooses to haul you into court, your statutory penalty can run as high as three times the recording "fee," or all of 6 cents for each illegal copy! Of course, there would also be the court costs to pay, too.

Be careful, though, if your impromptu performer sings a song that he heard somewhere but which had not been legally published. If John Q can prove that your recording deprived him of a recording contract, he can collect a healthy sum from you by way of personal damages. Just because a work is performed in public does not mean that there is no guarantee it has been published, in the legal sense. If the work is listed in a record catalogue, you're in the clear. But if it isn't, you'd better get permission to record, beforehand, from the composer. If you can't contact the composer, ask the conductor. It's his business to know the legal status of every work he plays.

Would the military bands and orchestras, tax-supported and thus theoretically owned by all of us, be within their legal right to prevent us from making live performances of public domain music? Probably, but not on the grounds of copyright infringement. They simply would not want to set a precedent, for in permitting one person to record, they would be obliged then to permit everybody to record, thereby turning the performing site into a forest of microphone stands and twisted vines of cable. If you decided to stand up for "your legal rights," chances are you would be threatened with forcible expulsion from the premises and possible arrest by the local constabulary for "disturbing the peace" or "creating a nuisance."

But recording live musicians, while absorbing, is only one way of building a tape library. The richest source of free music is the radio. Can you get into trouble recording a radio program? Not from the standpoint of copyright, as this author sees it.

The electrical substance of radio programs, records and tapes cannot be copyrighted. The Regulations of the Copyright Office state (Section 202.8b): "A phonograph record or other sound recording is not considered a 'copy' of the compositions recorded on it, and is not acceptable for copyright registration." This is one of the oddities of the 1909 Act, and it came about because, when the Act was being debated, around 1908, piano rolls were all the rage. Through a still-standing decision of the U.S. Supreme Court piano rolls and other "sound recordings" are denied copyright because they do not resemble the original musical score in appearance.

Everything which is broadcast is either copyrighted or in the public domain; common-law rights are legally terminated by broadcast, because of a 1931 Supreme Court decision that a radio broadcast constitutes a public performance. If not previously copyrighted, the copyright must be registered immediately after the broadcast, otherwise the music becomes public property.

Remember, though, that it is not likely to be the recording of copyrighted music which will bring the home recordist grief, but the recording of unpublished, privately performed music of which the composer has total common-law control. This cannot happen with a radio broadcast, as pointed out, but paradoxically, it can happen with a live performance, because this does not necessarily terminate the composer's common-law control.

Once a work has been copyrighted, the copyright stands for 28 years, and is renewable once. After 56 years the music falls into the public domain, where it may be used by anyone, live or recorded, without payment of royalty.

Most music written by the "old masters" is in the public domain, as is anything published prior to enactment of the Act of 1909, although new arrangements of public domain music may be copyrighted. All music of living composers in countries which are not signatories of the International Copyright Convention, such as Russia, is deemed to be within the public domain. If you are even in doubt about a specific composition, consult the Catalog of Copyright Entries at your library. Issues of the Catalog may be purchased by mail from the Superintendent of Documents, Washington 25, D.C. (not from the Register of Copyrights).

Needless to say, any attempt to sell copyrighted material recorded without permission is dangerous. Prosecution inevitably means conviction, and the fine may be very stiff.

How could all of this affect my nearly-forgotten tape exchange plan? According to my examination of the Copyright Act, exchanging tapes of copyrighted music, for free, would not constitute an infringement of anything. Certainly the exchange would be public, but lacking profit it would seem to me that it would avoid copyright infringement.

All over Washington, I asked whether this was true. None of my contacts wanted his answer quoted, because it is a legal area which is largely unexplored. But all agreed that, certainly, that was one way to interpret the Copyright Act.

I asked the same question with respect to the other legal aspect of home recording, the matter of unfair competition. There are cases where injunctions have been brought against home recordists who attempted to sell off-the-air recordings of musical performances, but as far as I could determine, no cases involving non-profit use of aired material have been heard in the courts. And until one comes up, who is to say how it would be decided?

Most authorities agree that non-profit dubbing is OK. John Koshel, Jr., a copyright attorney registered in New York, and counsel for SESAC, Inc., a performing rights society, wrote (in Hi-Fi/Stereo Review) that "what you do in your own home, without other people being involved, is pretty much your own affair."

But he advised recordists to keep their hobby within their home, to

(Continued on page 10)
The Revere-3M System

Several years ago, CBS Laboratories created quite a flurry of excitement with a press demonstration of a new, fully automatic tape cartridge system that they had designed under 3-M sponsorship, and which was claimed to be capable of true high-fidelity performance at the recognized no-fi speed of 1 1/2 ips. The demonstration resulted in some cautiously enthusiastic press reports, and hi-fi enthusiasts, recalling that CBS Labs had spawned the LP record, waited anxiously for the first of these wondrous devices to appear on the market.

Evidently, though, there were still some bugs in the works, for time passed and we heard no more about the fabulous CBS tape cartridge system. We never did hear about the CBS system again. Instead, we read announcements to the effect that the Revere-Wollensak division of Minnesota Mining and Manufacturing Co. was introducing a revolutionary new stereo tape cartridge system which looked very much like the CBS original. And lo and behold, most of the first pre-recorded tape releases were from Columbia’s library.

The Revere-3M unit records or plays special cartridge tapes. Each cartridge is about the size of a fat Graham cracker, and the tape, with a new fine-particle low-noise oxide, is on a 1 1/2-inch-wide base, with a very stout plastic leader tape at both ends. The tape is wound between the flanges of a small reel, but the leader at the start of the tape lies around the rim of the reel.

The change mechanism consists, visibly, of two platforms, side by side, in a recess at the rear of the deck. The left-hand platform is normally slightly lower than the right, to facilitate loading. Up to 20 cartridges can be piled on the left-hand platform, to give a maximum playing time of 15 hours.

Actuating the mechanism moves a roller against the rim of the bottom cartridge’s reel, and starts it turning so as to unwind the tape. The wide leader, being quite stiff, is forced out of a slot at the side of the cartridge, where it is grasped by the capstan and pinch wheel and fed past the heads and between the flanges of the large takeup reel. There, friction draws the leader in and wraps it around the hub. When the tape reaches its end leader, which is fastened to the reel hub, the leader pulls tight and trips a sensing switch that throws the device into its rewind cycle until the front leader is withdrawn into the cartridge. Then the change cycle starts.

![Record/play response of the Revere-3M machine, using the recommended tone control setting (A) and the flattest-response setting (curve B).](image-url)

A set of supports move in to hold the rest of the stacked cartridges in place, while the right-hand platform lowers and both platforms tilt to form a continuous incline. The cartridge slides down this onto the right-hand platform, the platforms straighten, and the right-hand one lifts to its original position while the next cartridge is dropped onto the left-hand platform. Then the whole process repeats itself, but this time a set of supports holds the right-hand cartridge elevated too, so the next one can slide under it. As the cycling continues, the left-hand stack diminishes while the right-hand one rises, until all the cartridges are stacked in a pile on the right-hand side.

In theory, there is no limit to the number of cartridges that the unit could accommodate. In practice, the mechanism is not powerful enough to lift more than about 20 of them on its right-hand platform.

The tape may be stopped, started, rejected or shuttled in fast forward or reverse at any time during its running cycle without damaging anything. There are only three simple precautions to be observed, and these are clearly spelled out in the instruction manual.

