AUDIO

APRIL, 1961
50¢

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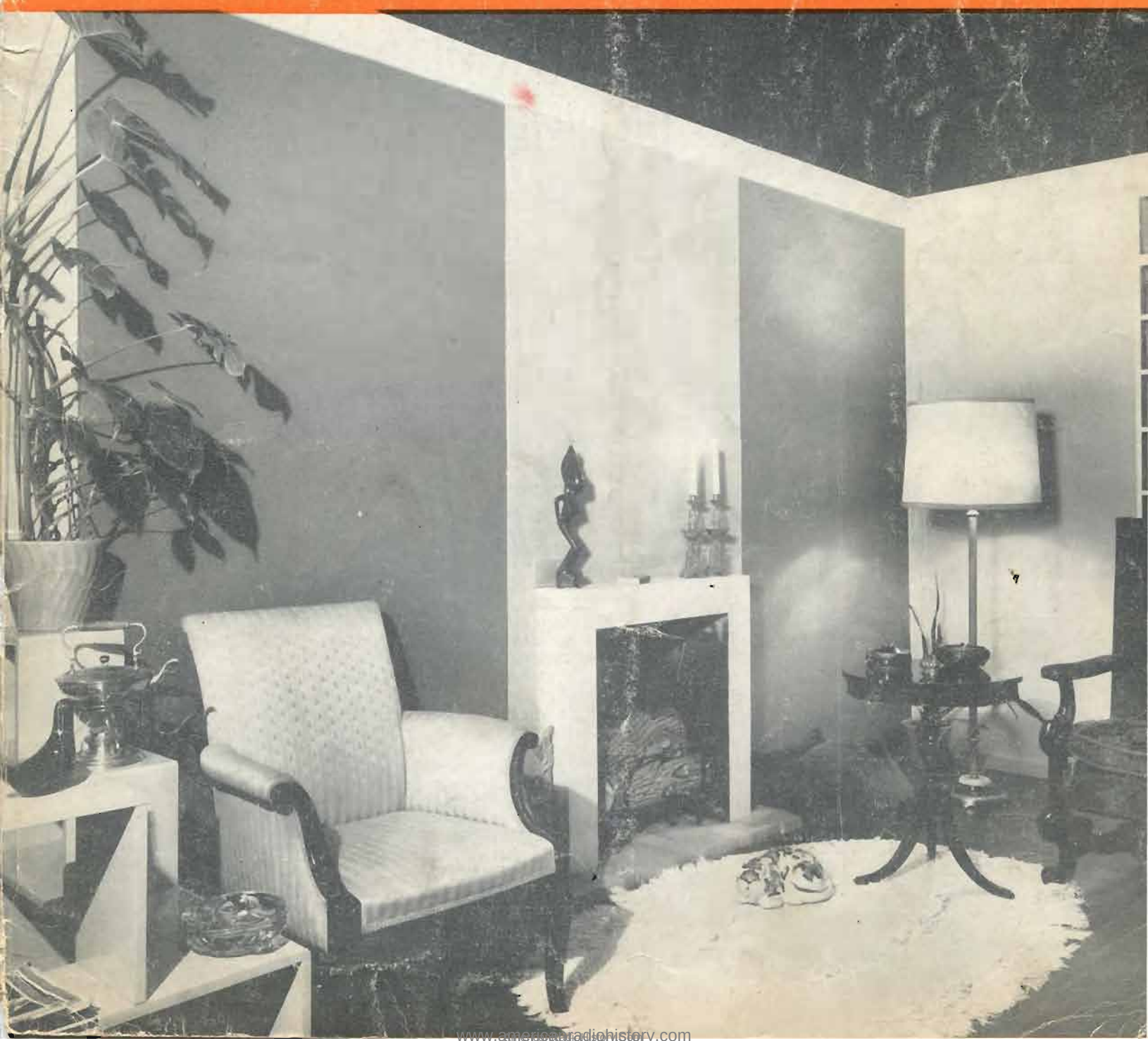

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AUDIOclinic

JOSEPH GIOVANELLI*

White Noise

Q. What is "white noise"? How is it produced? Is there any similarity between "white noise" and the hissing sound of an FM tuner set at a point between stations? Donald F. Sampson, Central City, Nebraska

A. The term "white noise" derives from the fact that this noise contains all the elements of the total audio spectrum plus others above and below it. This situation is analogous to white light which contains all the wavelengths of visible light, plus others.

Actually, the frequencies contained in "white noise" would, when plotted, appear as the familiar bell shaped, normal distribution curve. Because the audio spectrum represents only a small portion of the total frequency composition of "white" noise, however, the frequency response over the audio range can be considered to be flat.

The interstation hiss you hear on your FM receiver is indeed "white noise." However, the "white noise" from an FM set is actually attenuated at the high end because of the de-emphasis network in the receiver.

"White noise" is useful in audio analysis. A tape recording containing "white noise" can be used in aligning tape heads. Because the ear is sensitive to changes in the character of this sound, tape playback heads can be aligned by listening for maximum high-frequency components of the material.

Since "white noise" contains all the frequencies of the audio spectrum, it can be used as a rough check of the over-all frequency response of a home music system or the frequency response of any part of it.

The Tone Burst Test

Q. What is the "tone burst" test used for loudspeaker performance tests? How does one go about making such measurements? Do you need anything special as far as the oscilloscope is concerned? How do you get the tone bursts? Are any special instrument needed? C. K., Rochester, New York

A. You want to know something about the subject of tone bursts as related to loudspeaker evaluation. First of all, let us examine the need for such a test. In high-fidelity equipment we get the best possible transient response. This is not only true for amplifiers, but for transducers as well. Good transient response allows the equipment to reproduce the starts and stops of the program material with a high degree of accuracy. It is something like a man rowing a boat. If he digs his oars in deeply and pulls, he wants the boat to start forward the instant he begins pulling back on the oars. Conversely, he wants the boat to stop as soon as he backs water, or pushes the oars in the opposite direction to that normally used for propulsion. Precisely this effect is needed in amplifiers, phonograph cartridges, and, more especially as concerns this letter, loudspeakers. When equipment can operate with this ideal transient response, the sound as heard by the listener will have an incisive character which leads to better definition, or a better sound picture, of the original live performance. You can see why this would be so. A drum beat is characterized electronically by a steep wavefront—a sudden and large amplitude beginning of the sound. If our equipment cannot reproduce this complicated and sudden beginning, much of the original character of the drum will be lost. The sound can be described as "mushy." It is thought by some that good transient response improves the listener's ability to detect the direction and distance of a sound source from the listener. If this idea has validity it is obvious that good transient response means better stereophonic sound reproduction, in addition to its other benefits.

I have mentioned all of this to you as a background for discussing how we measure the transient response of loudspeakers. What we need to do is to determine whether a speaker cone starts to move the very instant the signal appears across the voice coil winding. Of even more importance, we want to know whether the speaker cone stops moving when the signal is removed. This latter task is the harder one for the loudspeaker.

It would certainly be convenient if we could count the number of pulses transmitted to the speaker and count the number the speaker actually makes in response to this signal. The speed with which the signal changes makes it impossible to do this with unaided eyes and ears. Other means must be employed. An oscilloscope, an audio oscillator, a microphone, perhaps a preamplifier, and a tone interrupter are the devices to be used.

A good scope is needed since it must not introduce distortion of its own. Because the signal ultimately seen on the 'scope face

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is picked up by a microphone, the signal from the output of the microphone must be amplified and fed to the plates of the scope. Therefore, it is best to have a 'scope which has most of the required amplification built into it. Such 'scope amplifiers usually do possess the necessary good transient response and are very low in other forms of distortion as well. In the event that the scope has insufficient gain, a preamplifier with excellent transient response must be used ahead of the 'scope amplifier. There are special instrumentation preamplifiers which are made for this purpose.

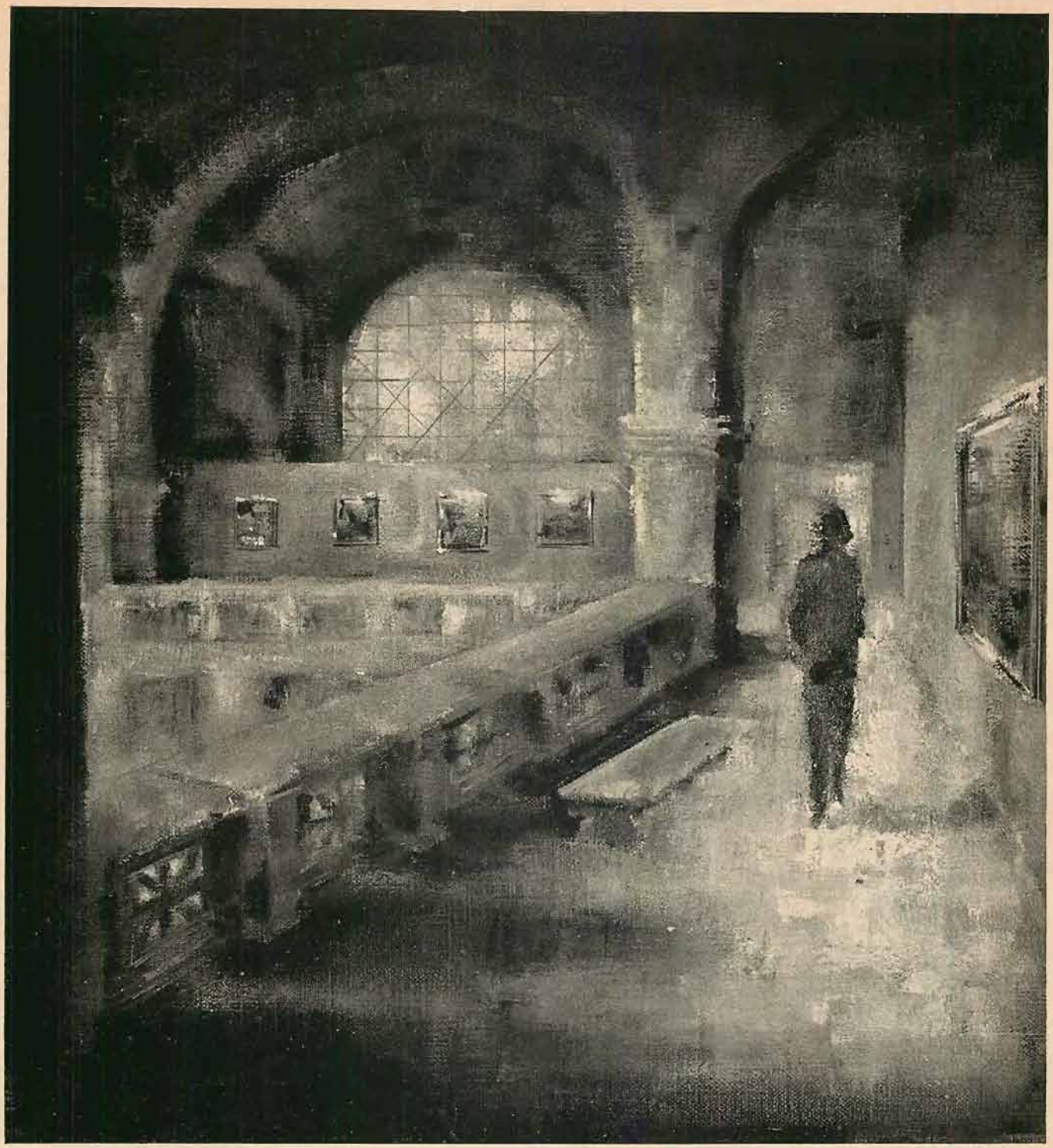
There are other requirements as well. To understand them better, let us see how to set up a test to measure the transient response of a loudspeaker. The test we will describe is known as the tone-burst test. Here is how the test is made.

First, the audio oscillator is fed into a power amplifier whose output terminates at the speaker under test. An interrupter turns the oscillator on and off rapidly, allowing eight sine waves to be transmitted before the next interruption. Then the signal is turned off for the duration of what would be the eight sine waves, and so on. The microphone picks up these alternating on-off signals and transmits them to the 'scope. The 'scope can be switched between the output of the microphone and the output of the amplifier or oscillator. It can, therefore, show the difference between the sine waves sent to the speaker and those produced by the speakers. If a good speaker is being tested, the two pictures will look much the same. If the speaker is not too good, the picture of the signal from the amplifier will be clean and sharp, but the picture of the signal from the speaker will be different from the one actually transmitted to it. It will contain additional sine waves whose amplitude will be less than the original. Each additional wave will have a lower amplitude than its predecessor.

It sounds quite simple but there are complications which cannot be met easily. The design of the interrupter presents perhaps the most formidable difficulties of the entire test setup. It is not easy to make an interrupter which will not introduce appreciable distortion of its own. We need an interrupter which can vary its rate of interruption in accordance with the frequency produced by the audio oscillator. If we can find an amplifier which would perform satisfactorily, we can interrupt the input circuit by means of an electronic switch.

In the event that such an amplifier is not available, the signal must be interrupted at the output of the amplifier instead. The current involved when switching signals feeding directly into loudspeakers are too much for the average electronic switching circuit to handle. Switching transistors capable of switching large amounts of current could be substituted for ordinary tube circuitry. The transistor chosen must be a switching rate of at least 3000 cps and must be capable of handling frequencies of at least 20,000 cps. If you do not want to use an electronic switch, you can use a commutator attached to a variable speed motor. The speed can be set in accordance with the frequency you are using as a test frequency. The com-

(*Continued on page 73*)



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CHESTER SANTON*

The symbol ✪ indicates the United Stereo Tapes 4-track 7½ ips tape number.

Ray Conniff Singers: Young At Heart
Columbia ✪ GCB 96 (2-Track)

How long has it been since you have heard a two-track stereo tape a month or so after its release? For that matter, when did you last read a review of a two-track release or encounter one in conversation? I daresay there are tape dealers in some parts of the country who would look puzzled were you to walk up to their counters of four-track stereo reels and ask for a two-track job. Some of these fellows came into the tape field only after four-track became the choice of the industry.

Yet, at moment of writing, Columbia Records is still releasing two-track reels for tape fans who either haven't converted to four track or, having a choice of playback on their machines, are willing to pay the price for the results they get with two channels taking up the width of the tape. Since the higher cost of two-track will always be a factor limiting its circulation, Columbia is trying to meet the problem, in pop releases, by offering fewer selections on the two-track version of a given recording. In this way, they are able to keep the price on a level with the four-track reels. This approach is no help in lengthy classical selections. A portion of a symphony or a concerto would hardly find a market no matter how terrific the sound of the tape. In the case of original-cast show albums, Columbia makes it a point to offer the entire recording in both formats at considerable difference in price. This particular Conniff album happens to have nine selections. At the same price of $6.95, the four-track version (CQ 340) carries three additional tunes. In order to facilitate the listener's choice, the Columbia tape catalog lists the contents of two and four-track reels side by side.

Coming down to the tape under discussion, Ray Conniff's "Young At Heart" does not measure up to the audio quality one expects in two-track today. Reverb is excessive even when judged by today's lenient standards. It's true that the stereo disc version of this same recording reveals some tubbiness. Yet my array of woofers had less difficulty with the disc since the relatively high modulation on pop records demands specific attenuation of the low bass. The same recording heard on a two-track tape is quite another story. It would seem that a reverberation technique you can get away with on stereo disc and four-track tape can prove bothersome when exposed to the response of two-track tape. I tried to reduce the tubbiness in this particular reel through rolloff of bass. The sound cleared up to some extent but then I found myself with no bass foundation in the male segment of the chorus. So long as four-track continues to outsell the two, I'm afraid recording techniques, in popular music at least, will continue to be aimed at the larger market.

In terms of musical entertainment, this tape sets forth the predictable pleasures of one of the best-selling choruses in the business. The arrangements, possibly to justify the title of the album, feature considerable work on the high side of the scale. The sure-fire standards includes favorites such as *Foolish Things, Dancing with Tears in My Eyes,* and *It's Dark on Observatory Hill.* Summing up, it seems to me that it's too early to dismiss two-track stereo tape as medium for the guy with playback facilities good enough to justify the added cost. Yet it is also reasonable to assume that Columbia itself would admit that a better case can be made for two-track than the one presetned in GCB 96.

Sampler Series (Popular)
UST ✪ RK 401

Sampler Series (Sounds)
UST ✪ RQ 404

Samplers based on the output of individual labels have been around for a long time. United Stereo Tapes, with its very handy access to the releases of more than thirty record labels, is now in a position to present sampler tapes that represent almost the entire industry. The four reels in the first release cover the areas of classical music, jazz, pops and sounds. At a special price of $3.95, these UST samplers are a whopping value. The pops sampler has about twenty eight minutes of music. The ten selections cover the high points of seven different labels. Side 1 of the reel consists of instrumentals that are adaptable for dancing or casual listening. The other side contains vocals with instrumental accompaniment. RQ 404, although listed as "Sounds" should not be confused with the familiar sound effects that were featured in the first stereo sampler tapes. Instead, if you can imagine the nerve assaulting possibilities of such a procedure, UST has gathered together the most forthright episodes in ten albums given over to percussion or unusual adaptations of instruments.

The sound quality is top notch. I compared several samples on these reels with the regular releases and the response was the same. If continued on a regular basis, this series promises to lick most of the problem of the tape stock that is kept in a sealed condition by the dealer until actual moment of purchase.

Do Re Mi (Original Cast)
RCA Victor LSOD 2002

The built-in brashness of "Do Re Mi" is reminiscent of one of the great musicals about the wiseacres of Broadway—"Guys and Dolls." Unfortunately, the thread of comparison linking the two shows is not substantial enough to fully entertain an audience in 1961. When plans for this production were first made public, the choice of Phil Silvers and Nancy Walker for the starring roles was a good sign that producer David Merrick had a fast and funny show in the works. Jule Styne, who wrote the score for an earlier Silvers show "High Button Shoes," as well as Judy Holliday's "Bells Are Ringing" and the Ethel Merman hit "Gypsy," was hired to take care of the music for "Do Re Mi." The lyrics, an important assignment in a show dealing with the zanier characters in the recording and jukebox business, were assigned to the well-known team of Betty Comden and Adolph Green. Yet somehow, listening to this record, I am not deeply moved.

Nancy Walker and Phil Silvers are inspired clowns on stage but their songs in this show do little more than keep the plot in motion. About half of the score is given over to comedy songs written for the stars. The rest is romantic interest of everyday intensity supplied by Nancy Dussault and John Reardon. The brightest patter occurs in *What's New At The Zoo* sung by Miss Dussault and the chorus. Phil Silvers has his best moments in *The Late, Late Show* and *It's Legitimate* as, in the latter, he tries to sell a scheme to become "Number One Man" in the jukebox industry to a trio of former slot machine cronies. Perhaps the major surprise in the album is the present-day Silvers singing voice. Lehman Engel directs the orchestra and cast with his customary eclat but the show never really comes to life in the living room.

On The Town (Members of Original Cast)
Columbia OS 2028

Faced with the seasonal rolloff in the number of new musicals opening on Broadway, Columbia has hit upon an interesting solution to the theatre's springtime doldrums. They've reunited, on records, the stars of the 1944 theatrical milestone—Leonard Bernstein's first musical, "On The Town". The featured performers—Nancy Walker, Betty Comden, and Adolph Green—were youngsters in the theatre when they hit the big time in this jaunty story of three sailors on twenty-four hour leave in New York City. The reunion, presided over by Leonard Bernstein on the conductor's stand, was obviously a gratifying occasion for all hands and especially so for Comden and Green because their lyrics for this show constituted their maiden effort on Broadway. The vitality of the war years of the Forties is the main tonic in the extended dance sequences which foreshadowed the impact of the Bernstein score for "West Side Story."

Percussive Pineapples
Medallion ML 7516

Some listeners who don't care for ping-pong effects in their stereo have found welcome relief from nagging neck pains caused by twisting of the head from speaker to speaker. These individuals now buy the mono versions of recordings which, in stereo, flip the sound of a given instrument from one side of the listening room to the other through electronic selection of channels. A mono release of such a recording has seemed a silly idea in the past but now I'm beginning to have second thoughts on the subject. Perhaps there is some point in issuing a gimmick record without the gimmick. It's certainly the easiest way to get away from abnormal directionality and still retain the ultra bright, ultra crisp sound this type of record is apt to feature. Medallion really comes through on technical grounds in this Hawaiian-flavored release. The percussion arrangements, of course, are not aimed at the purist. Chimes and organ in the *Hawaiian Wedding Song* may be condoned by some listeners but the bass clarinet and saxophone heard in the course of *My Little Grass Shack* hardly blend with ukeleles and guitars. Recommended only to the very casual novelty seeker.