Each channel has a volume control and a single tone control. The volume control affects both record and play, but the tone control affects only the playback response. Record level indicators are a pair of two-section neon bulbs. Half of each bulb fires at normal maximum recording level, while the other half indicates overload.

Two receptacles double as mike and line-level inputs, depending on which of two sets of plugs are used. The mikes supplied are the usual inexpensive (and mediocre) ceramic types, suitable for speech and un-critical musical recording.

Outputs are provided for connection to external loudspeakers, via the recorder’s own 9-watt-per-channel amplifiers, or to an external high-fidelity system. The input to the recorder can be monitored either through its own loudspeakers or through the external system before starting to record.

Blank 45-minute cartridges are available from 3M for $4.75 each, for making your own tapes. Recording and playing back according to Revere’s instructions, the unit’s frequency response was as shown in Curve A. Cutting the tone control back to a position halfway between the “Hi-Fi” and the “Balanced Tone” settings yielded curve B, which would be remarkable in an average recorder running at 3 1/2 ips. At 1 1/2 ips, it is almost unbelievable.

When used to drive a high-fidelity system, the Revere’s sound was quite respectable. Using Revere’s recommended tone control settings (Treble when recording, Hi-Fi on playback), the high frequency rise was marked evident as a brittle steeliness on strings and an aggravation of surface noise and tracing distortion from dubbed discs. Setting the tone control about half way between the Hi-Fi and Balanced Tone positions offset the high-end rise quite well, and gave very good over-all response.

When reproducing Columbia’s pre-recorded tapes ($7.95 to $8.95), at...
FM Sensitivity

In the September-October 1963 issue of The Stereophile there appeared an article on multiplex antennas. The author, Philip Geraci, recommended the use of "outdoor type 300-ohm lead-in wire, rather than the higher-loss 72-ohm coaxial cable." He further stated that "Low-loss 72-ohm cable is available, but its losses are still greater than those of 300-ohm twin-lead."

However, looking at the technical specifications of my recently-acquired Fisher R-200 AM-FM-multiplex tuner, I find the following FM sensitivity (20 dB quieting) figures: With 72-ohm antenna, 0.6 microvolts; with 300-ohm antenna, 1.2 microvolts.

Could you explain this seeming contradiction?

K. A. Willison Columbus, Ohio

Sensitivity ratings based on 72-ohm antenna inputs are in much the same category as "peak-power" amplifier ratings; they are superfluous, meaningless, and obviously intended mainly to mislead the unwary buyer.

It is true that a tuner is twice as sensitive when fed from its 72-ohm antenna. But it is also true that a 72-ohm antenna delivers just half the voltage that a 300-ohm antenna delivers, so you end up with exactly the same usable sensitivity. Mismatching a 300-ohm antenna to a 72-ohm input, in an effort to utilize the higher gain from that connection, will cause severe reflections along the antenna lead-in, and these will result in worse distortion and noise than will the correctly-matched but lower-sensitivity connection.

Universal Arm

My question pertains to the best all-purpose tone arm, if such a thing exists. I have long been a gatherer of cartridges, from the earliest to the latest. Some of the newer ones—the Empire 880-P, the new Grado, the Shure M33 series, for example—make some rather interesting claims as to tracking capabilities. They are claims which my present Shure 232 tone arm will not justify. The arm is mounted on a Thorens 124 turntable.

Is it possible that another tone arm would materially help the older cartridges I have—cartridges designed to track at three grams and more? If not, what arm is best for light-tracking cartridges? If you will not or cannot be that specific, list several that you think would do better for me than the 232. I find that it will not track satisfactorily when used at much less than two grams.

If there is a really good all-purpose tone arm, of course, I want it. If, however, there is not—that is, none that will work better with the heavier-tracking cartridges than what I have—I could probably save enough money on heads for the new, light-tracking arm to buy another turntable for use with it. Incidentally, if that seems to be the wisest course, what turntable would be better than the Thorens TD-124? If there is a better one, I personally have not seen it.

Vernon W. Roberts Louisville, Ky.

There is no such thing as an all-purpose arm, despite the claims of some manufacturers. Extremely compliant cartridges require a low-inertia arm; less compliant ones should have a fairly massive arm, and preferably one with viscous-damped pivots.

For cartridges that normally call for 3 grams or more of tracking force, the old Grays 108B or C, or one of the Japanese copies of this arm, is still the best thing we have found, but the viscous damping must be properly adjusted for optimum performance. For cartridges capable of tracking at between 3 and 1.5 grams, the Ortofon (Thorens) units or the SME arm are excellent. Lighter-tracking cartridges, intended for a force range of between 1.5 and 0.75 grams, are best used in arms designed specifically for them, which is why we advise buyers to purchase integrated arm-and-cartridge combinations when choosing a very lightweight pickup.

Hang on to your Thorens turntable. If it doesn’t function satisfactorily, either it is malfunctioning or there is something amiss with the rest of your system. We do not know of a turntable that is that much better than the Thorens to warrant replacing the TD-124 with it.

Budget-Fi

I am interested in obtaining a pair of really good speaker systems, but at present my speaker budget is limited to around $100 for both speakers.

Are there any excellent speaker systems available for around $50 per unit?

Sol Perry Amarillo, Tex.

If there are, we have yet to find them. We’re still looking, though.

If you can wait until you can afford a pair of unfinished AR-2 systems, perhaps as kits (from Heath Company), we’d suggest doing that.

European Tuners

Why do so many people advise against the use of European tuners? They seem to be excellent units, yet every expert I have talked to has tried to steer me to American tuners instead. They said something about lack of sensitivity, but this doesn’t make sense, because some of the European units have just as high rated sensitivity as the best American ones.

F. Lee Wesley Amarillo, Tex.

It isn’t a matter of input sensitivity, but of output level.

In the U.S., the "standard" high-level input signal level is between 0.5 and 1.0 volt, so control units are designed for this input level and tuners are (usually) designed to produce this much output. The European standard high level appears to be around 0.15 volts, so their tuners put out much less signal output than American units. Some American control consoles have enough reserve gain to produce adequate output from a 0.15-volt tuner input, but most of them do not, and there are very few tape recorders that can be driven to full recording level with a 0.15-volt "high-level" input.
Headphone Roundup

In preparing this report, the names of eleven headphone manufacturers were culled from current catalog listings, and letters were sent to all of them, requesting the loan of representative samples of their products for an evaluative report.

We did not receive a reply of any sort from Collins-Farley, Koss, Marcor or Telex. Since Koss is one of the major manufacturers of high-fidelity headphones, we queried them again a month later. This request also elicited no reply, but since we considered it necessary to include them in this listing, we managed to borrow a set of their popular SP-3 and their new PRO-4 phones locally.

Since no header was found to excel on all counts, we did not attempt to rate them in order of absolute quality. Instead, the tabular listing and the individual reports are arranged in alphabetical order according to manufacturer.

Rating Criteria

The headings shown below correspond to those across the top of the tabular listing on page 11.

Cable

Cable types, designated H, I and Y, are shown below.

Connections

The designations 2P or 3P in the headphone listings mean that the phones in question are supplied connected to a pair of 2-conductor plugs or a 3-conductor plug.

Phones supplied without plugs, but with four wire leads, are designated as 4W.

R-L Identification

Some manufacturers use a color-code (CC in the tabular listing) to distinguish the left-hand phone from the right-hand one. On other phones, the cable (C) may lead out of one phone only, identifying it as the right- or left-hand one.

Channel designations may also be printed (Pr) on the phones, as Right and Left, or as indications of the Front or Back of the phones, or may be suggested by the shape (S) of the phones.

Construction

All phones were rated on the basis of esthetic appeal (a purely subjective judgment), apparent solidity, and quality of workmanship. Construction was rated from Poor through Good to Excellent.

Ruggenedness

Physical durability was judged by "feel" and on the basis of those stresses that might be applied to the phones and the headband in normal (or abnormal) use. Units were downgraded for such things as rivets which appeared to lack adequate anchoring, friction devices that looked as if they would soon lose their friction, cables or headbands that could be easily broken, or phone cases that could break or impart severe shocks to the internal elements if dropped.

Handling

A relatively minor but nonetheless valid measure of a headset is the ease with which it can be handled. This was judged on the basis of the relative difficulty involved in carrying the phones and placing them on and off the head. The best units here were ones which could be lifted by one phone without the other one swinging around backwards or upside down.

Comfort

This is important when headphones are to be worn for long periods of time, for what may seem like mild discomfort when the phones are first donned can develop into acute soreness of the ear lobes or head after an hour or so. In general, those phones which applied their pressure to the sides of the head rather than directly to the ear lobes were found to be the most comfortable.

Noise Rejection

This is the measure of a headset's ability to block out extraneous sounds in the room.

For the home listener, high noise rejection is useful when listening in a room full of rambunctious children, or when others are watching a noisy television program. For the recordist who tapes live material, noise rejection enables him to hear only what is being picked up by the mikes, without interference from the direct sounds.

For our tests, we used a noisy air conditioner as the interference source (because its sound is constant, and covers a wide frequency range). We observed the degree to which this was audible when the phones were seated normally on the ears (under pressure from the headband) and with the phones pressed firmly against the ears by hand.

Impedance

These are manufacturers' ratings, and the impedance values shown are for each phone of the pair. Precise impedance matching is unnecessary with headphones because they do not put any demands on an amplifier's output power capabilities and they are unaffected by amplifier damping. Thus, 4- and 8-ohm phones may be interchanged at will without causing more than a slight change in volume. Mismatches of over 200% may, however, cause a headset to function at well above or below its normal sensitivity, and may degrade the phone's frequency response.

Sensitivity

We did not measure the input signal required to produce a certain amount of output from a headset, but we did make comparisons of this. Sensitivity is relatively unimportant when using a power amplifier to drive the phones, but when they are to be used for monitoring the line-level outputs of a tape recorder, the phones should be sensitive enough to allow the monitored signal to override the ambient noise that comes through as the result of imperfect noise rejection.
Sensitivity is rated on a comparative basis from Low through Medium to Extremely High.

**Power Capacity**

Since we did not wish to return all our sample headphones with their coils blown out, we did not determine their burnout point. Instead, we listed the manufacturer's rating for power capacity, where such ratings were provided.

We did, however, establish that, without extra bass boost, every headset tested was capable of producing painfully high volume without audible indication of stress.

**Sound**

The performance of each headset was judged on the basis of listening tests, using musical program material and an audio oscillator.

Commercial recordings were used for the musical tests, as were a variety of "live" master tapes that were made under known conditions. Volume was adjusted to the same level for each phone, and the sound was evaluated for freedom from response deviations (smoothness), frequency range, over-all balance, naturalness, reproduction of sonic details, and perspective.

Perspective, which is largely a matter of frequency response, refers to the sense of "distance" from the sound source that the phones seem to convey. For instance, if a recording was miked from a certain distance, the headphones should, ideally, give the illusion of listening to the performers from that distance. From a more practical standpoint, head-phones which do not seem to move the source away somewhat will sound less like loudspeakers than will phones with "perfect" perspective, because we normally listen some distance from the speakers. Thus, the buyer must often make the choice between an intrinsically excellent headset and one which, as a result of depressed middle range, sounds rather more like a typical loudspeaker system. This is, consequently, a matter of personal choice, so rather than attempt to rate headsets on this basis, we are simply reporting the apparent perspective of each phone.

The music listening came first, and served as the major basis for evaluating each phone's sound. Then the audio oscillator was used to confirm or refute our reaction to the music reproduction, and a subjective response curve was drawn up for each headset. Please note that these curves are not the result of measurements, but of estimates of the extent of the frequency deviations that were observed. Hence, the decibel scale on each curve must be taken with a grain of salt. The curves are a valid representation of trends in response, and of audible differences between phones, but they are not to be taken as literal response measurements.

For all tests, the phones were driven by a Dynaco Stereo 70 amplifier, coupled through Jensen's Model CC-1 headphone control adapter, a purely passive device which includes only the necessary amplifier output load resistors and a resistive attenuator to control the level going to the phones.

**Price**

Prices shown are manufacturer's net, or average hi-fi shop prices. Some retail outlets may charge more than the listed prices, others may offer additional discounts.

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**Beyer DT-48**

These German-made phones were designed for audiometry work and precision psychoacoustical measurements, and are priced accordingly. They are extremely well made, quite durable, and look rather like medical instruments.

The most sensitive phones tested, they appear to be almost perfectly linear in response from the upper bass range to well beyond audibility, and are free from audible peaks and dips. Noise rejection is only fairly good, and the over-all sound has the thin bass that was noted from just about every headset tested. Sonic details are reproduced with almost microscopic clarity. The phones are somewhat brilliant-sounding, tending to move the listener slightly closer to the sound than the microphones were placed. This quality, plus their extraordinary transparency, makes them ideal for analyzing the cleanliness and smoothness of program material.

Because the ear pads press directly on the ear lobes, these phones were comfortable enough for listening periods of a half an hour or so, but became increasingly uncomfortable thereafter. Bending the headband to reduce the pressure helped matters, but at the expense of the air seal and, hence, of some bass response. "Deluxe" ear pads are available, to distribute the pressure around the ear instead of right on the lobe, but while these make the phones quite comfortable and slightly improve the bass response, they also introduce some high-frequency rise.

**MANUFACTURER'S COMMENT:** Because of the flat ear cups normally supplied with the phones, the phones are likely to be worn slightly toward the front of the ear lobes, rather than directly centered on them. As a result, the treble output from the phones is directed obliquely at the ear canals instead of straight into them, and the phones are designed to produce linear treble response under these conditions. The larger cups hold the phones centered over the ears, directing the treble almost squarely into the ear canals, which accounts for the slight increase in perceived high-frequency response.

**Beyer DT-90**

A less expensive version of the DT-48 headset, these are a bit less professional-looking but are nonetheless very well made and evidently very durable. They are identical to the DT-48 phones as far as comfort, sensitivity and response smoothness are concerned, but they have markedly superior noise rejection characteristics. Although they sound quite similar to the DT-48 phones, they were judged to have somewhat less high-frequency range but slightly more natural sound. The DT-90 phones have a shade less brilliance than the DT-48s and a fuller low end, and they do an almost perfect job of re-creating the original microphone-to-source distance.

The DT-90 does not have quite the phenomenal transparency of the DT-48, so it is not as well suited for critical evaluation of sound. On the other hand, its over-all sound is somewhat richer than that of the DT-48, a quality that we found we preferred for less critical entertainment listening.