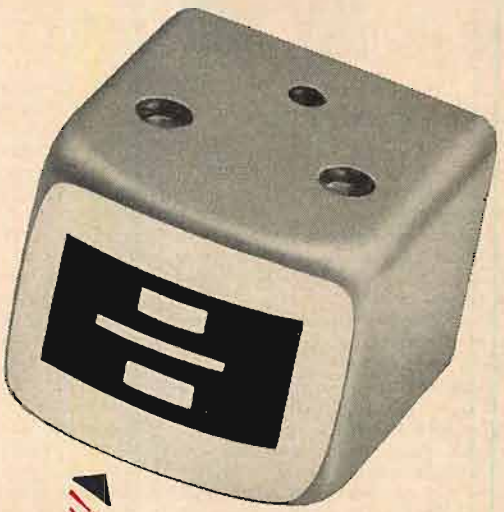
Mantovani: Operetta Memories
London ✪ LPM 70041

Here at last is a Mantovani program that can be played without apology while entertaining friends of any stripe. Of the fifteen albums by the maestro currently available on tape, I would choose this particular reel as one slated for wide acceptance. Listeners who have been only lukewarm about some of the more flamboyant Mantovani arrangements in the past will be relieved to learn that the more glaring mannerisms have been dropped. The fans who happen to own all twenty-nine Mantovani disc albums will still recognize their hero's work in these Viennese melodies.

Considerable license has been taken in these instrumental arrangements of songs from operettas by Lehar, Strauss, and Kalman. Some of the headings in the album should not be taken too literally because part of this production is a montage of themes that have been grouped under the title of waltzes.

(*Continued on page 77*)

* *12 Forest Ave., Hastings-on-Hudson, N. Y.*



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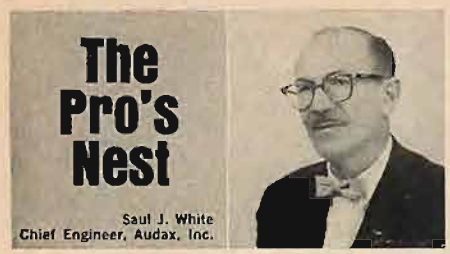

NO. 2: THE NEW SUPERSTITIONS

The high fidelity art has its source in the basic laws of nature. It is the application of physics to entertainment and esthetics. These laws do not change like women's fashions.

In science there are certain facts which a cultivated person will not tamper with, and these concern physical cause and effect and the assorted phenomena of natural laws.

Because hi fi has attracted thousands of lay enthusiasts eager for learning, it is necessary that writers, engineers, and all those professionals and amateurs who form the knowledgeable audio community, should know their facts and stop guessing and theorizing without foundation.

There is an appalling superstition springing up based on many fallacious assumptions, spread by hearsay, aided and abetted by manufacturers, sales people, entrepreneurs, and "Johnny-come-latelys." Sometimes the neophyte's understanding is twisted by innocent ignorance, and by self-created illustion. Egotism and love of one's own audio system may fire the imagination to immodestly create a personal new physical law! Every living room a private laboratory!

The "Pro's Nest" will no doubt clash with the Sales Department, but as stated in last month's column, I will let the chips fall where they may. In this column of personal journalism, I will attempt to explode foolish fads and fantasies.

Such fantasy or fanaticism may gather surprising momentum, especially if there is some commercial enterprise associated with it. For instance, I once overheard a salesman in a demonstration room remark to a customer that a certain brand tweeter had a "metallic" sound which he explained as being due to an aluminum diaphragm. Aside from the vagueness of the term "metallic" as applied to sound, both metallic and non-metallic diaphragms are capable of the highest attainment in the reproducer art today. The salesman in this instance was giving vent to his imagination.

One of our better known musicologists who does not hesitate to render intemperate technical judgements, described a certain brand of loudspeaker enclosure as a Helmholtz resonator, later on a *slot*, and then a *point source*. This is arrogant abuse of terms having a specified and classical meaning to workers in the acoustic field.

Or take the myth that an inductance for a speaker crossover network must contain no iron. The truth is, an iron-core coil of *proper* design is as satisfactory as an air-core, with advantages in size and economy.

Perhaps the prize case of mental disorder concerning speaker performance was the insistence by a sales manager to his engineering department that unless the aluminum center dome, or dust cap, was painted *black*, he could not sell the speaker as a woofer.

There are mad efforts to reduce the size of loudspeaker enclosures. Usually these are accompanied with claims of phenomenal bass output, associated with pseudo-technical terms and much mumbo-jumbo. But the day has come when it must be emphasized that few small enclosures can compare with their big brothers in the first useful octave of hearing, i.e., 30 to 60 cycles.

Demonstrations of turntables and arms operating at ridiculous angles, even upside down, is a mere advertising stunt to titillate the gullible. Where is the idiot who mounts his turntable inverted against the ceiling?

LETTERS

Re "The Best Loudspeaker"

SIR:

Your February, 1961, editorial, "The Best Loudspeaker" should prove a money and effort saver to many people—yes, even to those who should know better.

The point you bring out about a "peak in the response of a violin," will be news and an eye-opener to many of your readers, I am sure.

The editorial takes me back to the acoustic days when one of the then "Big 3," The Sonora Company (the original one) placed a full-page ad in a leading New York newspaper. In the upper right corner of the page was a picture of a trumpet. Diagonally opposite was a picture of a Sonora phonograph—acoustic, of course. From the copy in the center of the page an arrow pointed to the trumpet, reading:

> "This is why Sonora tone-arms are made of solid brass—for proper resonance . . ."

A week later, in the same newspaper, the Victor Talking Machine Company ran another full-page ad. Forming a frame around the edges of the page were pictures of the various instruments of the orchestra, as well as pictures of opera singers. This copy read:

> "We take special care that the Victrola does not resonate to favor any musical instrument. The Victrola has to reproduce all the different musical instruments and voices . . ."

That was more than 35 years ago, and to this day there are still those who would make resonating loudspeakers.

MAXIMILIAN WEIL,
500 Fifth Ave.,
New York 36, N. Y.

More on Current Flow

SIR:

Mr. Nissen's letter in the March issue commenting on my article in the December issue (which, in turn, commented on Mr. Pruitt's article in the April, 1960, issue) seems to deserve another comment or two.

First, the Cult of the Conventional Current to which Mr. Nissen refers (with, perhaps, some contempt?) is made up of just about all the college-trained engineers and scientists in the country plus the technicians who work with and for them. In addition, those who need to use the professional literature must be included along with a good many others.

On the other hand, the electron-flow advocates are, in general, hobbyists, radio and TV repairmen and operators, and others who have obtained their education from reading and building equipment and from institutes (both military and civilian) which specialize in technician training.

The first group is responsible for, among other things, the design and development of the electronic and electrical equipment of the future. The second group is primarily concerned with operating, maintaining, servicing, and enjoying the equipment designed in the past.

To put it another way, conventional current is used by what might be called the "theoretical" group, whereas electron flow is used to a large extent by the "practical" group. This is not surprising when one considers the fact that the principal advantage of the electron-flow convention is the ease with which it can be taught to relatively unsophisticated students who will only require limited understanding of the material on "theory" before they move on to the much more interesting problems of equipment operation and maintenance.

The importance of Mr. Nissen's letter, however, is the vivid demonstration it offers of the lack of communication between the "theoretical" and "practical" branches of the electrical and electronic arts. The people who design circuits use the arrows on diodes and transistors as they stand but the people in the field reverse them. Teachers revise their notes every year to keep their college students up to date in solid-state physics, information theory, operational calculus, Boolean algebra, and flow graphs, but they are dismissed as dogmatic by Mr. Nissen. I, too, did exactly the same thing before I went to college, so I can appreciate fully the problem.

This should make clear my motivation in writing an article on current convention in the first place. Many youngsters will acquire a taste for electricity via AUDIO, and some of them will be inspired to go on to engineering school. There they will use conventional current. If they learn to call electron flow by the name of current, they will simply have to unlearn it. This takes time and effort. I know from experience. Thus I repeat what I have said before: anyone who expects to use professional books, journals, or contacts should avoid the electron-flow convention like the plague.

LEO G. GOELLER, JR.,
2 Marsha Terrace,
Parsippany, N. J.

Dereverberator

SIR:

Please, can you tell me where to obtain a device to *remove* reverberation from recorded music? Such a device should be much more useful than the multitude of gadgets which add reverberation to the sound, since many, if not most, stereo records are afflicted with sickenly lush, overripe, blurred, faraway acoustics that bounce the listener from his traditional best-seat-in-the-house vantage point to a seat way out in the foyer of the concert hall. Such an anti-reverberation device would be helpful in salvaging something from an investment in stereo records which, despite rave notices by record critics, are often overly gimmicked, unnecessarily compromised, and carelessly made.

HAL M. DAVISON,
5119 Connecticut Ave. N.W.,
Washington 8, D. C.

(We wish we could! The answer to that one would put its inventor on Easy Street. ED.)

SIR:

Our firm is UST distributor in Venezuela and it was with special interest that we read Mr. Santon's comments in the December issue when reviewing the Mercury STB60103 tape.

Considering the number of records which are released each month and the small quantity of new tapes available, we found your remarks to be very much to the point. And since we have no possibility of testing new tapes before ordering them, we of course rely heavily upon reviews of yours and your colleagues' in order to keep track of the quality of new tape releases.

Maybe even the record companies will realize in time that tape is the sound medium of the future, but it sure is a slow process.

CARLOS HAUCK, Dir. Gen.
Cinefot de Venezuela C. A.
Apartado 4228 Del Este,
Caracas, Venezuela

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WNCN, New York outlet of the Concert Network, uses a FISHER FM-200 for absolutely reliable reception of their Hartford affiliate, for rebroadcast to the New York area. They write us: "The FM-200 is very good in rejecting strong signals which overload many tuners or cause noise."

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AUDIO ETC.

Edward Tatnall Canby

Over and Out

A SOMEWHAT MUSICAL ASIDE, this month, time out from audio to observe that I am unhappy about the trend in the record business these days. I don't mean the records themselves, but the stuff that is on them and the people who are in business to provide it. Never forget that, as this column used to say every two or three months, the business of audio is music. And things are changing very fast these days in the musical end of recording.

(I'm not very happy either about a certain by-product of recorded music—record criticism. That—uh, pardon me—noble art is metamorphosing very rapidly too, and the shift seems to be towards the computer. The computer, you see, collates objective facts. It isn't at all critical. It doesn't have a point of view, nor a personality. But it processes data at an alarming rate of speed.)

The trend in records is, of course, upwards. It always is that. Right now, it's an upward spiral of costs and outlay, an upward expansion in the minimum size of the operations base. And especially, it's an upward jump in the direction of uniformity, conformity, and generally cautious duplication of safe, big-time music. There's a violent upward spurt in failures among smaller record companies, an upward jump of huge proportions in the withdrawals of listed LP items.

Stereo is on the up-and-up, numerically, and it costs so much that only the bigger companies can exploit it, in view of the odd fact that stereo doesn't sell. Mono recordings are moving upwards astronomically in the bargain-basement bins, where they do sell—but the supply is limited, and the limits are going ever higher, as the sales mount.

The trend in recording is towards virtuosity, ever more expensive, plugging performance, not music. It is towards ever-increasing numbers of recordings of the famous "fifty pieces" of standard repertory that Virgil Thomson cited many years ago. In fact, except in point of numbers, we are fast returning to the days before the LP came along. But now, instead of one or two each of the fifty, we have fifty recordings each, and more every month. (If not fifty yet, then fifty in a year or so, at the present rate.)

I suppose all of this is no more than old cry, that someone has yelled every year since the dawn of recorded history. Give us back the good old days! But them days is gone forever.

True enough, those same old pieces, from "1812" to the Schubert Unfinished, have been popping up again and again on records since electronics came in, and there have indeed been steadily mounting technical improvements, to give a good hi fi excuse. This is no fake reason. Just go back and play the hi fi spectaculars of, say, 1956, and see how they rate against today's stereo miracles. (A few will rate very high, but the general run show their age, and especially in the noisy, crackling LP surfaces that we accepted as standard only five years ago.)

It's true, also, that we need many versions of any well known piece of music. I'm the first to say that there is no "best" version, nor ever will be, and I make much out of audible comparisons between versions in my weekly radio program—I'd be lost without them. And it's also true that stereo has given us a legitimate excuse for doing all the same old pieces once again—and again and again—updated into the new medium. I would be the last to scoff at that.

It's true, though the reasoning is narrowly commercial, that every respectable company catalog must be "representative" in order to impress dealers and buyers, whether there's a need or no. What good is any symphonic catalog without a Beethoven Fifth or a "Pictures at an Exhibition"? What good is any artist roster without a fancy fiddler who'll re-play the Lalo "Symphonie Espagnol" periodically, in higher and higher fi? This catalog-itis adds volumes to the repertory expansion, and I suppose it is inevitable.

No—I can't really object to the upward trend in repertory. It's in the cards and always will be as long as there are records. Or tapes.

Pioneers, O Pioneers

But what is really wrong with the record economy now is the disappearance of the small operation, and with it that really inspiring flood of imaginative, economical, wide-ranging recording that went on for the first half dozen or so years of the LP era. The standard repertory will continue to be kept topped-up, as the British would say. But the rest of music on LP will sadly fade away, and a big loss it will be.

I don't think enough of us realize what a splendid thing it was, that brave penetration into a thousand odd nooks and crannies of the silent paper-world of musical manuscripts by the little bands of enterprising LP promoters, who took off with a hundred bucks of capital and maybe a typewriter to launch a Record Company, full fledged. I am more and more reminded, as the early LP period passes into our history, of the pioneers of other ages, who similarly launched out towards adventure and the hope of gain, on a shoe string, in a Conestoga wagon, on foot or by sail, on land or by sea. There is now a universally admired aura of dash and *élan* to our pioneers, and to Columbus and Magellan and Sir Francis Drake of an earlier adventuresome period. They're all heroes, and so are the Forty Niners, the boys who went to Alaska for gold and, for that matter, every frontiersman who lifted an axe or blazed a trail a century ago.

And yet they mostly didn't take off to be heroes, these people, nor were they always as wholesome and delicious as we now assume. Plenty of hard-headed shrewdness was involved, plenty of pig-headedness, too. The "hope of personal gain" was often something rather more crude than those pretty words. Columbus was pig-headed, and wrong; he never did find the Indies where he said they were going to be. Neither did Elaine Music Shop have any prior intention of launching the history of the hi fi LP spectacular with the famous #401, "Ionisation" by Edgard Varèse!—the theme song of the 1951 Audio Fair. (I think it was #401—somebody walked off with my red plastic first edition.)

There were unpleasant things about small-company LP, and stupid things. There were bad, indifferent, mediocre performances, skimpy orchestras. (But Columbus had some pretty skimpy boats to sail with.) There were endless forays into musical aridity—for the ocean of music history is dotted with barren islands, too. There was pettiness and small-time dishonesty. (But then, after all, Magellan didn't even get home alive. And look what happened to the men of the Bounty.)

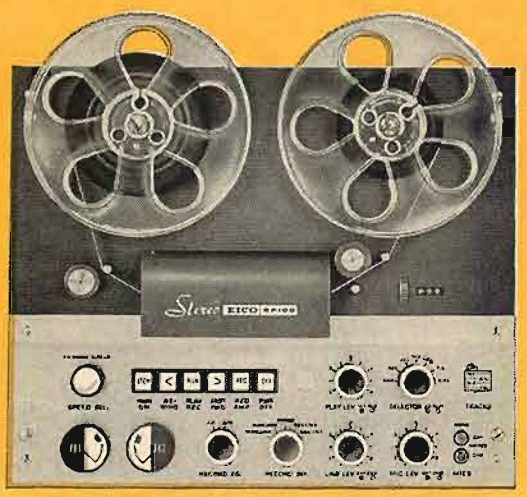
Quick-Buck Operators?

It's all very well to say that most of the little LP people were merely guys out for a quick buck, who didn't make it. Most of them, in a sense, were just that; for every promoter of a business has to have a certain gleam in his shrewdly romantic (or foolishly romantic) eye, if he's going to get started at all. Aren't the odds always against him? I suggest that, actually, the quick-buck operators were few and notorious. Small LP companies were never exactly gold mines in cash, and those that did make visible money of the sort that gets flashed around were suspect right from the beginning. Shady deals, mysteriously obscure tapes from doubtful sources, dirt-cheap European orchestras, working overtime.

No, the bulk of the small companies were founded in the highest of hopes for a real musical service to the listening public. Don't laugh. People do that sort of thing, and are uplifted in the experience. Even if the music they sell is lousy, they don't think so. (Ask *me*—I'm a record reviewer.) They didn't used to like unfavorable reviews, and it wasn't because their sales were inhibited. It was because their pride was hurt. That's a much more poignant sort of dislike.

If our pioneers opened up the West in their own interest, so did the LP makers

dedicated to perfection



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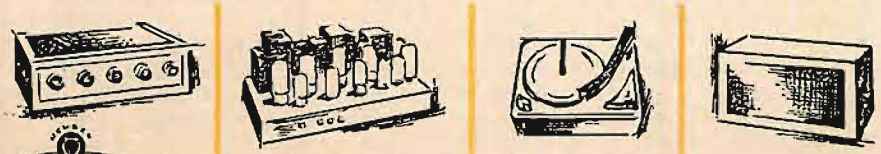

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open up a new musical frontier in a hundred different directions, and the feeling, for awhile, was much the same: the burden of hard work and the satisfaction of a personal accomplishment, small, but perhaps brand new to records and to music in our day. Ask any of them—didn't it feel pretty good, back around 1953 or so, when those first shiny new advance copies came from the pressing plant, ready to ship out to a waiting world? I saw enough of this myself to have a large respect for all of those who indulged in small-company LP exploration in the days when one could still do it and keep a shirt on one's back, more or less.

I guess it was to some extent like the early days of our industry and invention, when big ideas were worked out by big brains in home workshops. The brief history of LP recording has already compressed a hundred years of that sort of thing into its short span, and already we have arrived at the expensive technological stage of high professionalism. Who could be a Ford or an Edison or a Firestone today? Not without General Motors—or Ford—to back you up. At first, "anything went" on LP. Plastic was bad, but nobody knew of any better. Distortion was all over the place, but so was playback distortion and not many listeners bothered to make the distinction. It was the new, exciting, unheard of music that got our imagination, the stuff that nobody would have believed could appear on records, and—after the 78—at such unbelievable length and at such low prices! We reveled in it, as no one who had not been a 78 collector can now very well understand. And there were more new record companies every month, distortion or no.

I played over an early Haydn Society disc just the other day—there was a noble bit of tomfoolery!—and the obviously distorted sound was of a sort that simply would not be tolerated at present, though it was not of the sort that could obscure the sense of the music.

The music was priceless, two early symphonies of Haydn that had scarcely been known for several centuries and yet are among the world's musical masterpieces. Where but on the new LP's would they have then been heard? (Not in public concerts—not even now.) But at the same time, the performance itself on this record was dismally wooden, via a poor conductor and a confused, browbeaten orchestra. Misguided enterprise, poor artistic management, punk playing, and punk engineering, and the record is still worth any ten new ones today. Perhaps there was too much money in the Haydn Society, until it was all spent. The shoestring companies often did a better job with equally valuable material.

There is no substitute for the economical, centralized, small-company operation, as we all know in the hi fi equipment field. It is our stock argument against the so-called mass-produced "hi fi." The same argument holds true—or held true—for the small LP company, with the same advantages, with luck, of knowing and skilled direction, great flexibility, low overhead, adaptability. It all figured—back then.

Boldness

Just look at an early slice of small-outfit catalogue with me for a moment—Esoteric, whole successor is Counterpoint. Be amazed at the boldness and variety of this company's musical offerings, as of 1953 or 1954. I've pulled its cards out of my back file catalogue, in numerical order, which is roughly the order of release. How often today do we get this sort of high-flying, wide-ranging, flamboyant exuberance!

#501: Schoenberg: Serenade, Opus 24, for septet and baritone, with Dmitri Mitropoulos conducting and Warren Galjour—a priceless combination that could cost a big company thousands of bucks right now, if Mitropoulos hadn't died recently, and a piece of music of historical importance and plenty of hi fi interest. (That's how they got the performers; they must have done it mostly for love, and quite rightly.)

#514: Flemish Choral Music. My card doesn't list the performers—a typist who worked for me neglected to type out the name of the pianist in a piano concerto. But this is music of the Renaissance, of a sort that is tremendously dear to my own heart (I conduct the same sort in my own Canby Singers) and of an importance and beauty beyond compare, as well as practically without recordings at this stage in the early history of LP. There's been a good deal since.

#515. Handel: Music for Ancient Instruments and Soprano Voice. This is an antiquated title, going back to the 'teens when old instruments were really "ancient" and rarely heard; but the recording seems to be about the first of literally dozens in this musical area of later date, by many groups. This was the New York Pro Musica, as it is now known, and was surely an unusual venture for a small company.