These were the only bass-azy phones tested which responded to electrical bass boost in a wholly satisfactory manner. About 8 db of boost at 50 cycles, from a Baxandalt type bass control, produced excellent over-all balance, without boominess or muddiness, and pushed the phones' useful response down to almost 35 cycles.

The ends of the connecting leads (supplied without plugs) are marked to indicate polarity, for correct phasing, but there is no identification of Right of Left at the phones or the
cables. If a three-circuit plug is used, the Left channel will be carried by the tip of the plug, and the Right phone may be marked with a splodge of paint (white or red) or a piece of adhesive tape. If separate plugs are used, the Right-channel one should have a red cover or should be marked with paint or tape.

Heath (Roanwell)

These phones, sold exclusively through the Heath Company, are businesslike in appearance and look quite durable. They are very comfortable for long periods, and have good but not outstanding noise rejection characteristics.

As supplied, they terminate in four color-coded wires, but the instructions fail to designate which leads are the "hot" ones for each channel. Correct phasing is obtained when the Green and Red leads are "hot."

Their sound is bass-shy and a little hollow, but otherwise rather good. Highs are somewhat rough, details are well reproduced, and perspective is quite accurate. Overall sound is slightly harsh, apparently because of some transient distortion.

Jensen IIS-1

Neat, slick appearance, well put together and apparently quite rugged. They are not very easily handled, for the phone tends to swing around backwards when laid down or pulled apart.

They are very comfortable, partly because of light contact pressure, which causes some loss of bass and of noise rejection. Bending the headband helps, but not much; a stiffer spring might be the answer here.

With the phones pressed lightly but firmly against the head (by hand), these have fairly good noise rejection qualities and very good sound: quite smooth and rich, with a slight upper-end edge and spottiness, much like the on-axis sound of an electrostatic tweeter. Bass is a bit on the boomy side and not very deep, but is

dubious value to the critical listener.

MANUFACTURER'S COMMENT: Except for its external styling, this headset is identical to one of the others that you tested. Both use the same transducing elements, and their performance is identical, as proven by our own tests. Since, however, your report rated the other phones as acceptable, we can only speculate that the phones we sent you were defective, and it seems to us to be most unfair to condemn a product on the basis of one possibly defective sample.

Further, the review seems to us to represent quite a paradox, insofar as the writer uses such phrases as "quite comfortable," "fairly good noise rejection," "unusually good bass response," and "overall sound is nicely balanced," and then goes on to use terms such as "raucous" and "of dubious value."

REVIEWER'S ADDENDUM: We reported on the KN-845 as we heard it, and since it seemed unlikely that both phones of a single headset would be defective in the same way, we did not guess that the phones may have been defective. We will be pleased to accept a second set of these phones for testing, and if they are found to be better than the first sample, we will inform our readers of this in the next issue.

Koss PRO-4

Almost a dead-ringer for the early-model Sharpe HA-10, Koss's PRO-4 is readily distinguishable by a large knurled rubberband sticking out of the lower part of the right-hand phone. This, in case you've wondered, is a mounting for a "boom-type" lip microphone, for use in

speech labs and for communication purposes. (Sharpe and Permox also provide facilities for attaching a lip-mike.)

It is handsome, well constructed, and apparently quite durable. Noise rejection is extremely high, but the PRO-4 is not quite as comfortable for long periods as the Sharpe HA-10 (because of a smaller ear cushion). The PRO-4's sound was judged to be about midway in character between the new Sharpe HA-10 and the Jensen phones. The PRO-4 has a much more bass and somewhat less brilliance than the HA-10. Some noise was detected at the high end, but the phones otherwise appear to have a very neutral perspective, moving the sound only very slightly farther from the mikes than it originally was. Details were very well reproduced, and the sound was
sharply focused, but as with most other phones, bass was quite thin.

Koss SP-3
These phones have probably done more to popularize headphone listening than any other, combining as they do a moderate price with an over-all balance that is quite similar to that of the popular Acoustic Suspension loudspeaker systems. They are ugly-looking phones, cheaply but substantially constructed, and they appear to be very durable. They wear well (comfort-wise, as they say on Madison Avenue), and despite a very dull-sounding high end, some bass boominess, and a rather hollow sound, they are nonetheless very listenable. Balance is excellent and bass is almost too full (even though the extreme bottom is completely absent), and the over-all sound is unfocused and lacking in detail. Similar in sound to the Superex phones, these lack the other's detail and high-end sheen, but they were judged to be a hair more natural in timbre, possibly because they have less of the broad middle-range dip of the Superex phones.

Lafayette F-767
The lowest-priced phones tested, these are better-looking, better-built and more substantial than they have any right to be. They are quite comfortable for long periods of wear, and have moderate sensitivity. Unfortunately, their sound is not good — harsh, metallic, very thin at the low end, and with rather high distortion.

Monarch ES-300
These inexpensive phones, also sold (for the same price) by Lafayette Radio under the name of Pioneer, are neat-looking, and cleanly if not too substantially put together. Their foam rubber pads are a bit too hard for comfortable long-period listening, and their noise rejection isn't too outstanding, either.

Their sound is strangely muted, as if everything, including fairly respectable highs, were coming through (Continued on page 15)
BRAHMS: Symphony No. 3 in F major: Tragic Overture

Pittsburgh Symphony Orchestra, William Steinberg, conductor. Command disc CC-11015-SD, $5.98.

In adding another fine performance to his growing list of recordings for Command, Mr. Steinberg here gives an unforced, lyrical and well-controlled interpretation of these Brahms works. I was surprised at the conductor’s omission of the expository repeat in the first movement of the symphony, but I must nonetheless recommend this as a fine performance.

In contrast to some of their recent close-miked Pittsburgh discs, Command seems to have moved their microphones back from the orchestra, so it no longer sounds as if it is in our laps. There is also better control of hall reverberation, and woodwinds are more naturally placed in the orchestra. Directionality here is sufficient to give breadth to the orchestral perspective, and the dynamic range is wide, with easy, unforced tuttis. The low end is not as full as it should be, however, and Command has yet to solve the problems of clean tracking at inner diameters. Surfaces are above average.

J.W.K.

DUKAS: The Sorcerer’s Apprentice; SMETANA: The Moldau; SAINT-SAENS: Danse Macabre; ROSSINI: William Tell Overture; BRAHMS-DVORAK: Hungarian Dances No. 17-21; STRAUSS: On the Beautiful Blue Danube; BERZET: Carmen Suite No. 1; PONCHIELLI: Dance of the Hours; SOUSA: The Stars and Stripes Forever

NBC Symphony Orchestra, Arturo Toscanini, conductor; 2 RCA Victor “Stereo” discs VCS-7001(c), $6.98.

It’s no secret by this time that the sale of Toscanini recordings has dropped off alarmingly since his death and the advent of stereo. This is true of all recordings made before the development of the new medium, but as a result, many of the greatest recorded performances are passing into oblivion, to be replaced by second-rate interpretations in up-to-date sound.

It is to RCA Victor’s credit that they have attempted to keep some of the great Toscanini recordings in their catalogue, even if they did find it necessary to “modernize” them by adding a synthetic stereo effect to the old mono masters. This new album is far more successful than the first such attempts. There is a sense of reverberant spaciousness which was lacking in both the old mono editions and the early “stereo” re-releases, but the addition of considerable high-end preemphasis raises the diction with Toscanini’s marvelously controlled balances. Adjusting the treble control can take away some of the sizzling, but not all of it.

In an attempt to create a sense of directionality, the RCA “stereo” recording has placed the instruments in the customary stereo manner, with high strings to the left and lower strings to the right. Actually, Toscanini’s seating plan placed the low strings on the left with the first violins, and the viola and second violins to the right.

My own inclination would be to buy the mono version of this album, but if RCA Victor feels it is necessary to stereophonize Toscanini’s recordings in order to keep them in the active catalogue, then I’ll happily go along with them. I do hope, though, that the original mono editions are retained also, because these, in their own way, are a better representation of these wonderful performances.

J.W.K.

Erich Kleiber Dirigiert

Vol. I: MOZART: Symphony No. 39 in E flat; Five German Dances; WEBER: Symphony No. 1 in C

Vol. II: SCHUBERT: Symphony No. 9 in C

Cologne Radio Symphony Orchestra,

Erich Kleiber, conductor. Amadeo discs, mono only: AVRS-5010 (Vol. I); AVRS-5012 (Vol. II), $5.98 each.

These Amadeo discs were cut from tapes of broadcast performances by Mr. Kleiber, who was fated to die just as stereo was in its infancy (his only stereo recording is the classic performance of Mozart’s Marriage of Figaro, issued by London), and they are further evidence of how much superb material is preserved in the tape archives of radio systems throughout the world.

There is often a buoyancy and spontaneity about live-performance recordings that is sadly lacking in most of the slick, note-perfect performances that are made in the dispassionate atmosphere of a recording session. Most broadcast tapes are still monophonic, but if the public is willing to forego stereo occasionally in exchange for superb performances, these Amadeo discs could well herald an exciting new era in the history of the phonograph. The recordings lack the slickness of the usual commercial product, but they are disarmingly natural.

These can be obtained from almost any shop which stocks imported discs, such as Discophile and The Record Hunter, in New York City.

J.W.K.

MOZART: Divertimento in B flat, K. 287. MICHAEL HAYDN: Divertimento in G major

Members of the Vienna Octet. London disc CS-6352, $5.98.

The great Mozart divertimento and a pleasant short work by Joseph Haydn’s younger brother are both performed here with the loving warmth and virtuosity so typical of this fine Viennese ensemble, and London’s technicians have accorded them some of the finest recording of a small ensemble that I have heard.

The airy acoustics of the live Viennese hall are a perfect complement to the music and the performances. Even though the hall has a
great deal of liveness, microphone placement has been skillfully accomplished so we do not lose the basic intimacy of the ensemble. Instrumental balances are almost perfect, and the two horns, which often play high in their range, never overpower the remaining five strings. Directionality is effective and natural.

The dynamic range is very wide, and the low end is warm, firm and natural. Throughout, surfaces are excellent and tracking is no problem, except for a brief moment toward the end of the Haydn. All in all, highly recommended. J.W.K.

SCHUMANN: Symphony No. 2 in C

With only the Spring Symphony remaining to complete a recorded cycle of all the Schumann symphonies, Mr. Bernstein has produced a performance here of considerable lyric beauty, and with his usual and sometimes excessively driving enthusiasm.

I find this recording less successful from a technical standpoint than the Nielsen Fifth reviewed in the last issue. Again, Columbia seems unable to give true focus to the sound of the Philharmonic in the Manhattan Center auditorium. The excessively reverberant acoustics tend to cover up and blur many sections of the orchestra.

The recording has a nice sense of spaciousness, however. Orchestral balances are very well handled, woodwind miking is excellent, and there is enough separation and directionality to be effective without being intrusive. There is no real low end, and consequently the lower instruments lack impact. Tracking was no problem, except briefly in the inner grooves. Surfaces were satisfactory, give or take a few ticks and pops. J.W.K.

JOHANN STRAUSS, JR.: Vienna Blood; Artist’s Life; Roses from the South; Thunder and Lightning Polka. JOSEF STRAUSS: My Life is Love and Laughter
Chicago Symphony Orchestra, Fritz Reiner, conductor. RCA Victor disc LSC 2500, $5.98.

What may be the last recording we can expect from Fritz Reiner in Chicago turns out to be a winner all the way around. Reiner’s way with a Strauss waltz is fondly remembered by those who heard him perform them with the Pittsburgh Symphony many years ago, but here he has not only a much finer orchestra, playing in a truly Viennese style, but has also the benefit of some of RCA Victor’s finest pre-Dynagroove recording.

It is discs like this that underscore the tragedy of Dynagroove, for they illustrate that RCA Victor was fully capable of cutting wide dynamic range, full, solid bass and clean natural highs in a stereo disc, without resorting to the shenanigans of their much-publicized Dynagroove process. This disc provides a graphic demonstration of The Truth About Dynagroove, in that it sounds more natural and realistic on a good system than do the best of the Dynagrooves to date, yet would probably fail miserably on a cheaper system that would make Dynagrooves sound fine.

Indeed, the inner grooves of the Polka (an aural blockbuster of staggering proportions) are hard for even an excellent pickup to handle cleanly, but I suspect that a Dynagroove would fare no better, even with its “dynamic styli correlator,” were its crescendos cut at anything approaching this level. My pickup did break up slightly during the wilder parts of the Polka, but as a result of the very thing — the wide dynamic range — that makes this recording such a stunning tour de force.

The rich, live acoustics of Chicago’s orchestra hall here form a perfect setting for the wonderful sound of the orchestra under Reiner’s baton. RCA Victor has not always been this successful in controlling the highly reverberant character of the hall in their other Chicago recordings. Directionality is very effectively handled, and the surfaces throughout are excellent. J.W.K.

STRAVINSKY: Divertimento from Le Baiser de la Fee; Etudes for Orchestra; Suite No. 2 for Small Orchestra
L’Orchestre de la Suisse Romande, Ernest Ansermet, conductor. London disc CS-6325, $5.98.

In yet another disc in his already impressive list of Stravinsky recordings, Ansermet here presents some of the composer’s most amusing scores in performances of great refinement, but with little humor. This is a shame, for while the broad, almost slapstick comedy in some of this music does not require much subtlety or understatement, it does demand a light-handed approach, which Mr. Ansermet fails to bring in.

London’s Geneva recordings are nearly always of very high quality, and this one is no exception. As a matter of fact, I found this record well-nigh flawless. The depth and the richness of sound of the Suisse Romande Orchestra are beautifully captured here. The balance between orchestral choirs is natural, with a slight but tasteful accenting of the woodwinds to add a touch of extra color. The dynamic range seems very wide, the low end is clean, solid and deep, and tracking was no problem, even in the most heavily modulated passages. Surfaces were immaculate.

J.W.K.

Music of EDGAR VARESE. Vol. 2: Arcana, Deserts, Offrandes
Dona Precht, soprano; Columbia Symphony Orchestra; Robert Craft, conductor. Columbia disc MS-6362, $5.98.

In electronic music, the sounds of musical instruments, natural noisemakers and electronic signal generators are recorded on tape, modified by running them at higher or lower-than-normal speeds and manipulating their tonal content, and then combined in rhythmic and tonal patterns to create entirely new forms of music.

This Columbia recording is one of the few discs of full-length electronic compositions, and is an outstanding example of the virtually limitless range of tonal colors available to the electronic music composer. As for the music itself, I do not pretend to comprehend it. I even hesitate to grace it with the designation “music” at all. Perhaps in so doing, I label myself as a stick-in-the-mud reaction- ary, but I must admit that repeated listenings have not made this any less alien to my ear than it was on the first playing.