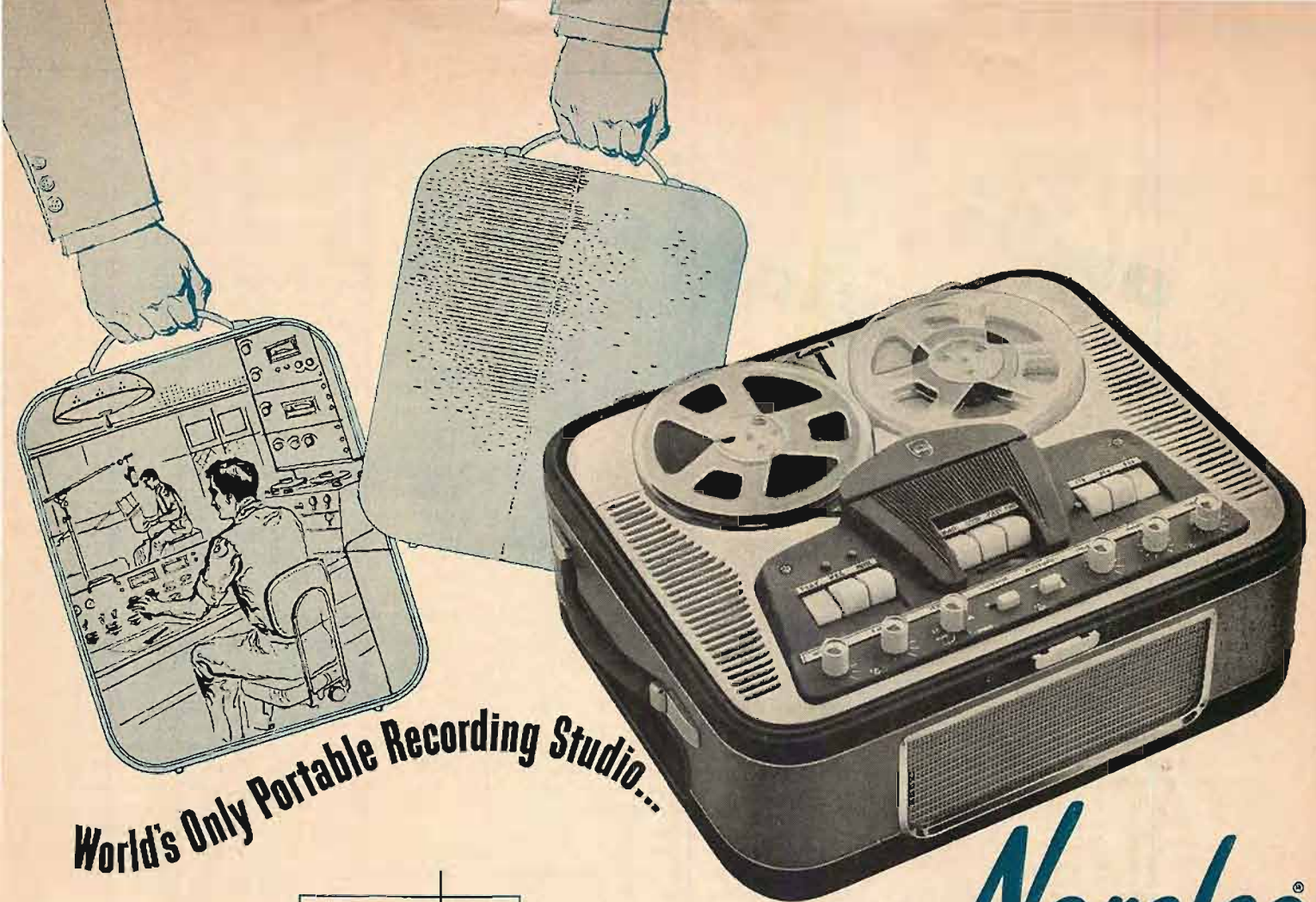
#522–524 Harp Music. Nicanor Zabalata. All over the lot! No sooner seen, or heard, than recorded! I don't remember the harp, but to toss out three complete LP's of harp music in a series is really quite a small-label accomplishment. Reckless, even; but this is how things were done then.

#527 Greek Folk Songs and Dances. Royal Greek Festival Co. Aha! And *now* who puts out the various royal ballets and orchestras and the like? Huge companies. But Esoteric, 'way back, was already in the field with its recorders, ready to catch anything that came along and would consent to record. Enterprising.

#528: Handel: Concerti a quatre; Cello Sonata. Bach: Trio Sonata #1. Harpsichord Quartet. Who started the present rage for Baroque music? Well, the small LP companies, Esoteric included, had a big place in it. Now, everybody's in the act, but this record was still relatively a pioneering effort.

#530: Wolpe: Sonata, Passacaglia, Quartet. . . . Wham! Right back to the ultra-ultra modern. Stefan Wolpe is a Schoenbergian follower of high repute and tough listening qualities. Here was another love-labor, with the redoubtable David Tudor on piano, Frances Magnes on violin, Samuel Baron conducting, even the well known Robert Nagel on trumpet. Amazing how a bit of enterprise could get together

(Continued on page 75)



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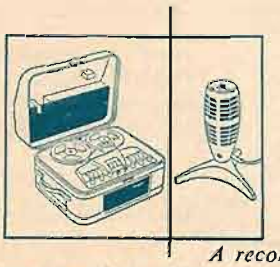

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Louis Armstrong, who uses a pair of 'Continentals' at home and on tour, says: "I've tried lots of tape machines since I got my first one in 1948, but Norelco is the one for me."

John Brownlee, Director of the Manhattan School of Music, calls his Norelco "an extremely versatile teaching tool, as it is capable of outstanding, undistorted reproduction."

Dr. Irene Cypher, Associate Professor of Education at N.Y.U., based her selection of the Norelco upon performance standards of high fidelity, reliability, versatility and simplicity.

Norman Singer, Dean of the Aspen School of Music, says: "A first-rate tape recorder like the rugged Norelco 'Continental' is an essential item for an active music school such as Aspen."

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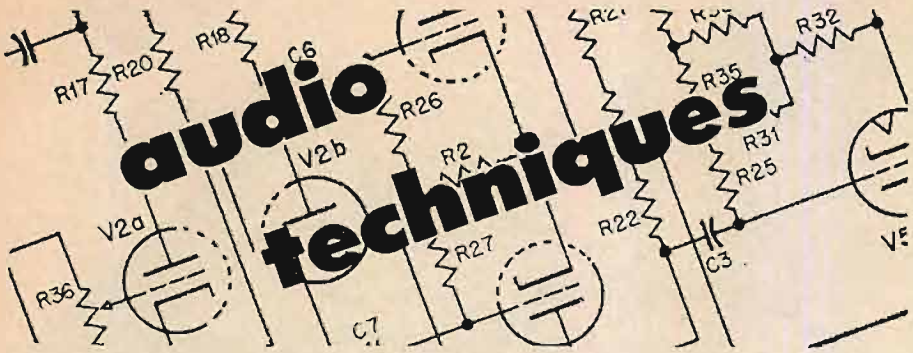

JOSEPH GIOVANELLI*

NOTE. The ideas presented in this column struck me as interesting. They all appear to be workable and practical, but I have not tried them. I know that any ideas others of you may have along these lines, as well as along other lines related to sound reproduction, will be appreciated by the readers of AUDIO.

Hum Suppression Circuits

The circuits shown in (A) and (B) of *Fig.* 1 are almost self-explanatory. The circuitry is arranged to feed hum into either the grid or cathode of an input stage, 180 degrees out of phase with respect to the signal of the undesired hum. *Byron Noe, Fairborn, Ohio.*

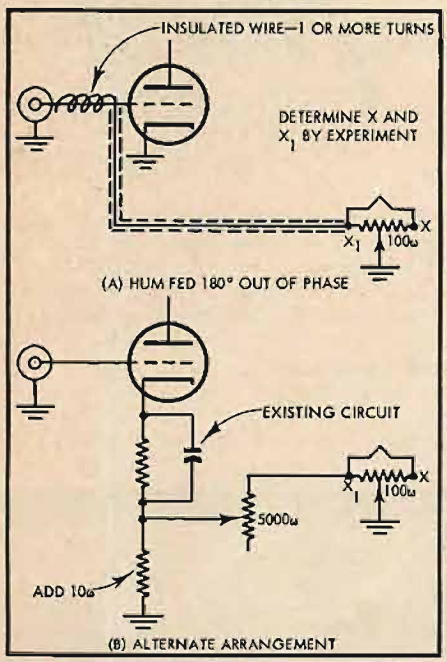

Fig. 1. Hum suppression circuits.

Feedback Cutterhead

One of the difficulties arising from the design of a feedback cutterhead is that of obtaining a good motion-sensing device. Such a device may be made from a Weathers FM pickup system. I would like to point out, however, that I have the early Weathers professional type pickup in mind. I feel that perhaps this method of operation would be more adaptable to cutterheads than the later models which I understand have the tapped grid coil inside the cartridge. The development needed will be that of adapting the cartridge.

The best procedure is to incorporate the Weathers cartridge directly into the cutterhead design. The stylus assembly is attached to the chuck of the cutter assembly by a suitable mechanical linkage. This linkage must be well damped to avoid resonances which will transmit spurious information to the feedback system.

Because the FM oscillator-detector is equalized to compensate for the RIAA characteristic, this arrangement must be modified to obtain flat response. The output of this modified detector can be fed out of phase into the amplifier in a manner determined by the design of the basic recording amplifier. *H. Tillison, Sheffield, England.*

Current Capacity of a Transformer

This is how I determine the current capacity of a power transformer, assuming there is no other way to find it—such as by looking up the information in a catalogue. This method has proved to be satisfactory to me.

Divide output voltage by winding resistance. Multiply this figure by 25 if capacitor input filtering is used. Multiply by 35 if choke input is used. The result will be current capacity in milliamperes. This formula is a good approximation with transformers up to about 200 watts. It may be justified by the following reasoning:

Output voltage is proportional to the number of turns, and hence, to total length of wire in the secondary. Resistance is proportional to length of wire and inversely proportional to cross-sectional area, which determines current capacity. The voltage-resistance quotient is then proportional to current, with 25 or 35 as an empirically determined constant of proportionality. Any error seems to give a more conservative current rating. At least, transformers run cool using the calculated values of current. *Ronald Keeney, Berkeley, California.*

Author's Note

In the September, 1959 installment of *Audioclinic,* I described a switching circuit designed to interconnect two speakers and two amplifiers in various combinations. Somewhere between my desk and the printed page an error crept into the diagram which made the circuit worthless.

Fortunately, several readers discovered this error and were kind enough to submit revised circuits. Some of them varied from the diagram as originally presented.

Since the whole purpose of this column is to provide an outlet for the interesting ideas of the readers of AUDIO, I thought that these circuits could be appropriately included here. The information in the September, 1959, *Audioclinic* was in response to a question by Martin S. Lubell, Pittsburgh, Pennsylvania.

Speaker Switching Circuits

Figure 2 shows a schematic drawn according to my original intentions. It was

(*Continued on page 44*)

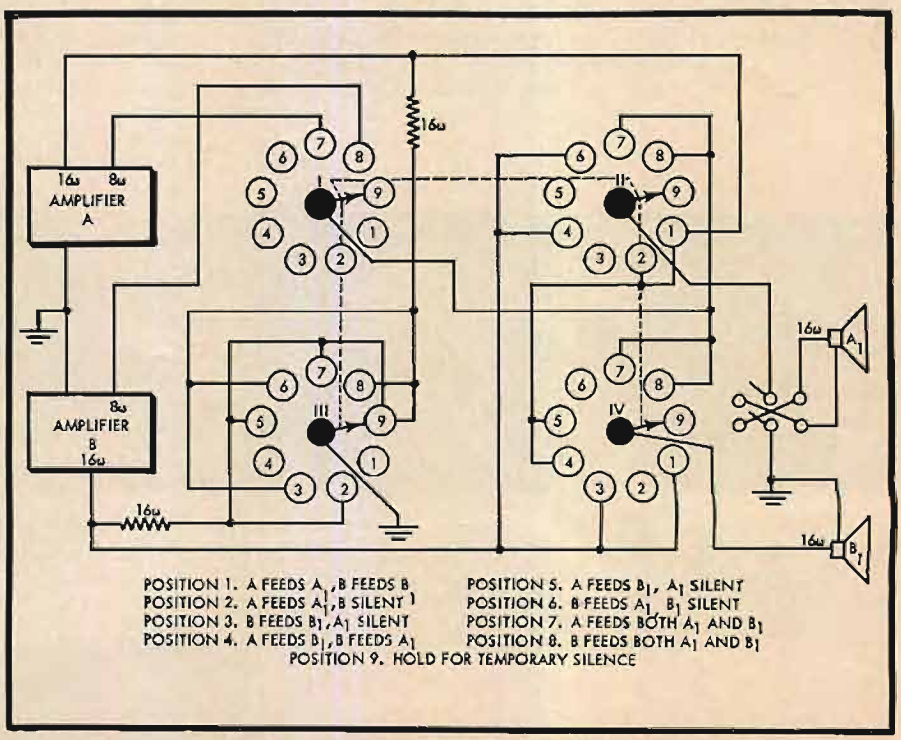

Fig. 2. Speaker switching circuits by Frank J. Dypold.

* *3420 Newkirk Ave., Brooklyn 3, N. Y.*

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The MX-111 Straight Line Mixer Control is a highly developed slide-wire unit using resistances in a ladder configuration to afford unusual facility in operation on control consoles. It is used to blend signals of various origin for music scoring, re-recording, high quality public address, radio and TV broadcasting. It requires only 1½" of horizontal panel space (1¼" with alternate escutcheon) and is 6½" long. It is the most compact unit of this type available, and extends only 2¼" below the top of the mounting surface. Several units can be operated with one hand when mounted adjacent.

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1. Smooth, Silky Operation for Easy Control — Most important to the operator is the overcoming of friction in the mixer control. In the MX-111 precision-built mixer, a nylon bearing rides along a longitudinally honed, hardened chrome-plated shaft. Smooth operation is the result of the exceedingly low coefficient of friction; only 2 grams of pressure is required to overcome the inertia and bearing friction of the control assembly.

2. Low Contact Noise for Clean, Clear Signal — A single contact brush fabricated of the same material as the resistance wire prevents generation of thermal voltages, contact oxidation and consequent noise. This brush is connected to the input circuit by a beryllium copper spring strip, eliminating the need for additional noise inducing brushes.

3. Exclusive Dirt and Lint Barricade for Trouble-Free Performance — An accessible lint and dirt trap over the windings eliminates the cleaning nuisance formerly associated with this form of control. In addition, the contact portion of the winding itself is upside down, so that the tendency of foreign matter is to fall **off** rather than **on.**

4. Plug-in Design for Easy Maintenance — Connections are made by an integral plug to the connecting cable socket. This permits rapid disassembly for inspection and cleaning.

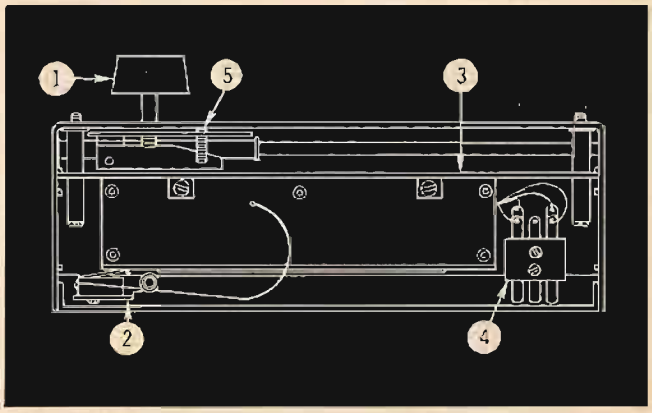
5. Friction Adjusting Screw for Angle or Vertical Mounting — For those recording engineers who desire less freedom of movement in the control, or for the designers who wish to incorporate a steep or vertical slope to the control panel, a friction adjusting screw on the guide shaft is accessible through the front slot on the control in which the knob assembly rides.

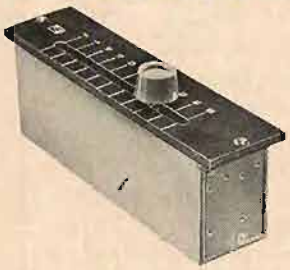
SPECIFICATIONS

Circuit, Ladder; **Frequency Response,** Flat, within ±.5 db at all settings from 0 to 20 kc; **Accuracy of Resistors,** ± 2%; **Input Level,** Maximum: 1 watt or 25 volts rms; **Slider Pressure,** 20 grams; **Static Friction,** Within 2 grams of sliding friction; **Insertion Loss,** 6 db; **Total Excursion,** 4⅛"; **Impedance,** Standard 600/600 ohms. Special impedance of 150/150 ohms may be obtained on order; **Knob,** Supplied with red knob as standard; **Dimensions,** 6¼" long by 15/16" wide by 2¼" high. Height with knob: 3¼"; **Escutcheon Plate Dimensions,** 1½" or 1¼" wide by 7" long by 3/16" thick; **Panel Finish,** Engraved black anodized dural; **Multiple Mounting,** 1½" or 1¼" centers between adjacent units according to escutcheon used.

ORDERING INFORMATION

Model MX-111 Straight Line Mixer Control with red knob, cable socket and plug, complete with escutcheon. Weight, net, ½ lb., 1 lb. shpg. **Price, Net Each $44.00**





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MX-111-3 3-Gang Mixer
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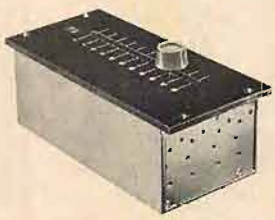

MX-111-4 4-Gang Mixer
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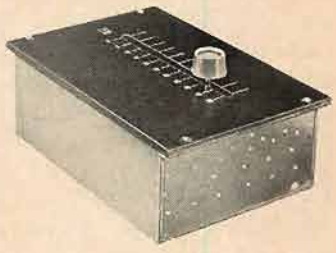

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EDITOR'S REVIEW

NO TONE CONTROLS, ANYONE?

THE HISTORY of high fidelity is full of examples of simplification, with the most obvious one being the elimination of a variety of phono equalizations in the more recent amplifiers. To be sure, some of the more elaborate models still provide some variation, but in the main, the average selector switch simply says "PHONO 1" and possibly "PHONO 2." To a large extent, we favor simplification when it comes to the sort of equipment that the industry hopes will someday be in the average home and played by the average family. To the dedicated audiofan, any compromise in the direction of eliminating flexibility is all wrong, and for his purposes he is probably right. So for him there will always be equipment of more than adequate flexibility. We do not believe that it is necessary that a maximum of more than 25 separate equalization curves be provided—and that from two switches with five steps each—and on a single switch it should be possible to cover practically any requirements with, let us say, the eleven positions which make up the usual maximum on a switch. And these eleven should also accommodate three tape speeds.

With stereo amplifiers, however, controls must be duplicated. Equalization will undoubtedly be the same in both channels (though we can easily imagine a case where the hypercritical user might want to adjust the equalization independently on the two halves of his stereo cartridge). With the same equalization in both channels, only one control is needed. When we come to tone controls, though, we encounter another problem, and the best we can do here is four controls—bass and treble for each of the two channels. (Speaking parenthetically again, can anyone imagine what the control panel is going to look like if we ever go to three-channel stereo?) At best, the four controls can be combined, after a fashion, with dual-concentric controls, giving the appearance of only two knobs.

To get to the point, though, let us ask a question. How often are the tone controls actually used? In this observer's normal home listening, either FM or phono, the tone controls are never away from the flat positions. Occasionally, to be sure, some experimenting may be done for effect, possibly, or to compensate for a poor piece of tape. But in general there never seems to be any need for operating the tone controls anywhere except "flat."

Now if we grant the need for tone controls, we might first define what we mean by this device. Are tone controls to be used to correct for environment, or to correct for some one else's poor judgement in a broadcast or a recording session?

In the latter case, it is to be presumed that the person in charge of the sound quality—be it the producer of a radio program or the A & R man at a recording session—is the one who passes on the balance, microphone placement, and probably on the equalization settings, if any. The fixed equalization prescribed by the RIAA curve, of course, must be introduced somewhere, but it is usually not an operating control for use by the studio engineer. The balance, microphone placement, and any equalization is judged on the spot by some one in authority, and as reproduced by the monitor loudspeaker. Here is a first possible hitch. If the monitor speaker is deficient in bass, the man in charge will introduce more bass in the circuit so that it sounds right to him. If he happens to like a lot of highs, he may arrange a microphone placement that will make it screetch in the speaker which may have a peak at 5000 cps, but result in dullness. There are so many variables in the entire chain that it is difficult to point out the one that really makes the difference.

But if we may assume that the monitor loudspeaker is a really fine one and that the recording or the broadcast is just exactly like the man in authority wants it, we then have the ideal situation. Should we change it to something else? Should we go to a fine restaurant and doctor up the cooking to our own taste by adding, perhaps, chopped green peppers to a chocolate souffle?

This is the sort of question we cannot answer. Some listeners may actually want to alter the frequeney response of a prepared selection just to make it match their own taste—and that is certainly their privilege. Perhaps we *do* think we can improve upon the original. Anyhow, that's why there are tone controls.

If, however, we are using the tone controls to correct for environment, it seems as though we might make the correction elsewhere. It has long been our belief that a "flat" signal presented to the input of the power amplifier should come out of the loudspeakers acoustically "flat." Many professional amplifiers are provided with a set of response curves to fit most acoustical conditions, along with a series of built-in components which can be strapped into or out of the circuit to give any of the specified curves. Would it not seem that the logical thing to do is to make some such provision in modern power amplifiers so that we could compensate for room and speaker system in a single fixed manner? Once this is done, perhaps we could eliminate the tone controls from the front of the control unit altogether—if we must retain them, why not put them behind a door, for example , like they do the adjustment controls in some TV sets. We think that simplification of the control panels would make more people less afraid of component high fidelity.