There is, however, a strange fascination about its shimmering, iridescent patterns of sound. It is also, incidentally, quite a demonstration record for top-notch equipment, for it has some of the highest- and lowest-frequency tones recorded on it that I’ve heard in some time. The recording is one of Columbia’s best, although I defy anyone to tell whether it is high, low or medium-fi. How hi-fi can a recording be, when none of the sounds on it are supposed to sound natural?

This is a must, even if only as a tonic for jaded ears. J.G.H.

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Recommended Components

Our initial listing of Recommended Components in the last issue stirred up somewhat of a hornet's nest, judging by the letters and phone calls that came in, condemning some of our choices and demanding to know why we hadn't included this or that or the other "excellent" component. We will answer some of these and other specific questions here.

Are these listings of satisfactory components, or are they what The Stereo Voice feels to be the best ones available?

They are what we feel to be the best available for use in systems of four levels of quality (A to D).

Categories B to D are supposed to represent diminishing steps of quality. How, then, can a component be listed in two different categories?

The quality categories refer to the performance of systems comprised of the listed components, rather than to the performance of the individual components. Thus, an amplifier listed in categories B and C will provide B-type sound when coupled to other B components and C-type sound when coupled to other C components.

Some of the components listed are discontinued models. Why waste space on them?

Because they are still available, even if used, and they are still excellent components.

Why were the following units listed?

**Garrard Model A**

It's a record changer, and it isn't as good as the better transcription tables, but some users insist on a changer, and this is the best combination of table and arm of any changer we know.

**Sony 777**

This was listed on the basis of a brief first-hand encounter, and the reports of several very satisfied users. It has been dropped from the listing, for reasons mentioned below.

**Why were the following not included?**

**Acoustic Research Turntable**

Samples of this that we examined had an oversized platter spindle. Many discs were difficult to get onto the platter and to remove, and attempts to push the discs onto the platter caused it to rub on the motor board, eroding the paint from it. In addition, the tone arm appears to require from many cartridges a higher tracking force than will yield clean sound from them in some other arms.

**Empire 880P Cartridge**

Too compliant for use in a record changer, not as smooth a high end as the Weathers LDM, and some sensitivity to induced hum.

**Magnecord 728 Recorder**

We haven't tested one of these, and neither have we heard any reports about it from owners.

**Ampex 960, 1260 Recorders**

Most of these that we have encountered ran sufficiently off-speed to cause a noticeable shift in the pitch and tempo of prerecorded tapes, and the single VU meter, with a throw-over switch, was felt to be inadequate for maintaining accurate channel balance while recording.

**Fisher 400CX Preamp**

Rather harsh, slightly obscured

| Turntables | (A) Thorens TD-124 | (B, C) Garrard 301 or Gray PK-33 | (D) Garrard Type A |
| Tape Recorders | (A) Ampex 350-2 or Ampex 354 | (B) Ampex 202-2 or Ampex F-44 | (C) Sony CS-300 or DK-300 deck | (D) EICO RP-100 or Viking 86 |
| Cartridges | (A, B) Weathers PS-11 | (C) Weathers LDM | (D) Audio Dynamics ADC-2 |
| Tuners | (A) McIntosh MR65B, Scott 4310 | (B, C) Dynaco FM-1/FM-3 | (D) Pilot 208 |
| Microphones | (A, B) Sony C-37A, Neumann U-67 | (C) B&O 100 | (D) B&O 53 |

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1. 33.3 rpm only.
3. Two-track only.
sound. The Dynaco PAS-2, although less flexible in the control department, was judged to give better sound at a much lower price.

**Acousteck 1 Amplifier**
Not tested as yet.

**Harman-Kardon Citation A Preamp**
Not tested as yet.

**Scott 2990 Amplifier**
Slightly soggy sound. Again, the Dynaco PAS-2 and Stereo 70 give better sound—at the same price in ready-built form, and at a significantly lower price in kit form.

**Karlson S-15 Speaker System**
Very highly colored, unfocused sound, quite wide in range but with shockingly poor transient response.

The following changes are being made in the listing, as of this issue:

**Sony 777 Tape Recorder**
Dropped from the list, until the new, "improved" model is released and tested.

**Ampex F-44 Tape Recorder**
Added to the list, as the best available machine in its price class. A complete report on this new unit is scheduled for the next issue.

**Beyer DT-90 Headphones**
Added to the list, as one of the best headsets in its price class. See the Headphone Survey in this issue.

**Koss PRO-4 Headphones**
A close competitor for the Beyer DT-90 in some respects, this may or may not suit your needs better. See the report in this issue.

**McIntosh 10-FM Tuner**
This was an erroneous listing in the last issue. The listing should have read McIntosh MR-65B, and is shown correctly in this listing, at the left.

**McIntosh C-20 Preamplifier**
Dropped from the list. Superseded by the McIntosh C-11, which has somewhat more lucid sound and a lower price tag.

**E. J. Sharpe HA-10 Headphones**
Dropped to class C. Replaced in class B by Koss PRO-4. See the report in this issue.

**Refreshments, Anyone?**
When was the last time you attended a live concert, to refresh your critical ear?
Or do you have a remarkably good memory?

**Headphones (from page 11)**
A velour curtain. Perspective is quite distant, but without the richness that Superex, for instance, gains from this quality. Actually, these are fairly agreeable-sounding, despite some slightly harsh distortion. Bass response is thin, but definitely there.

**Permoflux DHS Series**
Very professional-looking phones, these are businesslike and sturdily constructed. They are quite comfortable for a half hour or so, but then begin to bother the cheek bones.

Their sound is a shade on the brilliant side, with a rather hard, wiry-sounding high end and the usual thin bottom. Low end response is similar to that of Sharpe HA-10, and although the over-all sound is very lucid and free from distortion, the high-end roughness exaggerates any high-frequency distortion that may be present in the signal.

**Sharpe HA-8**
These are identical in most respects to Sharpe's HA-10 phones, but they have considerably less effective noise rejection. The HA-8's sound is somewhat thinner at the low end than that of the HA-10, and has a subtly hollow quality and a fairly rough-sounding high end.

**Sharpe HA-10**
Although there has been no change in model number, these are a new version of the HA-10 phones, and differ from the original model both in appearance and sound. Like the old ones, these are very handsome, ruggedly constructed, and apparently very durable. The old phones had green ear pads, with the Right and Left phones identified by printing inside each phone. The new ones are a uniform light gray in color, with a red and a blue insert inside the phones to identify Right and Left. The pads are slightly contoured, so right-left orientation affects their comfort and their noise rejection as well as their channel orientation.

They are exceedingly comfortable, even for very long periods, and their noise rejection is almost total. Sound is smooth, rather brilliant, and very thin at the low end. High-frequency response is excellent, as is the reproduction of sonic details. Over-all sound is quite similar to that of the Koss PRO-4, but with a shade more brilliance.

**MANUFACTURER'S COMMENT:** We have introduced an improved Model HA-10 phone, with about 10 dB more low-frequency output at 50 cps and below, and are sending you a set of the new phones for testing.

**REVIEWER'S ADDENDUM:** They did not arrive in time to make this issue, but will be reported on in the next issue.

**Superex STM**
These unique phones are true two-way reproducers, each incorporating a tiny cone 'woofer' and a ceramic tweeter. A small knob on each phone allows the tweeter balance to be adjusted to personal taste, or to correct for certain deficiencies in the associated equipment or sound source. Unfortunately, however, the manufacturer did not see fit to provide any indication of the flat-response setting, so the listener who wishes to use the phones as a sound standard for judging absolute balance is out of luck.