Actually, we have no axe to grind on this entire question. We think simplification is desirable, and it would be interesting to study a dozen different examples of built-in environment equalization controls. Make for interesting reading, too, no doubt.

OMISSION

Did anybody notice that the description of last month's cover, which appeared on page 53 instead of on the Contents page, listed all the components in the system except one which was perfectly visible and identifiable in the photo itself? That one was the Dust Bug, and even though it is an inexpensive device, it does have the ability to keep records clean and static-free. Furthermore, it isn't fair to list some of the components and not others.

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Amplifiers with Positive and Negative Feedback

CHARLES P. BOEGLI*

Contrary to a widely held belief, this author discovered that the cathode-coupled phase inverter ("long-tailed pair") introduces a significant amount of distortion. By including this stage in the negative feedback loop he achieved an unusually low-distortion amplifier.

SEVERAL YEARS AGO, the writer had two articles[1] published on the design and construction of audio amplifiers utilizing over-all negative feedback with internal positive feedback. A number of readers constructed these amplifiers and satisfaction was the general result.

Those who are interested in the details of these amplifiers should refer to the original articles. Several difficulties were encountered with the circuits, primary among which were:

1. The output transformer was not designed for the manner in which it was operated.
2. The output transformer secondary was at a small d.c. potential above ground.
3. The inverter (the first stage of the amplifier) was not included in the negative feedback loop, so that the distortion introduced by this stage appeared undiminished in the output.

Both amplifiers used ordinary output transformers with the secondaries connected in unusual fashion. The speaker lines were connected to the 0- and 16-ohm taps of the secondary and the 4-ohm tap was grounded (for a.c.), so that a balanced output was being drawn from a transformer intended for unbalanced operation. The output transformer was carefully specified, and those who were foolhardy enough to construct their amplifiers with other transformers usually paid the penalty of instability or oscillation. For some time, the reason why one transformer worked well while another did not remained a mystery, but it was thought that unbalanced capacitances between each end of the winding and ground might be responsible.

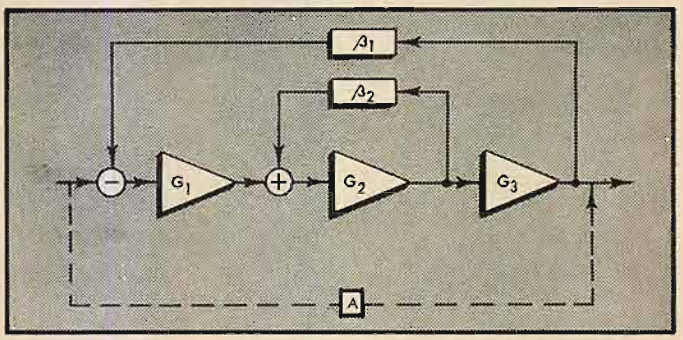

Fig. 1. Amplifier with over-all negative and internal positive feedback.

One hundred per cent negative feedback was obtained by connecting the ends of the secondary directly to the cathodes of the driver tubes. Internal positive feedback was brought from each driver plate to the grid of the other driver. Bias for the drivers was obtained by inserting a bypassed resistor between the center tap (that is, the 4-ohm tap) of the output transformer secondary and ground, so that the entire secondary was at a d.c. potential equal to the bias on the driver cathodes. If a speaker line became shorted to the chassis of the amplifier, the bias was disturbed and oscillation usually occurred. Nevertheless, speaker lines are usually not grounded, and this did not prove to be a very great shortcoming.

The inverter was not included within the negative feedback loop because of the desire to minimize the number of stages in the loop. A cathode-coupled inverter ("long-tailed pair") was used for inversion. This circuit was widely considered to be quite linear because of degeneration, so placing it outside the negative feedback loop was not expected to cause a significant increase in distortion.

Although the performance of the amplifier was quite good, distortion proved to be somewhat higher than had been anticipated. Since the only real source of distortion could be the inverter, a detailed study was made of the long-tailed pair with results that were, in some respects, surprising:

1. If the gain is defined to be the total plate-to-plate output divided by the grid-to-grid input, then the gain of the long-tailed pair is the same as that of a single tube operated under comparable conditions.
2. Because of the large d.c. voltage at the cathodes of the tubes, the output signal is somewhat limited in magnitude before distortion becomes excessive.
3. The distortion curve for this stage has a shape typical of a circuit without degeneration, suggesting that there is no improvement in linearity because of degeneration.

It was now certain that the inverter was the principal source of distortion in the amplifier. To reduce this distortion, the inverter would have to be included in the negative feedback loop, but it was not known what effect positive feedback around one stage would have on distortion arising in earlier stages. This lack of knowledge, coupled with the desire to explain the instability experienced in the amplifier when small changes were made in certain components, indicated need for further work on amplifiers using combined positive and negative feedback.

These circuits have now been rather thoroughly investigated. This paper details the work that has been done, and describes the resulting improved amplifier.

Analysis of Negative-Positive Feedback Amplifiers

Figure 1 is a block diagram for a gen-

* *Product Planning Manager, Bendix Corporation, Cincinnati, Ohio.*

[1] Boegli, Charles, A 35-watt "Infinite-Feedback" Audio Amplifier, *Radio and Television News*, July 1954, p. 39.
Boegli, Charles, A 13-watt All-Triode "Infinite-Feedback" Amplifier, *Radio and Television News*, November 1955, p. 68.

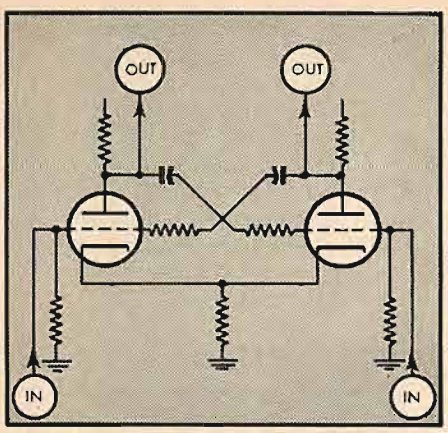

Fig. 2. Push-pull stage with positive feedback.

eral amplifier using over-all negative feedback and internal positive feedback. Each amplifier block can be assumed to consist of any number of stages, and in general the terms G and β, which designate gain and feedback factor, can be considered complex variables.

A straightforward analysis shows that the amplification of the circuit is

$$A = \frac{G_1 G_2 G_3}{1 - G_2\beta_2 - G_1 G_2 G_3 \beta_1} \qquad (1)$$

In the present case, β_2 is positive feedback and β_1 is negative feedback; when values are substituted into Eq. (1), the appropriate sign must be used (+ for positive feedback and − for negative.)

In the customary analysis of amplifiers of this type, the positive feedback is considered to be adjusted so that $G_2\beta_2 = +1.0$, so that if the negative feedback is removed, the stage represented by G_2 just oscillates. If $G_2\beta_2 = +1.0$ is substituted into Eq. (1), the resulting expression is

$$A = -\frac{1}{\beta_1} \qquad (2)$$

This is the result that would be obtained with an ordinary feedback amplifier if the gain were infinite.

The effect of positive feedback upon the distortion introduced by each stage can be found by assuming a disturbing voltage δ to be injected at the outputs of the various stages, and finding the voltage produced at the same point by an analysis similar to that used to obtain Eq. (1). The following results are obtained:

(1) For a disturbance δ introduced at the output of G_1 or G_3, a voltage is produced at the same point amounting to

$$\frac{G_1 G_2 G_3 \beta_1 \delta}{1 - G_2\beta_2 - G_1 G_2 G_3 \beta_1}$$

If $G_2\beta_2$ is adjusted so that it just equals +1.0, this expression simplifies to $-\delta$ showing that the distortion introduced anywhere except in the stage around which positive feedback is brought is completely canceled.

(2) For a disturbance δ introduced at the output of G_2, a voltage is produced at the same point of magnitude

$$\frac{(G_1 G_2 G_3 \beta_1 + G_2\beta_2)}{1 - G_2\beta_2 - G_1 G_2 G_3 \beta_1}$$

If $G_2\beta_2$ is adjusted so that it just equals +1.0, this expression becomes

$$-\delta \frac{(G_1 G_2 G_3 \beta_1 + 1)}{G_1 G_2 G_3 \beta_1}$$

and when this is added to the injected disturbance δ, the sum is

$$-\delta \frac{1}{G_1 G_2 G_3 \beta_1}$$

which represents a reduction in distortion by a factor equal to the loop gain in the absence of positive feedback. The loop gain should be as high as possible even when positive feedback is used, because the distortion arising in the stage around which positive feedback is introduced is reduced in this manner.

One very interesting observation about Eq. (1) can be made immediately. Suppose the internal feedback network is actually arranged so that $G_2\beta_2 = +1.0$ at all frequencies from zero to infinity. Equation (1) then simplifies ideally into Eq. (2); that is, the over-all gain is completely independent of the individual G's (even though they might be complex quantities) and is simply the inverse of the negative-feedback characteristic. The β_1 can, however, be held constant over an exceedingly wide frequency range; certainly, if it should be desired, down to zero frequency and also up into the radio frequencies. It should then be possible to obtain a flat and level response from the entire amplifier even with internal stages and, in particular, an output transformer, of very poor characteristics. No problems of instability would enter except when β_1 became zero which, as we have seen, can be at frequencies very much higher than those of interest in audio work. At such frequencies, of course, rather drastic steps could be taken to insure stability.

Unfortunately, the problem of making $G_2\beta_2 = +1.0$ over a wide frequency range itself appears insoluble. No matter how great the precautions, G_2 will drop off at high frequencies because of interelectrode and stray capacities; actually, this drop sometimes occurs at frequencies considered to be of interest in audio work. At the low end, it is quite possible by means of conductive feedback to keep $G_2\beta_2 = +1.0$ down to d.c. The results of the attempt are, however, rather peculiar.

Making $G_2\beta_2 = +1.0$ has the effect of causing the stage represented by G_2 to oscillate (in the absence of other factors), so this stage can be considered, for the moment, a wide-band untuned oscillator. Now, the effect of keeping $G_2\beta_2 = +1.0$ down to d.c. is to extend the range of oscillation down to d.c.; that is, the stage becomes not only an a.c. but also a d.c. oscillator. A d.c. oscillator, by extension of the definition of an a.c. oscillator, is a device that will generate a d.c. voltage with no external input. Experiments have shown that this is precisely what happens with conductive positive feedback, and the d.c. voltage which then saturates the stage causes it to be ineffective in amplifying a.c. signals.

For example, a typical push-pull stage incorporating positive feedback is shown in *Fig.* 2. Its similarity to a multivibrator is at once evident. In fact, the only difference is that the positive feedback is controlled at the point where oscillation just begins, while in a multivibrator the positive feedback is very much greater than that. Now, if the positive feedback is extended down to d.c. by elimination of the blocking capacitors, the stage becomes in effect a flip-flop circuit quite incapable of passing an a.c. signal.

The inference, of course, is that in all practical cases, $G_2\beta_2$ must drop off at low and high frequencies, becoming less than +1.0. An investigation must therefore be made of the frequency response of G_2 with a.c. positive feedback, so that this response can be controlled to prevent instability in the final amplifier.

Stages with Positive Feedback

Consider an amplifier with positive feedback (*Fig.* 3) and let β be constant with frequency from zero to infinity while G drops off at 6 db per octave below some frequency $\omega_1 = 1/T_1$ and above another frequency $\omega_2 = 1/T_2$. Then β may be considered a real quantity while

$$G(s) = \frac{GT_1 s}{(T_1 s + 1)(T_2 s + 1)} \qquad (3)$$

The T's are time constants, and s is the Laplace transform argument. By ordinary feedback analysis, the closed-loop transfer function is

$$A = \frac{GT_1 s}{(T_1 s + 1)(T_2 s + 1) - \beta G T_1 s} \qquad (4)$$

We now make the following substitutions: $T_2 = T$, $T_1 = aT$, and $G\beta = K$, which transform Eq. (4), after expansion of the denominator, into

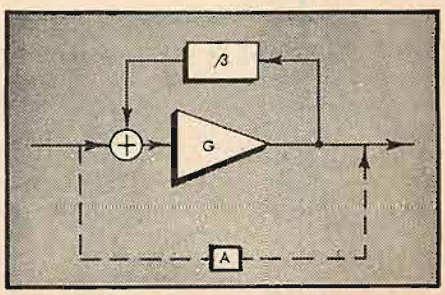

Fig. 3. Amplifier with positive feedback.

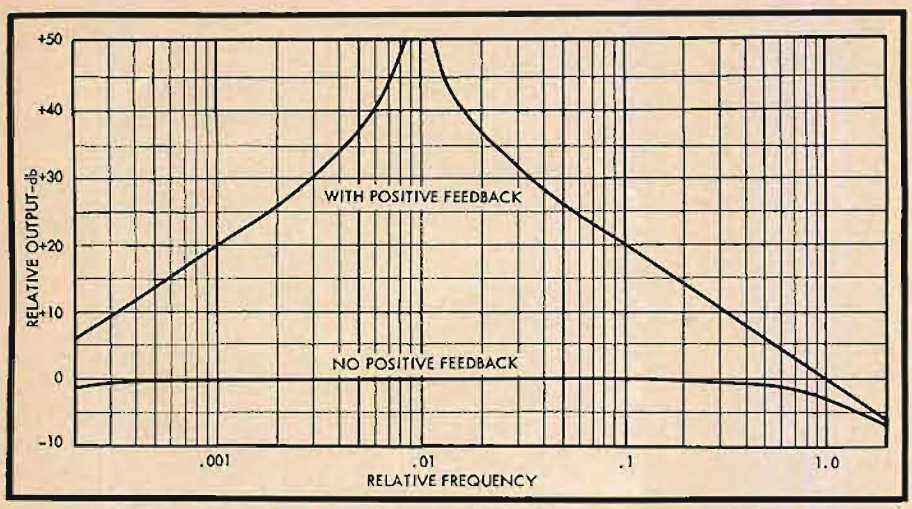

Fig. 4. Response of a single stage with and without positive feedback.

$$\frac{A}{G} = \frac{aTs}{a^2T^2s^2 + (1 + a - Ka)\,Ts + 1}$$

In the usual case where positive feedback is considered, K is about 1.0 and a is much larger than 1, so that as an approximation,

$$\frac{A}{G} = \frac{Ts}{T^2s^2 + (1 - K)\,Ts + 1/a} \qquad (5)$$

To find the shape of the response curve, ju is substituted for s, and the magnitude of the resulting expression is calculated. This turns out to be

$$\left|\frac{A}{G}\right| = \frac{\mu}{\sqrt{\mu^4 + \mu^2\left(B^2 - \frac{2}{a}\right) + \frac{1}{a^2}}} \qquad (6)$$

in which $B = (1 - K)$. Since the expression for amplification, Eq. (6), contains only B^2, it remains unchanged if $-B$ is substituted for $+B$; that is, the response will be the same if K is 0.95 or 1.05. The fact that the phase shift in the two cases is different is of no consequence in the present study.

Now, when $\mu \neq 0$, the amplification, Eq. (6), approaches infinity as the denominator of the expression goes to zero. To find the value that B must have to make the amplification go to infinity at some frequency, we set the denominator equal to zero and obtain

$$\mu^2 = -\frac{1}{2}\left(B^2 - \frac{2}{a}\right) \pm \frac{B}{2}\sqrt{B^2 - \frac{4}{a}}$$

which is real and positive only when $B = 0$, or $\mu^2 = 1/a$.

In other words, when positive feedback is led around an amplifier and adjusted so that oscillation just begins, that oscillation occurs at a single frequency located at the geometric mean of those represented by the two time constants of the amplifier. Thus, what has ordinarily been assumed to be a wide-band untuned oscillator is in reality a tuned oscillator. Equation (2) was derived from Eq. (1) by substituting $G_2\beta_2 = +1.0$. It is now evident that this condition, and the conclusions drawn from it, can exist only at a single frequency in an a.c. amplifier, unless $\beta_2 = \beta_2(j\omega) = 1/G_2(j\omega)$ for more than one frequency.

The shape of the response curve for a typical amplifier with positive feedback adjusted so that $K = 1.0$ is shown in *Fig.* 4. The response rises for $f < \sqrt{f_1 f_2}$ and falls for $f > \sqrt{f_1 f_2}$ at 6 db per octave except for a region at the geometric mean where the gain rises to infinity and the slope consequently increases.

It can be shown that if the amplifier transfer function has a different shape, e.g. so that the response at each end drops off 12 db per octave, the response with positive feedback remains unaffected except for regions near where the relative gain is 1.0. For this reason, it is not possible to alter the shape of the response significantly by changing the transfer function of the amplifier.

If another case is considered in which the amplifier is flat from zero to infinite frequency and the feedback factor drops off in the same manner as was assumed for the amplifier in the first example, the over-all response is unchanged except for regions above $1/T_2$ and below $1/T_1$. Once again, the important part of the curve remains unchanged.

These are valuable properties. By using them correctly, it is possible to design an amplifier with negative and positive feedback which shows greater stability and lower distortion than can possibly be attained with negative feedback alone. The logic behind the development of such an amplifier is presented in the next section.

General Amplifier Design

In a three-stage amplifier with negative feedback around the entire unit including the output transformer, oscillation is certain to occur at some frequency where the loop phase shift is 180 degrees if the loop gain at this frequency is equal to or greater than 1.0. The problem in the design of such an amplifier has always been to control the response at the extremes of frequency in such a manner that the loop gain is less than 1.0 when the phase shift is 180 degrees. This may be accomplished in several ways. One is to introduce phase-correcting networks. Another is to stagger the time constants of the stages so that two of them are flat out to extreme frequencies and the third has a response that drops off gradually (6 db per octave) toward low and high frequencies. In this manner, the phase shift can be kept at 90 degrees until the loop gain is less than 1.0.

The first method suffers from the fact that the response of an audio amplifier is apt to depend upon the nature of the load, so a fixed phase-correction network may work satisfactorily for one load and fail to prevent oscillation for another. All loudspeakers are not identical. The second method, however, can be used to produce an amplifier completely stable with any previously assigned range of loads. Positive feedback is an ideal way to apply the second method to amplifier design.

The steps in the practical design of a completely stable audio amplifier with

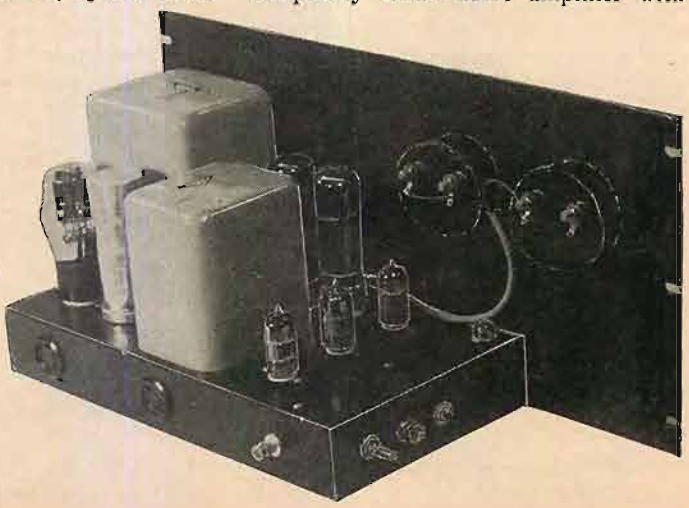

Fig. 5. Rear view of amplifier.

over-all negative and internal positive feedback are:

1. An amplifier with at least three stages (input, driver, and output) is constructed. The over-all negative feedback loop is closed, and the loop gain is adjusted (by controlling the gain of one of the stages) until the amplifier shows no trace of instability when the worst desired load is connected to the output. This load will generally consist of a resistor of the correct size shunted with a capacitor as large as is likely to be encountered in the use of the amplifier.

In stabilizing this amplifier, a small amount of network phase-correction may be used, but the amplifier should not oscillate even in its absence. Stability may be considered adequate when the high-frequency peak is no higher than 2 db.

2. The positive-feedback loop is now closed, and the time constants of the feedback network are controlled so that the high-frequency peak remains no higher than 2 db. (Remarks relative to high-frequency peaks also apply to low-frequency peaks). Under these conditions, the amplifier is necessarily no less stable than it was with the negative feedback alone.

When the loop gain is adjusted to prevent instability in Step 1, it will generally be found that the final loop gain is quite small. In fact, if the maximum treble drop of the open-loop amplifier is 18 db per octave, it may be shown that the loop gain can generally not exceed 1.8 before the high-frequency peak exceeds 2 db. A completely-stable feedback amplifier with more than two stages must often have a quite-low *loop* gain. This places no restriction upon the gain of the amplifier, for if G is the gain of the open-loop amplifier and β is the feedback factor, then the loop gain is $G\beta$ while the gain is

$$A = \frac{G}{1 - G\beta}$$

If $G\beta$ is fixed, therefore, any value of A may still be obtained by adjusting G. For example, if the loop gain is set at 1.8, the over-all gain will be $0.36G$. If the over-all gain is to be 25, G must be set at around 70. With such a completely stable negative-feedback amplifier, the distortion introduced in the various stages will obviously be reduced only a small amount (in the example, by a factor of 2.8). By the converse of this reasoning, the conclusion is reached that negative-feedback amplifiers having high loop gains and in which distortion is brought to a low value tend to be unstable.

That the introduction of positive feedback need now cause no additional instability is evident from the typical response curve of *Fig.* 4. A 6 db per octave slope in response corresponds to a phase shift of 90 degrees, which is insufficient to cause oscillation. To control the positive feedback so as to prevent the entire amplifier from being unstable therefore simply means that the relative gain of the positive-feedback loop must be 1.0 at the point where the response of the negative-feedback amplifier is just beginning to rise because of phase shift.

The work that has so far been presented indicates that the reason for the instability difficulty with earlier amplifier circuits lay in the failure to control the high-frequency cutoff point for the positive-feedback network. This difficulty might have been remedied by various expedients, but the problem of inverter distortion would still have remained.

Practical Amplifier Design

There are many possible designs for amplifiers incorporating both negative and positive feedback. Before proceeding with a circuit, the designer must lay down ground rules which, according to his own experience and study, lead to what he believes is good performance.

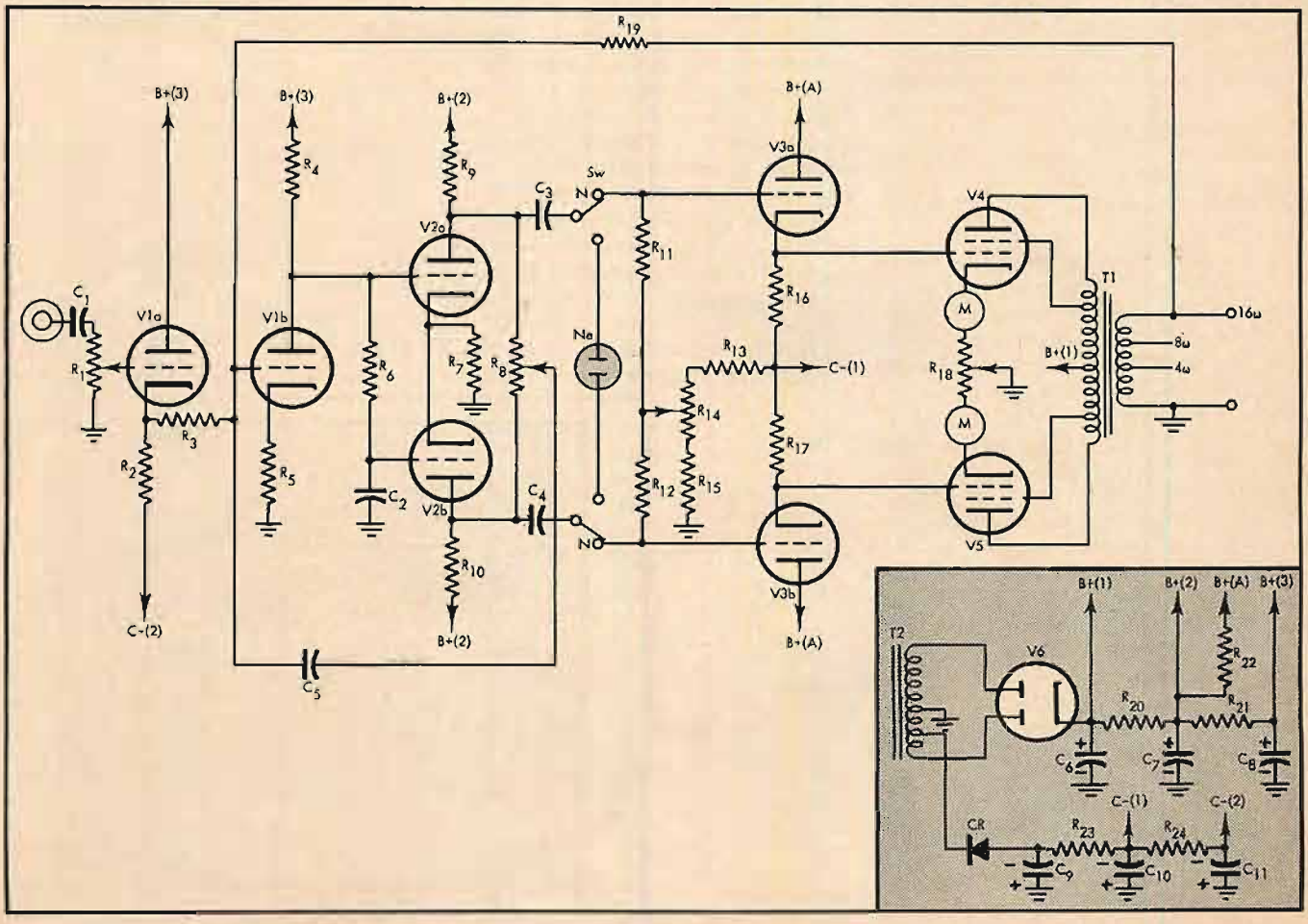

Fig. 6. 50-watt power amplifier.

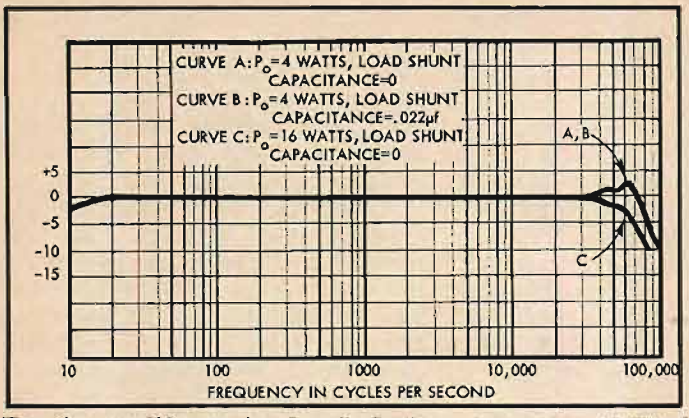

Fig. 7. Response of amplifier.

For the amplifier to be described, the ground rules were:

1. The output stage should be push pull.
2. The output tubes should be driven by cathode followers.
3. The output transformer secondary should be operated single ended.
4. Feedback should be achieved entirely by means of a resistive network.
5. Performance of the amplifier should not be affected by reasonable variations in load or in signal-source impedance.

With the exception of Rule 4, reasons for most of these rules are obvious enough. The reason for Rule 4 is that feedback amplifiers are quite sensitive to distortion introduced in the feedback connection. Where feedback is returned from the output transformer to the cathode of the input tube, nonlinearity in the grid-cathode voltage appears as distortion in the amplifier output. It was for this reason that the present amplifier combines the feedback with the input signal in a resistive network.

Using these criteria, the writer constructed the amplifier shown in *Fig.* 5 according to the circuit diagram of *Fig.* 6. The output stage consists of push-pull fixed-bias 6CA7's in a distributed-load circuit with a Triad HSM-189 25-watt output transformer. The grids of the 6CA7's are directly coupled to the cathodes of the 12AT7, and the fixed bias is applied to the 12AT7 grids. This connection eliminates the large coupling capacitors that would otherwise be required for the 6CA7's because of the low permissible grid resistances. It also reduces the loading on the phase inverter, permitting it to operate with minimum distortion.

The inverter, a long-tailed pair, is directly coupled to the preceding amplifier. Anode-follower feedback is brought to the grid of the amplifier from two sources: negative feedback from the output-transformer secondary through a 1-megohm precision resistor, and positive feedback through a .047-mfd capacitor from a 5-megohm control shunted across the phase-inverter plates. A precision 40,000-ohm resistor in series with the input grid of the amplifier completes the feedback network.

The effects of signal-source impedance variations on the feedback are eliminated by a cathode-follower input stage, which is outside both feedback loops. The cathode resistor is returned to a well-filtered negative voltage rather than to ground, which allows use of a large cathode resistor and minimizes the distortion of this stage.

The positive feedback is initially set by breaking the negative-feedback loop and adjusting the 5-megohm control until the amplifier-phase inverter combination begins to oscillate. A push-button switch connects a neon bulb from one plate of the inverter to the other, and simultaneously disconnects the output tubes to prevent damage to them and the loudspeaker during adjustment of the positive feedback.

The experimental circuit uses a 50-ohm control in the output-tube cathode circuits for cathode-current balancing. Balancing is facilitated by two 100-ma meters permanently inserted into the circuit. The fixed-bias control permits the 6CA7 cathode currents to be varied between about 20 to 60 milliamperes each.

With the exception of the positive feedback, no particular pains are taken to achieve high gain in any of the amplifier stages. On the contrary; the absence of a bypass capacitor across the single-ended amplifier cathode resistor insures a low gain.

The power supply is conventional, utilizing a 5V4 rectifier with minimum R-C filtering. The negative fixed-bias voltage is obtained from the 70-volt tap on the power transformer by a silicon rectifier and an R-C filter. It has been found necessary to filter the C- to minimize the hum in the amplifier output.

Amplifier Adjustment and Performance

When the positive-feedback control was centered (resulting in zero positive feedback) and the negative-feedback loop was closed, measurement of the response at low and high levels showed no evidence of a high-frequency peak. The push-button switch disconnecting the output stages and inserting the neon lamp into the circuit was depressed, and the positive-feedback control adjusted until the neon lamp indicated that the stages around which positive feedback was connected were oscillating. The push button was released, the output tubes balanced at 50 ma each, and the amplifier was placed in service for a month to insure that all stages were properly aged and stabilized. After this period, the amplifier was subjected to a series of tests to determine its quality.

Tube interchangeability

The first three stages of the amplifier are directly coupled. One might well be anxious about the effects of tube replacement upon the performance of these stages. The first 12AT7, which comprises the cathode follower and first amplifier, is in the most sensitive position. A series of seven randomly selected 12AT7's was tried in this posi-

(*Continued on page 74*)

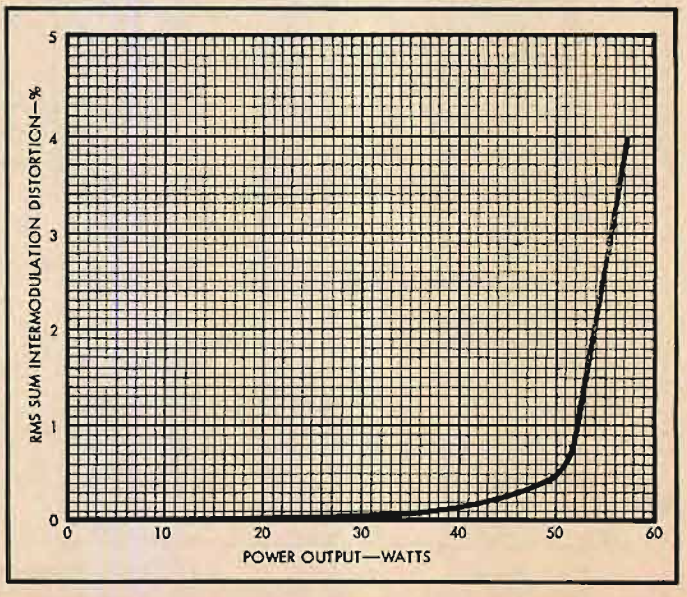

Fig. 8. Rms sum intermodulation distortion of amplifier (60 and 3000 cps, 4:1).

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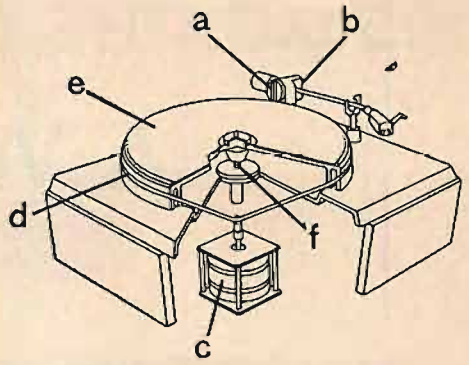

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ARM NOTES: (a) Calibrated knob—accurate to ±0.1 gram—adjusts torque of clock spring for desired stylus force without disturbing arm balance—does not shift center-of-mass. (b) Vertical and lateral pivot bearings suspended in ball races.

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TURNTABLE NOTES: (c) Hysteresis motor has dynamically balanced rotor and stepped, 3-speed pulley. (d) Neoprene-impregnated seamless belt is ground to uniform thickness ± .0005". (e) Turntable platter individually adjusted to dynamic balance. Weighs 6 lbs., and has dual rim for optimum flywheel effectiveness. (f) Lapped mainshaft rotates in micro-honed bearing-well. Tolerance is less than .0001".

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THIS MONTH'S COVER . . .

A Wall of Sound

H. E. McALLISTER*

Putting the loudspeakers entirely out of sight greatly enhances the illusion of a "curtain of sound," and is neither difficult nor costly. A cure for the decorator's nightmare.

LOUDSPEAKERS, it must be admitted, are essential to the reproduction of sound, but it must also be admitted that they have two grave faults (aside from intermodulation distortion, Doppler effect, and other engineering headaches). In the first place, even the prettiest of them usually do not blend too well into the average room arrangement, and they have a nasty way of sounding best where they look worst or of getting into locations where a big chair *must* be placed in front of them. And in the second place no matter how well the "hole in the middle" is filled, there is an irresistible urge to look at the speakers while listening to music and to associate the origin of the sound with them, robbing the music of some of its spatiality and depth. We are, of course, talking about stereo sound.

A "sound wall," in locations where its construction is feasible, solves both of these problems neatly. The source of the music cannot be pinpointed, and decorating problems are eliminated. In addition, you can astonish your friends (at least once) by producing music from nowhere—full, rich, and convincing.

The installation illustrated on the cover should fit a large number of situations in principle, and is capable of considerable alteration to fit circumstances. The author's requirements were for a room divider or partial partition, 8 feet high, to separate space in a room with a 16-foot ceiling. Since the width required was 12 feet, three 4×8 plywood panels were used for each side—or front and back, if you wish. A simple framework of 2×4 lumber was built, with 18 in. between front and back walls to allow room for bass reflex speaker cabinets. *Figure* 1 shows the general plan.

As shown on the cover, the "living room" side was finished with a center panel of natural grain wood. After holes had been cut for the speakers, the two side panels were covered with cloth, which was simply stretched in place and fastened in back with a staple gun. It was thought that by leaving the material free to move—that is, not actually cemented to the panels—there would be less muffling of sound. The grille cloth was removed from the speaker cabinets before mounting, thus eliminating an extra sound sieve.

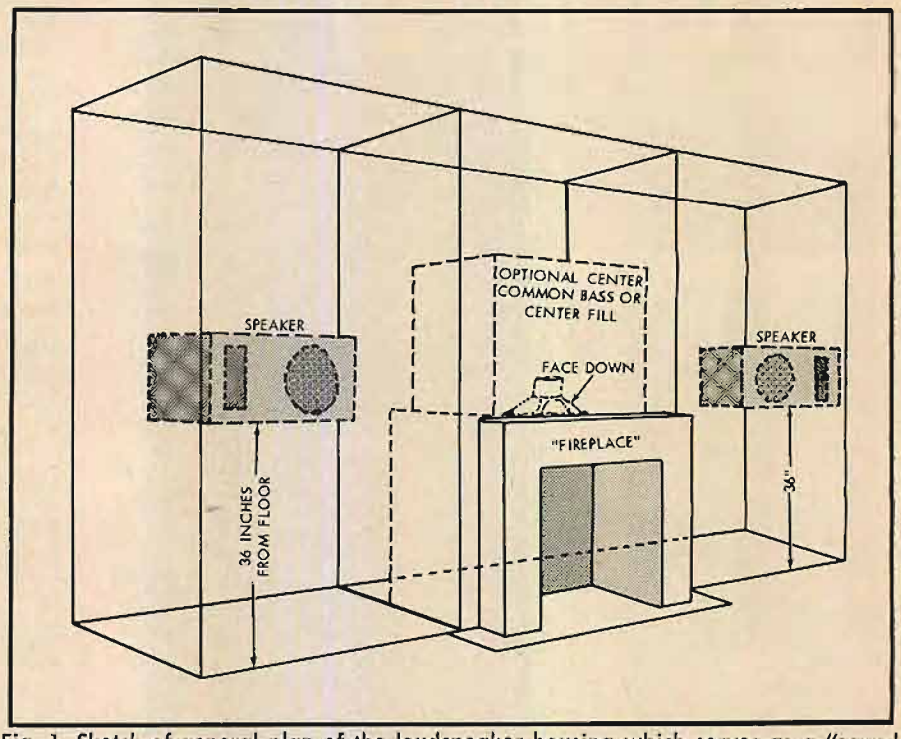

Fig. 1. Sketch of general plan of the loudspeaker housing which serves as a "sound wall."

The Grille Cloth

Forty-eight inch widths of drapery material are available in countless varieties of texture, pattern, and color, and in an open weave which will not hamper sound passage. Many of these will stretch sufficiently that they can be carried around the edges of a 4-ft. panel and stapled out of sight. Material can even be obtained to match or complement wallpaper used on other walls of the room. Also available are upholstery materials in 54-in. widths, some of which are open enough in weave to be useable. That used by the author was of the latter type—an open basket-weave material with a linen-like texture which matched the color of the walls. No degradation of sound has been noted.

The fireplace shown is a working gas log set in a sheet copper container, enclosed in turn in an asbestos-lined wooden frame. While this is both good looking and useful, it could present venting problems in some locations. With steam, hot water, or electric heat, the fireplace could also serve as the location for a center common-bass speaker pointed toward the floor at the top of the cavity, with andirons and logs still set in place for appearance, if desired. This would permit the use of less expensive wing speakers, though the author (and his friends) like the effect of two well-separated full-range speakers. Again, a small center-fill speaker could be placed in this position instead, if it seems necessary.

Philippine mahogany plywood was used for the center panel. This is a

(*Continued on page 73*)

* *P. O. Box 330, Santa Barbara, Calif.*

Distinguished panel of musicians from Boston's famous symphony orchestra evaluate speaker performance in home of Hermon Hosmer Scott, Lincoln, Mass.

Famous musicians and engineers first to hear remarkable new H. H. Scott speakers!

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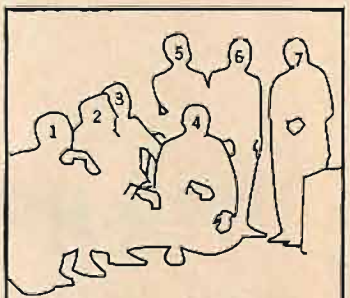
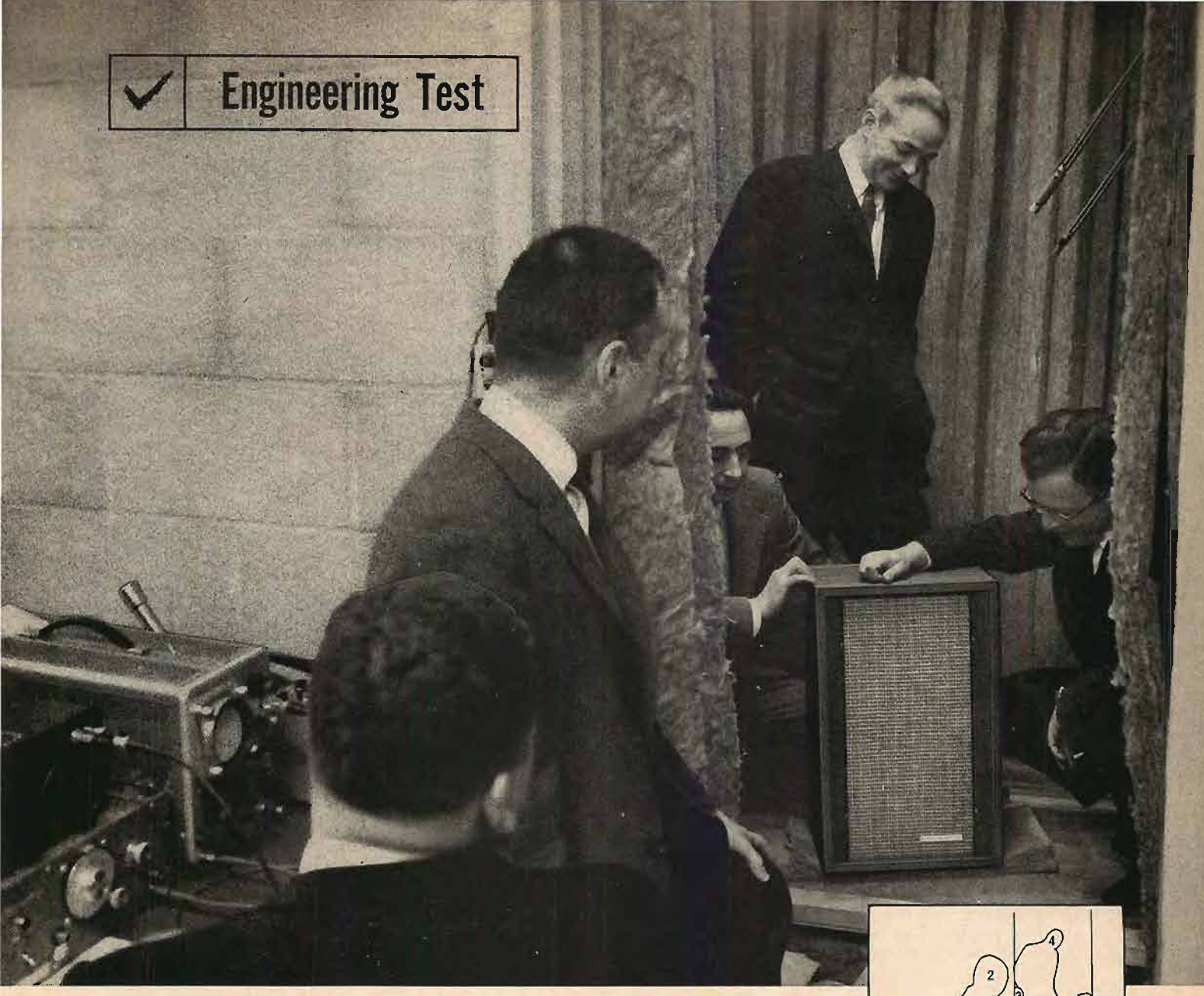
"*The closest I have heard to the true sound of the violin. I was not even aware I was listening to a recording.*" **Leonard Moss**, Violinist. "*The trumpet sound was uniform and consistent in every range, from the lowest to the highest note . . . a feat virtually unheard of in any other speaker.*" **Roger Voisin**, First Trumpet; Recording Artist, Kapp Records. "*I have never heard any reproduction of organ which sounded so faithful to the original. I felt I was sitting in the center of Symphony Hall.*" **Berj Zamkochian**, Organist. "*Every other speaker I ever heard sounded nasal and artificial. This was the first one that did not.*" **Bernard Zighera**, First Harpist and Pianist. "*I was in the control room when this recording was made. Played through these new speakers, the reproduction was closer to the original performance than I've ever heard before.*" **James Stagliano**, First Horn; Recording Artist, Boston and Kapp Records. "*The percussion came through with amazing clarity. The cymbals, the snare drum, the tympani and the bass drum all were equally true to the way they sound when I play.*" **Everett Firth**, First Tympanist.