Our efforts to establish the flat response setting were hampered by the fact that the tweeters in our sample were badly mismatched, one being considerably 'hotter' than the other. The best way we found of setting these was by listening to interstation FM hiss with both tweeters turned off, advancing each control in turn until an increase in highs was barely perceptible, and then advancing the knob to 60 degrees past that point.

When so adjusted, these produced rich, full sound with very nearly the bass balance (but not the range) that we have come to associate with good
low-efficiency loudspeaker systems. Middles were slightly depressed, yielding a somewhat distant sound perspective, rather like that of Janszen or AR speakers, but with less upper-end smoothness than either of these speakers. Over-all sound was subtly hollow, although sonic details were quite well reproduced.

Incidentally, the instructions for these phones contain one bit of misinformation. It is pointed out that these phones may bring out excessive hiss in program material, which is quite true, when the tweeters are set too high. The instructions blithely dismiss this noise as a sign of "wear of the records or tape," or as tube noise, adding that the phones are a "completely passive device," which is not altogether true. Boosting is just beyond its normal "flat" level will always exaggerate hiss out of all proportion to its actual intensity, whether the boosting takes place in a pickup, an amplifier, a loudspeaker or headphones. If you're troubled by hiss from these phones, particularly from local FM transmissions (which should be noise-free), chances are the phones are out of adjustment.

**MANUFACTURER'S COMMENT:** We wish to commend you and your staff on an excellent, informative, and very inclusive article concerning the state of the art in headphones.

We can only agree with your description of the ST-M as having richness and perspective, and would like to explain that this is due to the separate low- and high-frequency reproducers incorporated exclusively in Superes hi-fi stereo phones. While it is true that we do not calibrate the tweeter controls, we do run a frequency response curve on an X-Y plotter, match tweeters, and check each phone's overall response.

The maximum tweeter setting produces flat response, and at no point do the tweeters peak the high end over the low-end response of the phone.

**Summing Up**

There are several interesting observations to be drawn from our examination of these headphones. First, and most obvious, is the wide disparity between frequency response claims and actual subjective performance. Not a single headset tested came anywhere near meeting its claims for low-frequency range. No manufacturer quoted a figure higher than 30 cps as the lower limit of his phones. Yet not a single headset tested produced any audible output at a frequency when the input signal had flat response and the level was set for comfortable listening and program material. As for the claims for 20- and 10-cps response, these proved to be so fanciful that we wonder where the manufacturers ever got their figures.

Possibly, some of the headphones tested could meet their low-end specifications if coupled to a probe mike through an airtight seal, and if the definition for low-frequency limit was taken as the lowest frequency at which any output at all could be measured. If this were the case, then it is about time someone established headphone testing standards that bear at least some relation to subjective performance. The IHF has managed to do this for amplifiers, tuners and loudspeakers. Why not for headphones?

Actually, the over-all balance of all the bass-thin phones could be improved by turning up the amplifier's bass controls, but only two of these headsets - the Beyer DT-90 and the Jensen HS-1 - could be brought up to what was judged correct balance without incurring severe boombiness or bass overload at fairly high listening levels. Even with the bass boost, though, neither these nor any of the other phones produced any usable output below 30 cps, and most were down and out by 50 cps. The effect of bass boost on a given headset's over-all response may be judged, roughly, by comparing its subjective response curve with the bass boost curves provided by any given amplifier. Remember, though, that most phones will overload at moderate listening levels if fed more than about 10 db of bass boost at 50 cps. A phone's power-handling specification will give some indication of how much bass boost it will take.

Second point: While there are certainly some benefits to be gained from headphone listening, it is by no means true that all headphones provide better listening than loudspeakers. Some are smoother than loudspeakers, and have lower distortion. But nearly all of them have at least as much coloration as a good loudspeaker system, and all of them provide an artificial, albeit impressive, stereo illusion when used with commercial stereo recordings. Jensen's "Space Perspective" device (which we'll discuss in the next issue), is a step in the right direction, but not a completely satisfactory one. Perhaps more basic research is needed before we will come up with a gadget that will permit headphones to recreate an accurate illusion of live listening.

In the next issue, we'll discuss some of the available accessories for headphones.

**Hoodlum? (from page 5)**

avoid publicly antagonizing either the composer, the performer, the broadcaster or the record manufacturer.

It's reasonable to assume that, unless competition from a non-profit tape exchange were to become so severe that it was deemed a serious economic threat to the commercial interests involved, their protestations would be verbal, not legal. Fighting a case in the courts is an expensive game, particularly when the plaintiffs are not at all confident of victory.

As I see it, a home recordist can, legally, record virtually anything he chooses. And he can do practically anything he wants with the tape except make a profit at another's expense.

Like many unexplored legal territories, opinions here are rampant. It's impossible to say how a case dealing with non-profit use of home-recorded music would be decided by a court, and one court may disagree with another. The final arbiter is the U.S. Supreme Court. Just because there's no "law" against it, don't think you can lug your battery-powered transistor recorder into the park next time there's a concert and make a tape. On the other hand, don't leave it home because you think it's "against the law." There isn't any law — yet.

The Copyright Act of 1909 is long overdue for revision, to take into account all the new technological ways of duplicating creative works. Several years ago, Congress voted funds for a survey of copyright matters. A careful analysis of the studies, plus talks with legislative leaders, Copyright officials and others in government and industry, leads the author to the conclusion that revision of the 1909 Act, when it comes (perhaps within the next few years) will probably favor the home recordist more than the businessman.

The new law undoubtedly will, however, make things a lot tougher for the genuine infringer. Still lines almost certainly will be levied against out-and-out record pirates.

But in the meantime, those of us who record for fun can rest assured that, so long as we don't try to make our hobby pay off financially, we can legally record virtually anything within reach of a mike cable or a pair of alligator clips.

If anybody tries to threaten you, tell him to sue you. He just might.
Tape (from page 6)

the predetermined flattest-response position, the sound was generally pleasant, with full but slightly soggy low-end response and a nice sheen at the high end, but it had a rather veiled, hazy quality that tended to obscure sonic details. As a matter of fact, tapes that were made on the Revere, from clean input material, sounded better than the prerecorded tapes sold for use on it. Its own tapes had much the same over-all balance, but the sound was more transparent.

We did find that the Revere was quite critical of recording level. The overload indicator is just that. One flicker of the overload half of the neon bulbs, and the signal records with audible distortion. Even at recording levels which do not fire the overload bulbs, some marginal mudliness was evident during heavy bass passages, and high frequency transients caused trouble, too. Triangles came through sounding like breaking glass instead of ringing metal, even at levels far below the maximum permissible recording level, and vocal sibilants occasionally tipped “holes” in the rest of the sound. Tape hiss was quite low, but hum was clearly audible at full listening levels.

One distinct disadvantage of this, and of any cartridge tape system, is the fact that the tapes cannot be edited. This would not be too much of a drawback were it possible to do some sort of erase-editing on the recorder itself, but each time the Revere was started in the record mode, it left a loud pop on the tape.