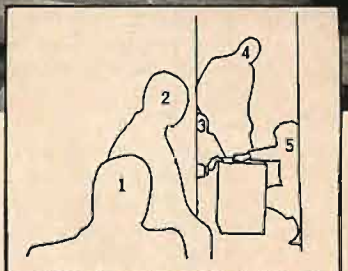


The famous musicians in Hermon Scott's living room are: 1. Leonard Moss (Violin), 2. James Stagliano (Horn), 3. Berj Zamkochian (Organ), 4. Everett Firth (Tympani), 5. Bernard Zighera (Piano), 6. Hermon Scott, 7. Roger Voisin (Trumpet).

Engineering Test



Scientists watch while Peter Globa, Speaker Development Engineer, makes exacting measurements on the new H. H. Scott speaker in anechoic chamber



This distinguished panel consists of: 1. Richard L. Kaye, Technical Director, WCRB, Boston; 2. Steven J. Stadler, Grason-Stadler Co., manufacturers of instruments for psychology and acoustics; 3. Peter Globa, Speaker Development Engineer, H. H. Scott; 4. Prof. Samuel J. Mason, Professor of Electrical Engineering, M.I.T.; 5. Dr. Jordan Baruch, Vice Pres. Research and Development, Bolt, Beranek and Newman Inc., world famous research, consulting and development organization in acoustics and related fields.

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As with its tuners and amplifiers, H. H. Scott uses new techniques in both construction and testing that represent a significant advance in the state of the art. New construction methods assure excellence in performance . . . New testing techniques and quality controls substantially reduce variations in quality from speaker to speaker, common until now.

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Artificial Reverberation

FRED L. MERGNER*

Many recordings are made in concert halls or studios with less than ideal acoustics. It is possible, through skillful application of artificial reverberation during playback, to achieve sound approximating the acoustics of a good concert hall. Here's how it works—

FOR SOME YEARS, radio stations and manufacturers of records and tapes have successfully demonstrated how the acoustical impression of music or the spoken word can be enhanced by the addition of artificial reverberation. Skillful application of this modern technique allows the engineer in the studio to improve considerably the quality of the final sound one hears. This is especially true when a recording session is held in a room that is acoustically unsuitable for that particular musical selection. There are a number of concert halls that are recognized as ideal for the performance of major symphonic works. Unfortunately, however, these famous auditoriums, such as the Musikverein Saal in Vienna, Symphony Hall in Boston, or the Concertgebouw in Amsterdam, to name only a few, are not readily available for recording sessions. For that reason, most recordings have to be made in studios which are acoustically inferior to these ideal halls.

Measurements have shown that an average of 25 to 50 milliseconds of delay time exists in good concert halls during a live concert. Thus, by artificially delaying the signal in this range, even ordinary rooms or studios can simulate the acoustic conditions of a good concert hall and thus greatly enhance the listener's enjoyment. This is especially true of recordings of smaller ensembles, vocal groups, and the spoken word.

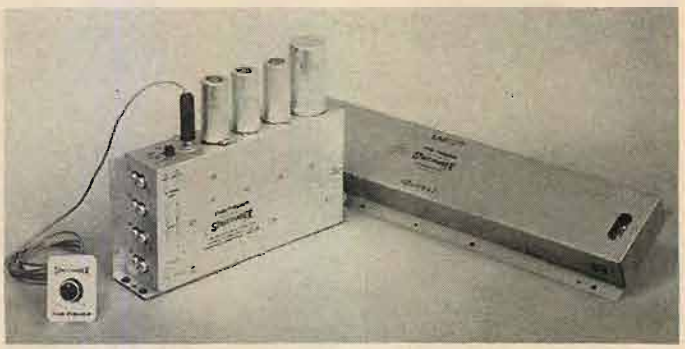

Fig. 1. Relation between sound level and decay time for a constant noise level.

Several methods have been developed to generate artificial reverberation. One of the oldest is the radiation of the original sound from loudspeakers in rooms with "live" characteristics. The reverberated sound from these loudspeakers is then picked up by microphones and added to the original signal. This method is no longer used because it is cumbersome and does not readily allow for variation of delay time. An improved technique is to guide tape recordings past several playback heads spaced at predetermined and variable distances from the first playback head. The mechanical distance between the heads governs the delay time. For example, with a speed of 7½ ips and a spacing of half an inch between the heads, the time delay is 1/15th of a second, or approximately 66 milliseconds.

Another way is to create vibrations in a large metal plate, corresponding to the electrical content of the music. These vibrations are picked up by a microphone and added in variable degree to the original music.

All such installations are costly and require considerable maintenance and technical knowledge. For that reason their use is limited. The recent introduction of low cost, simply constructed, and highly effective reverberation devices is especially fortunate because of the wide variations in home listening room acoustics. Reverberation equipment is particularly useful in such environments. For example, it is well known that reproduction of music at low volumes often sounds unsatisfactory even if the sound is equalized according to the Fletcher-Munson curves. The reason for this is readily apparent, especially if one realizes that the amount of reverberation received by the ear depends on the volume level *as well as* the prevailing noise level. The explanation of this phenomenon follows:

Decay time is defined as the time it takes for the sound pressure to decrease exponentially from its original value to one millionth part of it. The reverberation of a particular piece of music, reproduced with an average level of 80 db, has a decay time which is pleasing

* *Director of Engineering, Fisher Radio Corp, L.I.C., N. Y.*

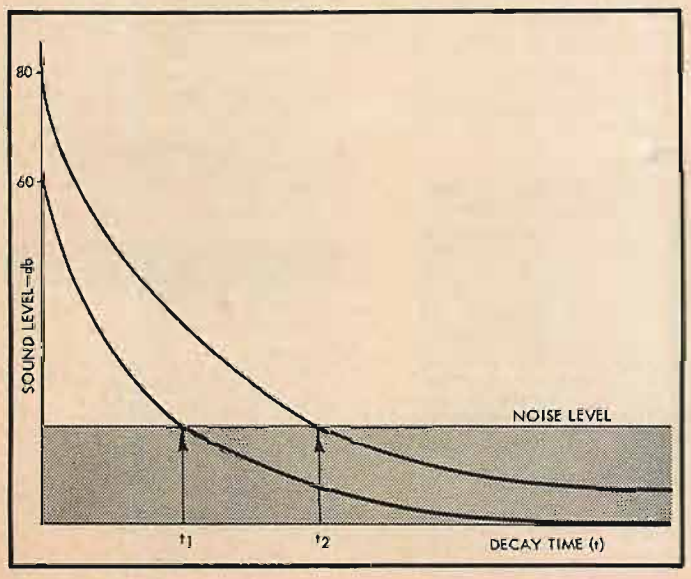

Fig. 2. The Fisher Dynamic Space-xpander, Model K-10.

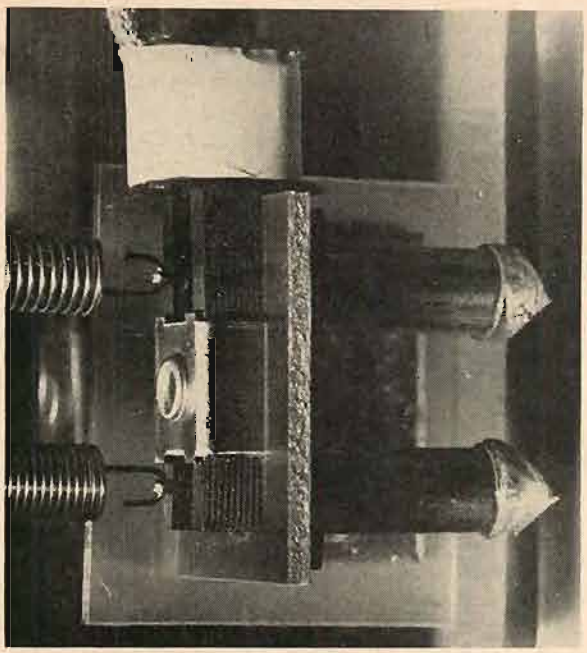

Fig. 4. Close-up of transducer showing how the coil springs are connected to the ferrite rotors.

to most ears. Reducing the volume level to 60 db will at the same time reduce the decay time of the reverberated sound portions, because it will take less time for the volume level of the reverberation to drop below the threshold level of the ear. Consequently, the music will sound more "dry" and less lively. Because of this effect, artificially reverberated sound must be added to the original music in order to recreate the same pleasing listening conditions that prevailed earlier with the higher music level of 80 db. (See *Fig.* 1.)

Many attempts have been made, therefore, to design equipment which would easily fit into the average home listening room and at the same time fall within the budget of most listeners.

One of the earliest such devices created artificial reverberation by means of acoustical delay lines. As mentioned earlier, "live" rooms were used to simulate acoustical conditions prevailing in concert halls. The "live" room in one instance was replaced by plastic tubes approximately 32 feet in length and ⅝ inch in diameter. The signal was fed to a small transducer connected to one end of the tube and picked up at the other end by a microphone after a delay of 50 milliseconds. This idea was perfected and demonstrated by Blaupunkt of Germany in cabinet models where the tubes were wound in an oval shape and mounted on the rear of the cabinet. Of course, it is quite difficult to install 32 feet of plastic tubing in an unobtrusive way. Therefore, this method is still far from being the best one possible for production of reverberation in the home.

Fisher Radio Corporation, in its solution to this problem, recently introduced a device which allows the easy addition of reverberation to practically all stereophonic and monophonic installations. This unit is called the Dynamic Space-expander. (See *Fig.* 2.) This reverberation device makes use of two metal coils to delay the sound in the following manner:

The coils are connected on both ends to small ferrite rotors, which rotate inside the field of an electromechanical transducer, similar in design to a dynamic pickup. (See *Figures* 3 and 4.) A portion of the sound signal or, in the case of stereophonic system, the combined sum signal from both channels, is amplified and fed to the transducer. For stereo reproduction, it is entirely satisfactory to combine equal portions from both channels, to delay this A + B sum signal, and add it, after delay, to the original sound in amounts which can be controlled by the listener. This reflects the acoustical conditions prevailing in concert halls, where reverberation is practically nondirectional. The delayed sound finally reaching the listener's ear after several reflections is a composite signal from all sections of the orchestra.

The current through the transducer causes the ferrite rotors at the beginning of the delay line to rotate. This torsional movement is proportional to the current through the exciting transducer and is transmitted down the length of both coils, reaching their ends after a certain time. The magnetic rotors at the far end induce a current in the pickup transducer coil, which, because of their rotation, is proportional to the feeding current. This basically means that the signal available on the pickup transducer is an image of the feeding signal delayed in time and, because of the inherent losses in the delay line, much lower in amplitude.

The delay time, to which the signal is subjected, depends not only on the length and the diameter of the coils, but to a large degree on the mechanical properties of the wire (elasticity).

A time delay of the signal by itself is not sufficient to simulate the effects of natural reverberation. In the concert hall the reverberated sound consists of a multitude of reverberated signals, which reach the listener's ear with different delay times and amplitudes depending on the length of their path. Therefore it is also absolutely essential to simulate this acoustical property of the concert hall.

For this purpose the delay line contains two different coils which create delay times of 29 and 37 milliseconds respectively. In order to gain a series of reflections having an amplitude decreasing with time, a mismatch is utilized so

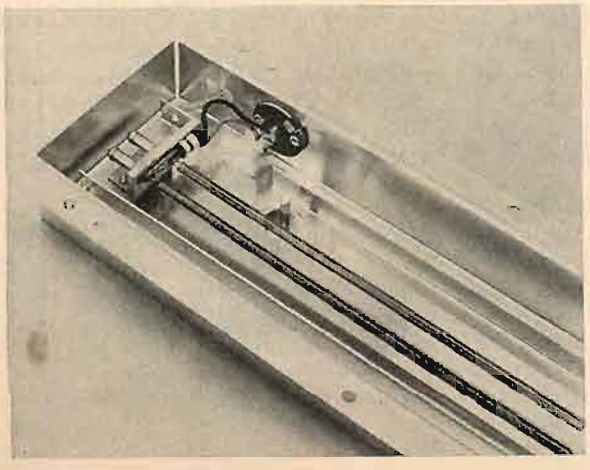

Fig. 3 (left). Transducer and coil-spring delay lines. Opposite end has a second transducer of similar construction.

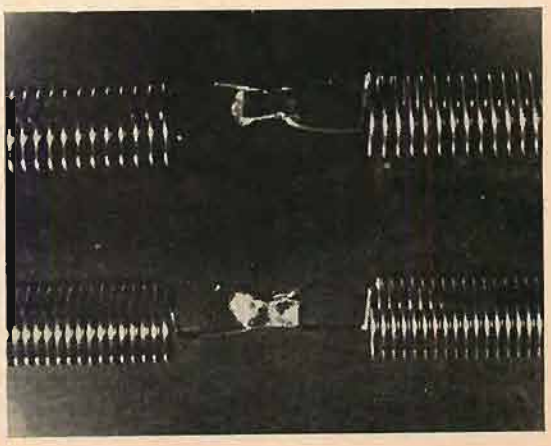

Fig. 5 (right). Close-up view of mechanical linkage joining the two sections of each delay line. Note the different number of turns in left and right coils.

that a part of the mechanical energy arriving at the end of the coils, is reflected back into the coils. This reflected energy travels through the coils back to the feeding transducer and after additional reflection reaches the output end again. This process is repeated several times. The final result of the repeated and overlapping reflections in both coils is a multitude of signals, of different amplitudes and delay times. In this way the natural process of reverberation occurring in the concert hall is simulated with remarkable exactness.

Examination of both coils will reveal that each consists of two sections, wound in opposite directions and linked mechanically at the center. (See *Fig.* 5.) This is done to prevent undesired vibrations which might reach the coils from disturbing their movements. Sound waves from loudspeakers or other external vibrations could easily create this condition. The two opposite windings for each coil compensate for any effects on the transducers from external and undesired sound sources.

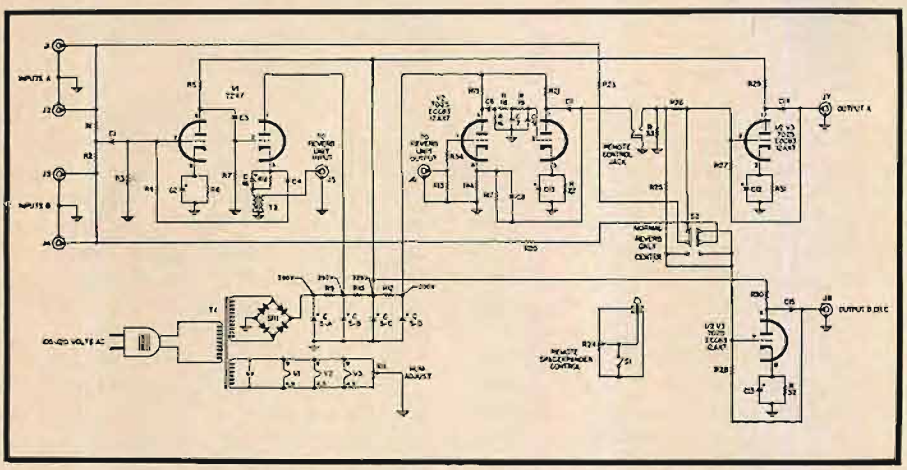

Fig. 6. Schematic diagram of electronic section.

The circuit of the electronic section is shown in *Fig.* 6.

Signals from the left and right stereo channels are combined at the grid of a 7247 tube (V_1), connected as an anode follower. After amplification the combined signal is fed to a cathode follower, which utilizes the second section of the same tube, operating into the primary of a matching transformer (T_2). Its secondary is connected to the feeding transducer at the beginning of the mechanical delay line. The transducer at the opposite end picks up the delayed and strongly attenuated signal and feeds it into the grid of V_2, a dual-triode voltage amplifier. Connected to the plate of the second triode is a potentiometer (R_{24}), which varies the amount of the reverberated signal fed to the grids of both sections of the output tube (V_3). The non-reverberated portion of the signal from both channels is also present at the same grids of V_3. At the channel A output jack (J_7), a combined signal is available containing the non-reverberated signal A plus the reverberated sum signal A + B. The same is true for channel B output jack (J_8), but here the non-reverberated portion is derived from channel B.

A closer look at the circuit will reveal some interesting design features. The time-constants for the coupling networks (C_1, R_2, C_3, and R_7) surrounding tube V_1 were chosen to provide a rolloff for frequencies below 250 cps. This takes into consideration the fact that there is practically no reverberation in the concert hall for frequencies below 250 cps. Transformer T_2 provides a perfect match between tube V_1 and the input impedance of the delay line. Matching permits tube V_1 to drive the highest allowable current through the feeding transducer, which in turn supplies a fairly high reverberated signal to V_2. This is important in order to achieve a good signal-to-noise ratio at the grid of V_2, because the delay line causes a large amount of attenuation in the signal. The upper-frequency response of the delayed signal is restricted to approximately 6000 cps, following the natural properties of the concert hall, where the surfaces of the walls, drapes, and the clothes of the audience sharply attenuate the higher frequencies of the reflected sound waves. The 12-db-per-octave low-pass filter in the circuit consists of an R-C network between both sections of V_2, plus feedback around the tube.

Switch S_2 permits the use of the unit in three different applications. In the **Normal** position the circuit works according to the arrangement, described previously, which means a combined signal is available at the output jacks. This kind of operation will be used mainly for monophonic or stereophonic installations with respectively one or two speaker systems. The amount of reverberation from zero (**Min**) to 70 per cent of the combined signal (**Max**) is adjustable. In the position marked **Reverb Only**, a pure reverberated signal which may be varied in amplitude, is supplied at both output jacks.

In systems including a "center channel" output, an effective method of adding reverberation is to add the reverberation unit to the center channel (with a center channel amplifier and speaker), and place the Mode Selector in the **Reverb Only** position. Then, by adjusting the volume of the totally reverberated center channel, one can determine the optimum reverberation level. An alternate method of using reverberation with a three-channel system is to place the Mode Selector in the **Normal** position. This adds a variable amount of reverberation to the "center channel" signal and has the advantage of providing a normal, unreverberated "center channel" when the control is placed in the **Min** position.

In order to convert a stereo system to three-channel operation, even though the control unit does not have a "center channel" output, a composite signal is provided in the matrixing circuits of the unit, and a variable amount of reverberation may be added to this "center channel" signal.

Only a single knob is required to operate the unit. In addition to the normal rotation, the control knob may also be used to remove reverberation from the circuit by pulling it outward. In this way the setting of the knob can be left permanently in the position which gives the amount of reverberation most pleasing to the listener's ear.

The circuit permits easy connection to monophonic or stereophonic installations. The unusually high permissible input voltage of five volts, the low output impedance of 2000 ohms, and unity gain make insertion into the circuit of any control amplifier completely non-critical.

One important additional application for a reverberation unit is in connection with tape recording. Very rarely will the recording hobbyist have access to a studio, nor will he likely encounter good acoustical conditions in his home. Under these conditions, a reverberation unit will enable him to make really "live" recordings, surpassing in quality the recordings he can make without it.