Tests with a (borrowed) flutter meter indicated an over-all RMS flutter of around 0.2%, which is within specifications, but is nonetheless quite perceptible on certain kinds of program material. (An Ampex 601 read 0.1% on the same test, and its flutter is barely audible.)

In truth, it must be said that the Revere’s sound is much better than that of the average pickup playing the average stereo disc. But then its price is hardly competitive with the average phonograph, and commercial stereo discs, for all of their tipped-up high end, are still considerably clearer-sounding than the prerecorded tapes that are currently available for this unit.

It cannot really be classed as the long-playing record, as a reversion in home music reproduction, because its fidelity is no higher than that of existing machines, and it does not provide any more continuous playing time than other tape media. Each of Revere’s cartridges can run for 45 minutes continuously, but then so can a 71/2 ips tape machine using extra-play tape. At 34 1/2 ips and with double-play tape, a conventional machine can rack up over twice as much continuous playing time as the Revere, and will record for the same time in the opposite direction on the same reel.

So there it is. A truly remarkable performer, for what it is, but clearly no match for a top-notch 4-track 71/2 ips machine. There is no doubt that this does represent a significant advancement in home music reproduction, but the advance is in convenience, not in sound. Just as many people are willing to accept the convenience of a record changer in exchange for some loss of it, there are many who will gladly swap 15 hours of music for a few less of fidelity. Its present price of $390 is likely to put it out of the reach of most casual home music listeners, but restaurants and professional people with waiting rooms will probably latch on to this with some enthusiasm.

*S Reverse has announced three new models, all of which are less expensive than this one.
Errata Encore

Again we goofed!

The formula for parallel connection of loudspeakers of different impedances (Page 4, May-June '63) was correct for two speakers, but would not apply when there are more than two speakers in the circuit.

The correct formula for three or more paralleled impedances of different values is:

\[ Z_i = \frac{1}{\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3} + \text{etc.}} \]

where \( Z_i \) equals the total impedance, and \( Z_1, Z_2, Z_3 \) etc. are the impedances of the individual speakers.

Our thanks to the several readers who brought this to our attention. We missed it completely.

Disc Deferral

The article "How Hi-Fi Are Stereo Discs?" originally scheduled for this issue, got bumped out by the "Headphone Survey," which ran quite a bit longer than we anticipated. We had the choice of curtailing the headphone piece or postponing the disc article, and chose the latter, simply because we figured that, if we were going to do the headphone piece at all, we might as well do it right.

Progress (?) Report

We promised to keep you informed as to the status of this worthy venture, so we present herewith a progress report, of sorts.

To be blunt about it, business is lousy. We are managing to keep our head(s) above water, financially, but barely.

If you have already subscribed, we thank you. You've already done your bit, although you could help some more, if you wished, by brow-beating some of your friends into sending in their $8 checks. But if you're reading this thing free, having borrowed it from a friend, you are doing a disservice to us and, ultimately, to yourself.

We are trying to make a go of this magazine without advertising because we want to maintain the consumer's point of view. But if the people we are trying to represent won't help us, we are going to have to sell out to Madison Avenue, and you know what that means.

If this sounds like a switch on our first editorial, it is. We thought all our readers would get the point: i.e., that without their support, this can't be their magazine. Evidently we were wrong. A hint isn't always enough. So we'll spell it out. The more unsolicited subscriptions we get, the better our future will look, and the longer we will be able to maintain the kind of no-advertiser independence that allows us to call the shots as we see them. If each of our readers could bring in but one new subscription, it would help immeasurably. Any additional converts would help even more.

Enough said?

One Down

Our printer informs us that the stock of STEREOHIFI Number 3 has been exhausted. So please do not ask for that back issue, because we can't supply it.

Pickup Tests

We were interested to note the very thorough survey of some available stereo pickups, in the June and July issues of HiFi/Stereo Review. We raised our editorial eyebrows, though, at some of the conclusions that were drawn from the report, and at some things that we considered to be rather important omissions.

In the section entitled "How to Interpret the Curves," it was stated that "Deviations from flat response, unless they exceed 3 db, are not usually detectable when music material is being played." Our own observations do not agree. To begin with, two adjacent deviations of 3 db from flat response, one above and the other below the zero-db line, will be heard as a 6 db total deviation. This represents a doubling or halving of output, which is perceptibly audible. It has been our experience that a total deviation of 1 db—which can range from + to -1/2 db—is enough to cause a perceptible coloration of sound when listening to musical material. We would be inclined to judge HiFi/Stereo Review's published curves on this basis.

Second, we are very skeptical about the validity of distortion tests on pickups, as related to audible distortion. The fact that some pickups which measured well in the distortion tests are ones that, to us, sound quite bad, tends to confirm this.

Finally, we feel that some additional observations are in order with regard to the published frequency response curves. None of the pickups tested showed any tendency toward low-frequency rolloff. The bass curves (with but one exception, which deviated all over the place) all varied from flat to slightly rising. The pickups, on the other hand, reproduce musical discs with bass response that varies from slightly deficient to just about flat. Question: Are the musical recordings bass-thin, or does the CBS STR-101 test record have a slightly rising low-frequency characteristic? We would be inclined to trust CBS's test record. But, on the other hand, what good is a test record that does not reflect the performance obtained from musical discs?

One significant point that was not brought out in the report was the behavior of different pickups at their high-frequency limit. Most of them cut off quite sharply above the frequency of their stylus/vinyl resonance, usually about 12,000 cps. The result was a small peak that looked for all the world like the peak of a tuned circuit, which in effect it was. Four pickups did not have this sharp peak-and-cutoff characteristic within the audible range: Sonotone's Velocitone Mark III, The Dynaco Stereodyne II, the Weathers LDM, and the Ortofon SPU. Is it so strange, then, that these should happen to be the sweetest-sounding of all the cartridges tested?

Cubes and Candelabra

Subscriber Edwin Schwarz (Cranson, R. I.) wrote to us straight on two things that were mentioned in the "On Tape" department in the last issue.

First, he informed us, the designation "candelabra" is not the proper term to describe the screw base on a standard light bulb. A light bulb normally has what is called a "medium screw base." "Candelabra" designates a screw base of a smaller size than is normally used in the home.

Second, Mr. Schwarz pointed out that the objection we raised to rubber cube taps was not common to all such cube taps. He enclosed some catalogue sheets showing two GE taps, one of vinyl, the other of an unspecified plastic, which use so-called double-wiper contacts and, hence, do not lose contact when all three outlets are in use. Catalogue numbers are GE-1739-1 and GE-1735-1.
Frequency Spectra

This chart shows the frequency range spanned by various musical instruments and some natural sounds, as compared with the range of human hearing (top) and the fundamental range of a standard 88-key piano (bottom).

The solid part of each line indicates the range of fundamental frequencies commonly spanned by the sound; the dotted line indicates the distribution of overtones (musical partials) and noise components which normally accompany the sound. A reproducing system must be capable of flat response out to the upper limit of an instrument's overtone range in order to reproduce its sound without perceptible change in quality.

Note that the upper limit of human hearing is shown as 15,000 cps. This is a conservative figure for young children, some of whom respond as high as 30,000 cps, but male adults over age 40 may have considerably less high-end range than 15,000 cps. There is some evidence, however, to suggest that a listener whose hearing is restricted to, say, 8,000 cps is nonetheless capable of detecting the difference between 10,000- and 20,000-cps reproduced range, possibly because the ear's response to transients does not atrophy as readily as does its response to continuous tones or repetitive impulses.