Thus the Fisher Spacexpander may be used for a great variety of applications and with practically every type of sound reproducing and recording equipment. It represents a really practical method of providing a new and important dimension to home listening enjoyment, and marks another advance toward the ultimate goal of completely lifelike reproduced sound. Æ

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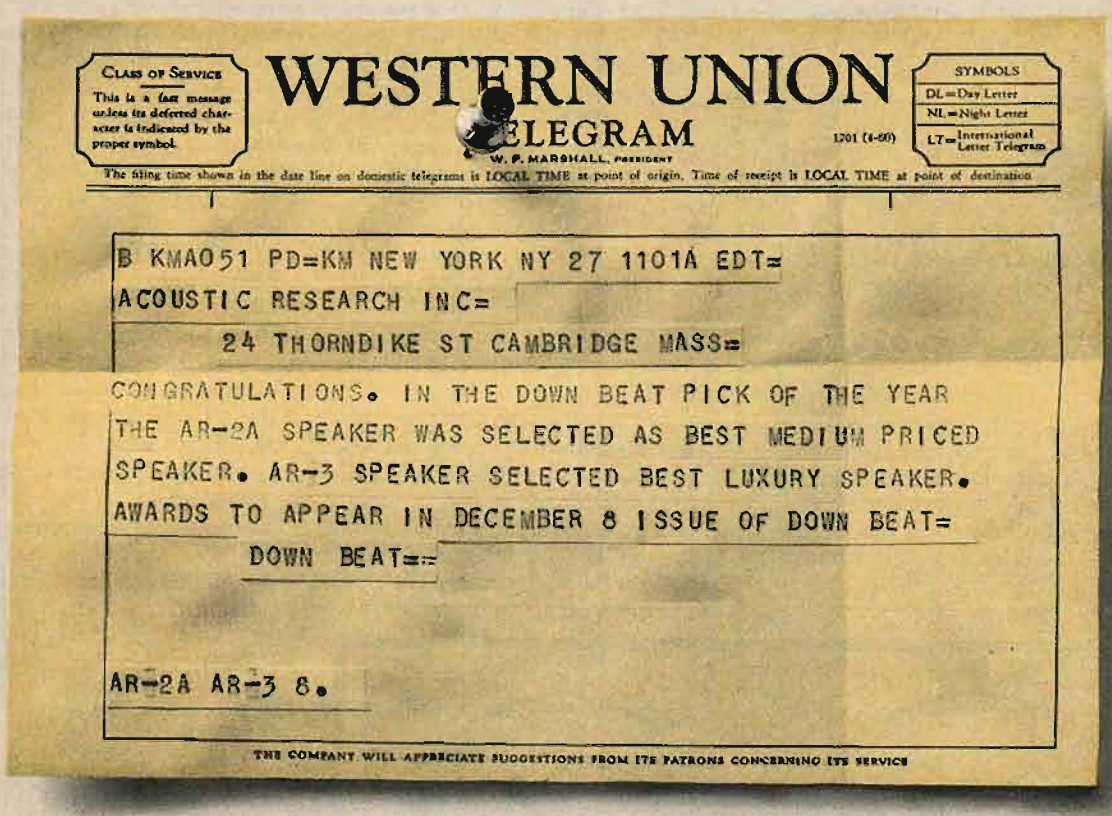

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Recording Perspective

WILLIAM G. DILLEY*

For the recordist who is puzzled as to what is the best possible recording, this article outlines a systematic approach which will enable him to achieve a personal standard.

THE ACCEPTANCE of high fidelity in the home, and the resulting improvement in the standards of reproduction have brought certain changes in the audio industry. Most obvious, of course, is the improved quality of available home equipment, and the trend toward component buying. This tremendous increase in home capability has been reflected by a marked improvement in the quality of source material such as records, tape, radio, and even TV. Much more obscure to the majority than those mentioned, however, is the change in recording practices as a direct result of better audio reproduction capabilities. These changes have not only influenced the quality of the recording (specifications), but also the musical compositions, arrangements, instruments selected to perform—and the treatment given each. The organ, for example, has experienced a comeback in popularity solely as a result of its magnificence in the low frequency ranges. Other completely new instruments and exotic *sounds*, have appeared only because of their high-frequency characteristics. In fact, some recordings have experienced great success (in sales) as the best "to show off your equipment". These changes in recording technique, or at least approach, are of considerable interest to the would-be recordist, which make the underlying concepts worthy of discussion.

Prior to embarking upon any recording task, it is assumed the individual will attempt to obtain a perfect recording —or, at least, the best possible recording commensurate with the equipment and knowledge available. Now comes the question, "Just what is a perfect recording?" In practical terms this might be, "What is the best possible recording?"

In order to measure anything, one must have a standard, or a comparison. We can, of course, establish given technical standards for the recording equipment (distortion, signal-to-noise ratio, etc.), but this in no way assures standardization for tape recording. Different sounding recordings can be made employing one set of equipment and varying only the placement of the microphones. The results (in perspective) would be quite similar to listening to a live performance from a variety of locations, ranging from the center of the orchestra to the top left balcony. Certainly, the audible information received would differ at all locations. Further, in any direction as to the recorded perspective of a tape, the actual listening process must be included because of the additional effects and colorations introduced.

The EDITOR'S REVIEW entitled "Recording Perspective" (AUDIO, Dec. 1959), adequately defines the problem and this editorial is recommended reading for those who plan to engage in recording. It discusses mainly, however, the effects of room acoustics in the playback environment. The establishment of a recording perspective still remains to be determined.

Accurate audio reproduction has sometimes been simply defined as: faithful reproduction of the original with respect to frequency response, distortion, etc. But a definition of this kind is meaningless in the recording process unless it specifies both direction and distance from a specifically located source in a *specific* recording site—in terms of an ultimate listening impression.

It becomes obvious, that in the absence of any standard, the answer to the question, "What is a perfect recording?", is a subjective one. If no given standard exists, then what is to determine our approach in planning the recording perspective?

We must acknowledge, that, for normal listening, the playback acoustics cannot be separated from the recorded acoustics. For purposes of evaluation, and to provide a "standard" for the recorded perspective, however, it would be advantageous to divorce the playback acoustics and compare tapes on the basis of *recorded* perspective. Thus, tapes with the same *recorded* perspective would sound essentially the same when played back in a given environment—or expressed differently, your tapes will always sound right for your living room

* *577 East Avery St., San Bernardino, California.*

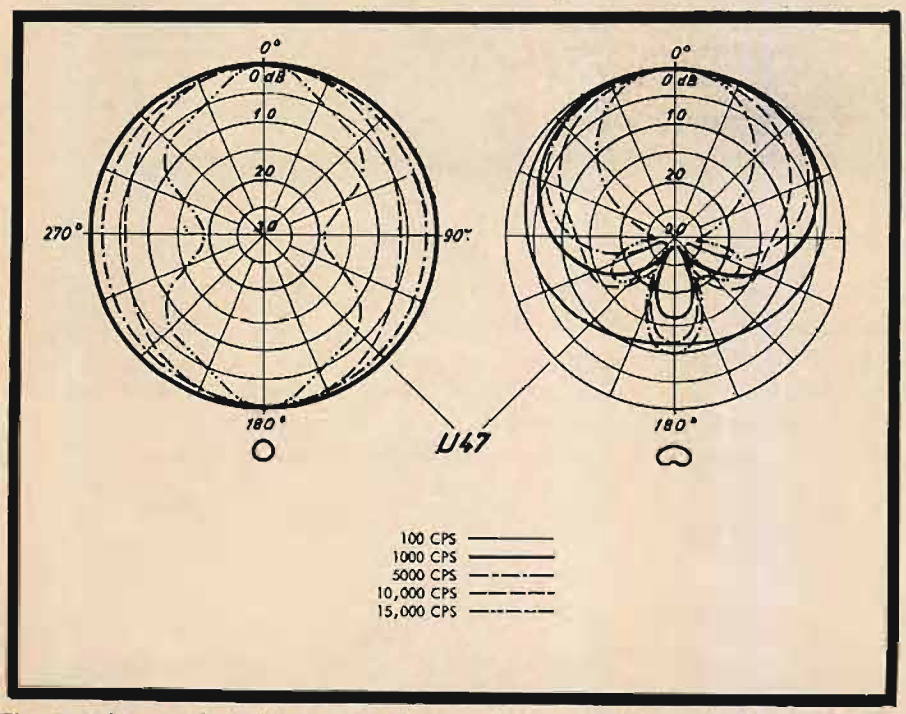

Fig. 1. Polar graphs indicating the directional characteristics, with frequency, of a high-quality microphone.

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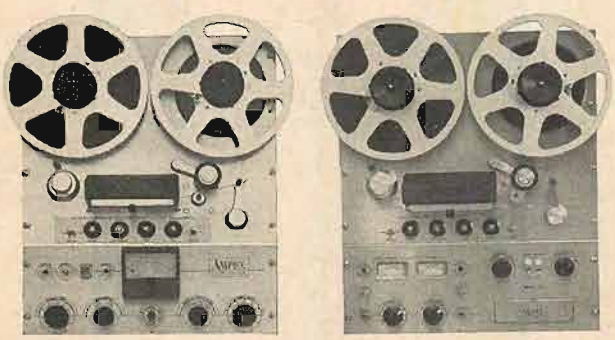

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once you have established the proper recording perspective for your taste.

The use of headphones to monitor the performance will isolate playback acoustics and allow the recordist to establish the same degree of perspective with each recording. The requirement for a high-quality headset, and allowance for low-frequency response is obvious. To establish *one* listening standard, it would be necessary to *standardize* (specify) the headset performance, but since the individual recordist usually uses the same headset for each recording it will establish a standard for him, at least.

Since all possible "perspectives" are included somewhere between a point within the orchestra center to a point furthermost in the recording hall, a proper understanding of the effects of mike placement will allow the recordist to make a decision with some degree of accuracy with respect to the perspective of the final recording.

The factors which determine this perspective are:

1. Size of the recording hall
2. Distance from the program source
3. Dynamic range of the performance

The apparent size of the recording hall is a function of the amount of reverberated sound present, in relation to the amount of direct sound, while the distance impression is, primarily, a function of the amount of high frequencies present. For example, a recording can be made with a large percentage of reverberated sound and will give the impression of being performed in a large auditorium, but it will impart the impression of being close to the performance only if a large amount of high frequencies are present. On the other hand, a recording with almost no reverberation and an absence of high frequencies will sound like a small room, but not close to the source—only dead! (For purposes of this discussion, no differentiation will be made between reverberation time and intensity). As you move away from the source, the reverberation increases, the high-frequency content diminishes, and the dynamic range compresses. The larger the building, the greater the action of all three at extreme positions. Therefore, it can be stated that the impression of the size of the recording hall is a function of the amount (and time) of reverberated sound present in relation to direct sound, that the distance from the source is primarily a function of the amount of high frequencies present (and secondarily a function of reverberation), and that dynamic range is a function of distance (and carrying power of the individual instruments).

With reference to only size, distance, and dynamic range, let us consider the characteristics of a single microphone. The amount of reverberated sound picked up by a microphone can be controlled by two factors: distance and direction; the closer it is to the source, the greater the amount of direct sound received, and also the more "on axis" it is to the source, the greater the amount of direct sound received.

Artificial reverberation can, of course, be added to increase the reverberation time and/or intensity. An abundance of the higher harmonics, to give the impression of closeness to the source, is much more difficult to obtain, since the microphone is, in itself, a frequency discriminating device (see *Fig.* 1). At the higher frequencies, it becomes highly directional and is, in reality, a narrow beam receiver. In addition, the energy levels of the higher harmonics of some instruments are so low as to carry only a very short distance. In order to achieve the effect of closeness, it is clear that one mike must be close to, and pointed directly at the source, and that large orchestras require multiple miking for proper high-frequency coverage. Either increasing the mike distance, or reducing high-frequency coverage will increase the apparent distance effect. It is obvious that a mike with poor high-frequency response will net the same results.

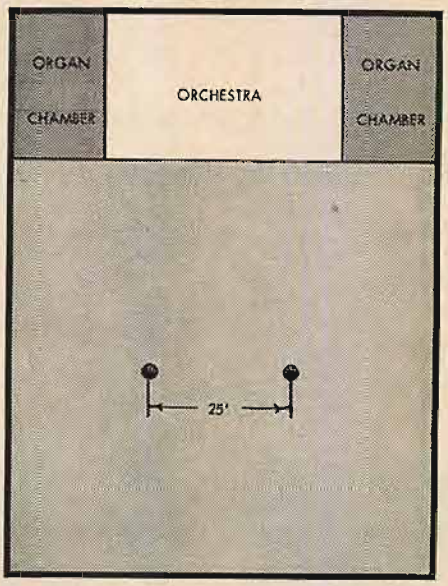

Fig. 2. Microphone placement for "far from orchestra" perspective.

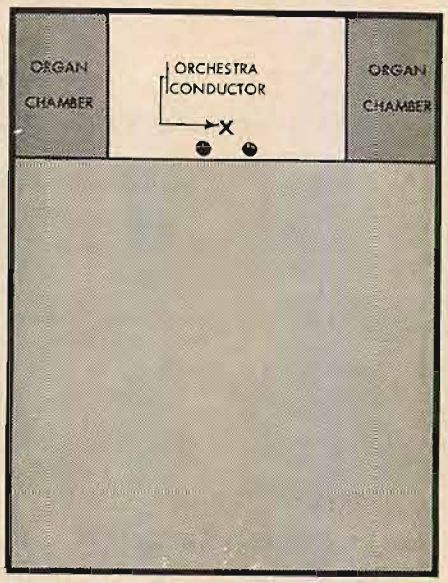

Fig. 3. Microphone placement for "midway" perspective.

From the standpoint of dynamic range, the problem becomes a practical compromise between the dynamic range of the source and the dynamic range of the recorder (signal-to-noise ratio). For example, considering only dynamic range, three different mike placements will show the relationship between these factors. The closest placement possible without overloading the mike (dynamic range of source equal to dynamic range of mike), an intermediate position where the input dynamic range is equal to the dynamic range of the recorder, and a position where the dynamic range of the input is less than the dynamic range of the recorder. In the first position, it is apparent that constant control must be exercised during the recording to compress the program and prevent tape overload. The second position is an ideal range for hands-off control during the recording, while the third position calls for continual control during program to expand the source for full utilization of the available range. All other mike placements will lie somewhere between these three positions. The actual locations of these three positions will vary with the sensitivity of the individual mike used. From the foregoing it is easy to see that a constant level source presents much less of a problem to record than one with a very wide dynamic range, and that if close perspective is required, the dynamic range still must be controlled within the limits of tape capability. It should be remembered that each of these factors has been discussed individually to clarify the effects of mike placement as related to each. When recording, however, the final result may be a compromise, particularly if only one microphone is expected to produce a desired perspective. It also should be noted that this perspective must result while maintaining proper instrumental balance, lack of peaks, dips, and resonances, stereo effects (if stereo recording), and so on.

Any discussion relative to technical information is subject to criticism from the standpoint of being oversimplified or too academic, depending upon the level of the reader. It is hoped that the middle road between the two has been taken and that the following point has been stressed: *no* instructions can be given for microphone placement in recording without *first* stating the re-

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cording objective in terms of final recorded perspective.

So far, we have discussed the factors in recording which control the impression of the size of the recording hall, distance from the source, and dynamic range. These impressions when divorced from playback acoustics, have been referred to as the "recorded perspective" of the tape recording. While not ideal, this approach gives us a point of common ground upon which further evaluation and discussion can be based.

Now we will review a series of recordings of the same source material with varying mike positions (in accordance with the above listed principles) and evaluate the results in terms of recorded perspective and subjective listening tests of these varied perspectives.

First, a brief mention of the recording set-up—the recording site was a rectangular university auditorium approximately 150-feet wide and 200-feet long with a ceiling height of approximately 60 feet. The program source was a 95-piece symphony orchestra augmented by a Cassavant pipe organ with chambers on each side of the front of the auditorium. So as not to have the results colored by the use of different microphones, six identical (make) mikes were employed (Telefunken U-47). Mixing was accomplished by a six-position mixer with flat response from 20 to 20,000 cps. The recording was made utilizing a Concertone Series 30 stereo recorder. Mastering, where required was accomplished on a rack mounted unit constructed by the author.

Although all recordings were stereo, the discussion will be with regard only to obtaining a desired perspective, and its effect upon other factors in recording. Some of the microphone positions described would not ordinarily be considered, but were included to allow verbal description of the results and to aid the beginner in determining a starting point.

For the first series of recordings, it was decided to attempt to obtain the following perspectives employing just two microphones:

1. Large auditorium—far from orchestra
2. Large auditorium—close to orchestra
3. Large auditorium—midway between previous extremes.

To satisfy the first perspective, the microphones were positioned approximately one-half of the way back from the orchestra, elevated 15 feet and placed in the omni-directional pickup position (see *Fig.* 2). The first recording indicated extreme reverberation and muddiness, and was unacceptable. The mikes were then changed to cardioid (facing forward) and an improvement was noted, but the results still indicated that we were farther away from the orchestra than desired, that the auditorium sounded larger than it actually was, and the organ completely overpowered the orchestra.

Moving the mikes forward (approximately one-third of the way back) and closer together (cardioid) improved both deficiencies; better balance was obtained between the orchestra and the organ, and an increase of direct sound to reverberated sound improved the clarity.

To obtain the third listed perspective, the mikes were placed on the stage immediately behind the conductor, approximately 10 feet apart and elevated 10 feet (see *Fig.* 3). The first recording used the mike in the cardioid configuration and was deficient in two major areas: the proximity effect was satisfactory, but the trumpets blared out of proportion to the orchestra (balance) and the auditorium sounded too small (not enough reverberation). The omnidirectional configuration of the mikes could improve the reverberation effects, but could not improve the balance. Therefore the mikes were repositioned back about 6 feet, raised in height to about 15 feet, and pointed down at about a 20 degree angle. The results of these changes improved both deficiencies, but the size of the auditorium was still not apparent in full. Further movement of the microphones away from the source would increase the size effect, but only at the expense of the proximity effect.

The second perspective, or "middle of the road," was easiest to obtain and verbally more difficult to describe in terms of sound because it is *somewhere* between the two. The latitude of placement is, of course, wider and positive description of differences is obtainable only after direct A-B comparisons. Let it suffice to say that this approach should be the starting point for beginners since it involves less problems from all factors and is easiest to obtain the first time.

Microphones were placed approximately 20 feet from the orchestra using the omnidirectional selection, and the results were satisfactory. As mentioned above, any further movements would entail only minute sound changes that are lost in word description.

The second series of recordings was made in an attempt to reduce the compromises between balance and perspective that resulted from the use of just two microphones. All six mikes were employed for this series to duplicate the two extreme perspectives.

The approach used was to position two mikes in terms of the perspective desired and then employ the additional mikes as "fill in" to improve reverberation, balance, or proximity as required.

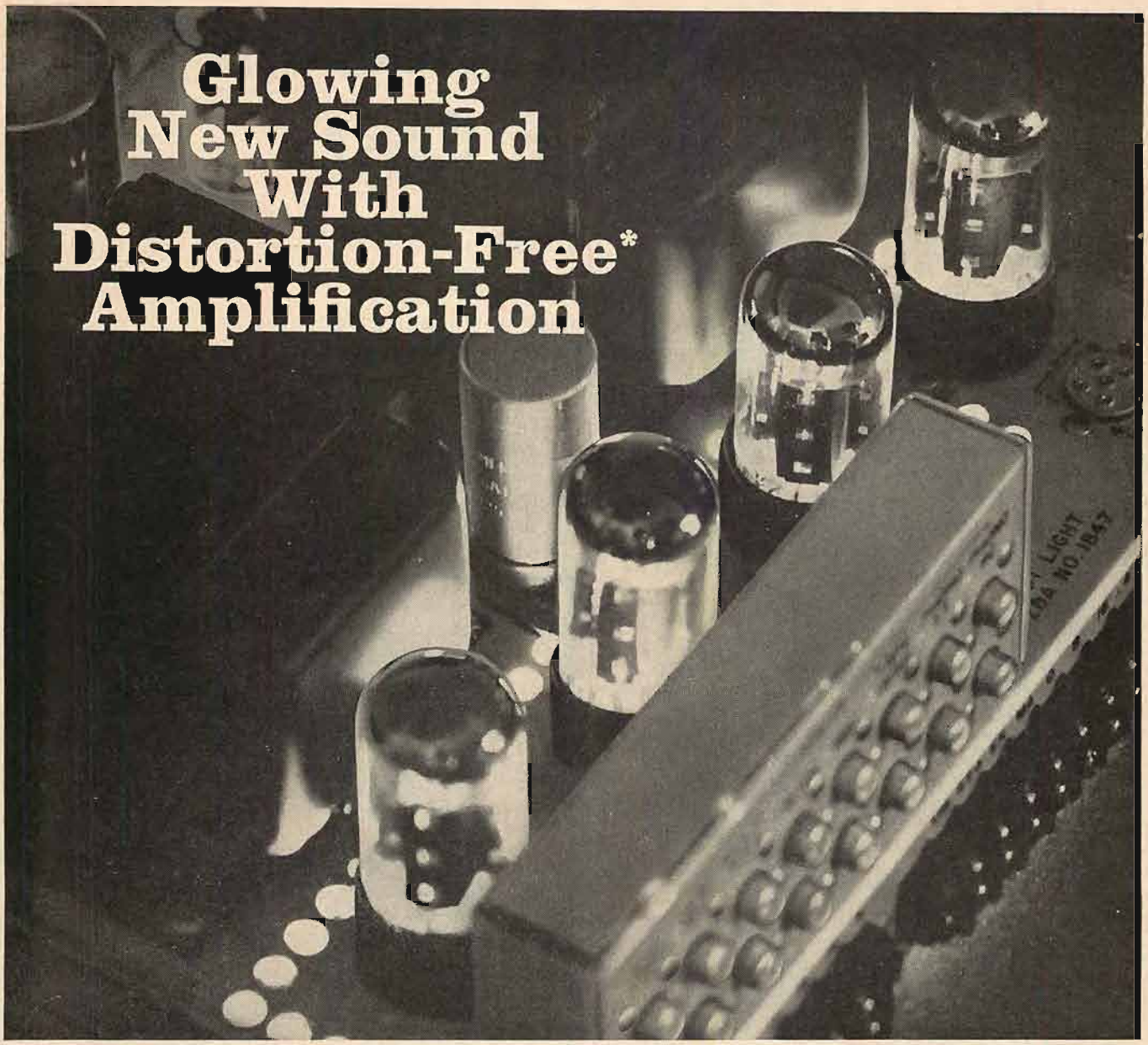
In the first perspective, the two main mikes were moved forward to improve clarity, two additional mikes were placed forward of these to improve the balance between the orchestra and the organ and the last two mikes were placed farther back to improve the reverberation. The levels of all three positions were, of course, determined at the mixer.

For the close-perspective recording, the two main microphones were moved closer together (omnidirectional), moved back about five feet and pointed down slightly more. Four additional mikes were placed symmetrically, two on each side, approximately one-third of the way back from the front of the orchestra, and pointed down like the first two except in the cardioid configuration. The two main microphones achieved the majority of the gain, while the remaining four provided the high-frequency coverage. Size of the recording hall suffered a little (two additional room fill-in mikes would have helped), but the author would not sacrifice the clarity and presence obtained to use any of the existing mikes for this purpose.

It was felt that the recordings utilizing multiple miking were decidedly superior to those of the first series. However, as stated previously, any evaluation is subjective and in order to evaluate this thing called perspective, the author conducted a series of listening tests.

The tapes were played back on a high quality system (AUDIO, Sept. and Oct. 1959) in the author's living room measuring 30x20x8 feet. The listening panel consisted of anyone and everyone willing to listen and offer opinions. Results of these listening tests were quite surprising, but first some general observations relative to the various listeners might be of interest. Prior to conducting these tests, I was of the opinion that my most valuable (or accurate) appraisals would come from either musicians or audio enthusiasts, but learned rapidly that such is not the case. The professional musician or engineer cannot *objectively* listen to a recording without subconsciously listening for that which he has been trained to consider. For example, the musician, is usually completely unaware of anything else while concentrating on hearing himself play, or paying strict attention to the composition and/or *performance* of the other musicians. The conductor is most aware of the performance, and, in addition, is most concerned with the balance, not particularly as it was played (and recorded), but as "it should be played." the engineer is inclined to listen with constant thought as to how "it could have been recorded," and does not listen to performance while straining to detect any distortion, resonance or other imperfection.

(*Continued on page 66*)



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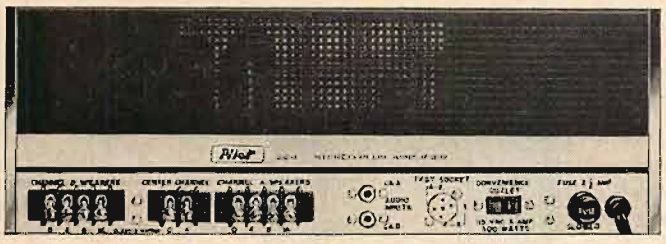

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L. F. GOELLER*

For the beginner, here is a project which will go a long way towards unveiling some of the mysteries of speaker enclosures.

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In general, this is a good thing. But all too often those who would get a lot of pleasure from doing their own design, layout, and testing never realize what they are missing. Of course testing and adjustment sometimes require specialized equipment; this also drives the would-be explorer to the logical philosophy of "Kit Construction" rather than the frontiersmanship of "Kit Carson."

For those who would like to strike out on their own, however, there are certain experiments which are not only simple and rewarding but also require a minimum of test equipment. The bass reflex loudspeaker enclosure is a case in point. With nothing more than a screwdriver, brace and bit, hammer, and saw the woodwork can be polished off. Tuning requires only an audio signal generator, an a.c. VTVM (although I have been able to get by with a sensitive multimeter), a 100-ohm resistor, and a double-pole double-throw toggle switch. As an extra added attraction, the entire cost of a very respectable speaker and cabinet should come to less than $10.00. The finished product may not be hi fi, but it will contain more "fi-per-buck" and "fun-per-hour" of assembly time than almost anything else in the badlands.

The story is short and simple. Most inexpensive eight-inch speakers (at least the several I have measured) have their free air resonance in the region of 100 cps. In a properly tuned cabinet, their useful response can be extended down to about 50 cps. The appropriate cabinet volume is on the order of 1.5 cubic feet; this suggests that ordinary wood shelving 12-in. wide[1] and ¾-in. thick is a suitable building material. The proper port area is something less than 50 square inches, or about 12 by 4 inches. Thus to tune the port a simple and straight saw-cut, removing the bottom three or four inches of the front panel, is all that is needed.

* *2 Marsha Terrace, Parsippany, N. J.*

[1] It should be noted that 12-in. shelving, for some mysterious reason, is 11⅝-in. wide.

Construction

Before going into the matter of tuning, a few construction details are in order. *Table* I shows a list of materials with approximate prices. The speaker itself can be any of the 8- or

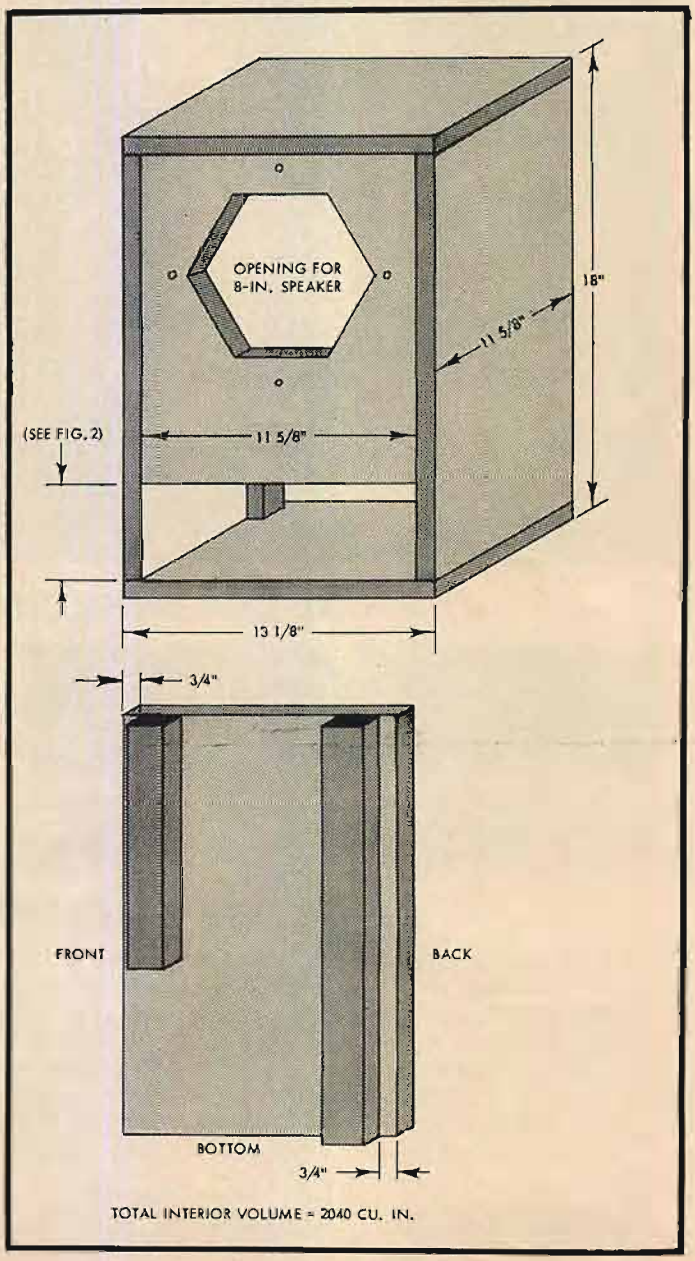
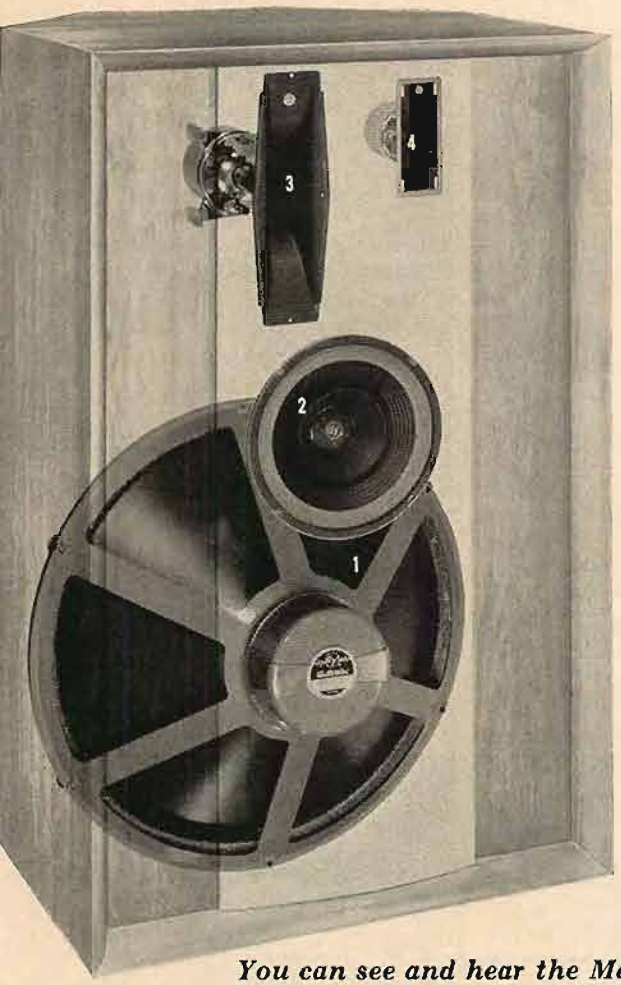


Fig. 1. Construction details.

ENGINEER'S MASTERPIECE

music lover's dream



The Patrician 700 is the most effective recreator of great music that has ever been made. And, while the exciting aspects of its physical design and performance are interesting to many, they should not and need not be misunderstood by those whose backgrounds lie in the creation and appreciation of music rather than in the means of reproducing it. For, if the Patrician 700 can reproduce with distinction the more esoteric sounds of earthquake, railroad train or thunderstorm, so can it recreate the sound of the big bass drum, the mighty pipe organ and the majestic sweep of the full symphony orchestra as can no other loudspeaker. It is for this reason that every music lover will be thrilled by the effortless ease with which the Patrician 700 handles large masses of sound, and the order it reveals in complex sonic tapestries—where lesser reproducers can present only chaos.

The world's greatest loudspeaker system is a fitting companion to the world's greatest music. Ownership of the Patrician 700 is an appropriate expression of devotion to the music you love.

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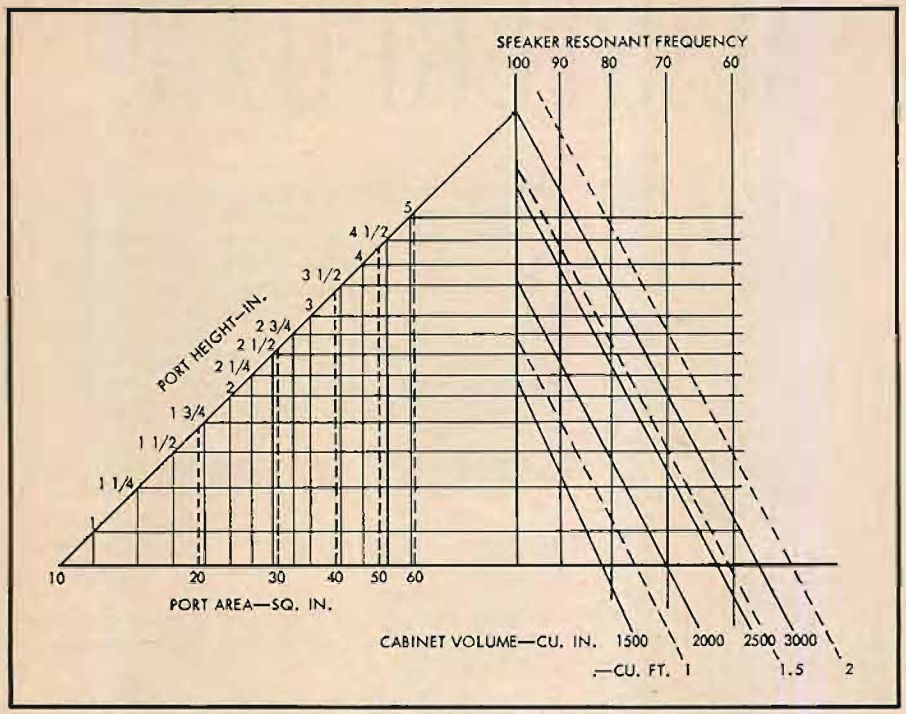

Fig. 2. Relationship between speaker resonance, cabinet volume, and port height.

10-in. models that sell for about $3.00. For a first experiment, there is no need to be more elaborate.

Table I

Materials Required for Cabinet

Quantity	Description
10 ft.	12 × ¾-in. shelving
6 ft.	1¾ × ¾-in. stripping
3 ft.	Fiberglas insulation, 2-ft. wide
2 doz.	#7 flat-head wood screws, 1¼-in. long
1	2-terminal terminal-strip
	glue, putty, speaker mounting bolts, etc.

The front, back, and sides of the cabinet are all 18-in. sections cut from the shelving. If the top and bottom are cut to be 13 ¼-in. long (this allows ⅛ of an inch for error), the box can be assembled as shown in *Fig.* 1. The 1 ¾ by ¾-in. strips act as supports for the back and front of the cabinet, and also provide a convenient mounting for the Fiberglas insulation. The strips should be attached to the sides first with the short ones at the front to leave room for the port. It is easy to assemble the box around the back panel; use wood screws and glue for best results. The joints where the top, bottom, and sides meet the back should be sealed with plastic wood or putty to make them air tight. At this time the front should fit snugly but care must be taken to see that it can come out easily during the tuning process.

Wires are needed for the speaker. A 2-terminal terminal strip should be mounted on the back of the cabinet and a pair of wires about 2½-feet long connected and run through a hole in the panel. The hole should be sealed after the wires are run. It is a good idea to have the wires fairly long because a certain amount of play will be needed while the cabinet is being tuned.

The insulation goes in next. It comes in 2-foot widths, which means a 6-inch strip will have to be trimmed off the 3-feet long section intended for covering the back and sides. The insulation should be attached (I used thumb tacks) to the brace strips in such a way that it stands away from the back and sides about ¾ inch. Insulation across the top (2 1-foot sections of the 6-inch strip will do nicely) should be mounted the same way. Front and bottom do not require insulation. The remaining piece of Fiberglas will be needed later, so don't throw it away.

At this point the speaker can be neglected no longer. An opening must be provided in the front panel, along with holes for mounting bolts. The speaker should be centered horizontally with its top edge about two inches from the top of the front panel. Mark the bolt holes using the speaker face down, as a template. A circle should be drawn about ½-in. inside these mounting holes to indicate the area to be removed. Personally, I like a hexagonal shape because it is easier to saw. After the opening is completed, a wood rasp can be used to make it slightly funnel shaped with the outside diameter greater than the inside diameter. This tends to eliminate resonances at the higher frequencies. The basic construction is now complete and the process of tuning can begin.

Tuning

Tuning a bass-reflex cabinet is not difficult. The speaker, all by itself, acts similarly to a series resonant circuit at some relatively low frequency—about 100 cps in the case of inexpensive speakers, and lower for better ones. To keep the speaker from overloading at this frequency, a parallel resonant circuit, in the form of a tuned cabinet, is placed in series. All one has to do is tune the cabinet to the speaker resonance.

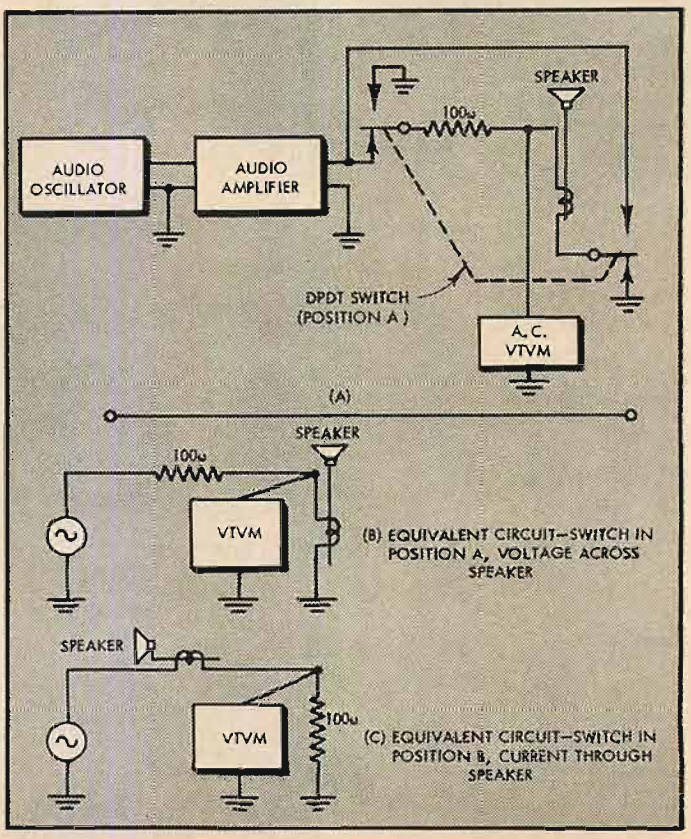

Fig. 3. Test Circuit.

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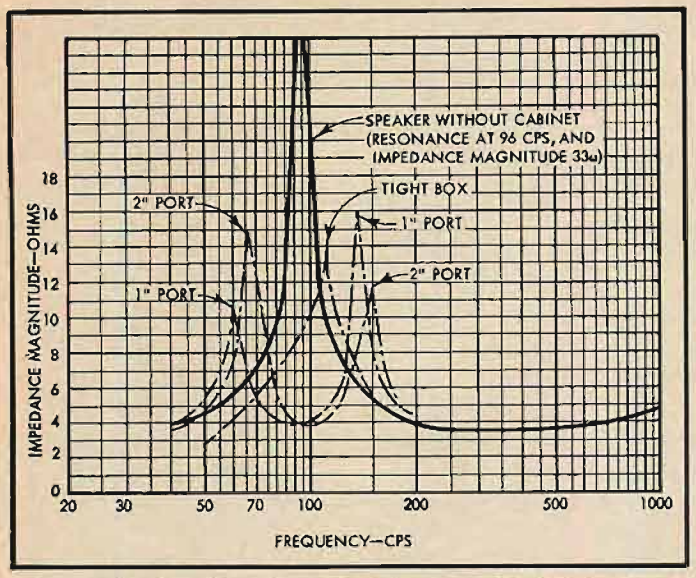

Fig. 4. Experimental tuning curves.

A word of caution is needed here. When the speaker is described as being like a series resonance, the phrase depends on a analogy where mass corresponds to inductance, cone-support springiness to capacity, and cone velocity to current. Just to confuse things, however, the actual electrical impedance looking into the speaker terminals at resonance is very high, not low as might be expected. The trick is to concentrate on the mechanical circuit for understanding the theory and then shift gears and use electrical measurements to get the tuning job done.

In any event, the important things to remember are these:

1. The cabinet is to tuned to the speaker resonant frequency (using data from *Fig.* 2).

2. The magnitude of the *electrical* impedance looking into the speaker terminals can be used to study the effects of various steps in the tuning process.

For those interested in a more complete discussion, references are provided at the end of this paper. Particular attention is called to *Ref.* 3.

The use of *Fig.* 2 can, I hope, be easily explained. The cabinet volume and speaker resonant frequency can be obtained rather simply, the first from calculations based on cabinet inside dimensions and the second as described below. If a horizontal line is followed to the left from the intersection of volume and resonant frequency, the port height will be obtained. Alternatively, if the port height (based, of course, on a port width of 11 5/8 inches) is known and the cabinet volume is known, the frequency to which the cabinet will resonate can be found by going horizontally to the left until the volume line is intersected and then straight up. For those interested in history, *Fig.* 2 is based on a less explicit diagram in *Ref.* 3 which, in turn, is based on a formula in *Ref.* 1.

Since the procedure is obvious, there will doubtless be a strong temptation to hack off the front panel, bolt down the speaker, finish things up and sit back and listen. If this temptation is resisted, however, many interesting experiments can be conducted. Tuning measurements come first, followed by damping operations. In each experiment, the magnitude of the speaker impedance is measured; at low frequencies it is necessary to make measurements every ten cps or so, and even closer together in the regions of resonance. The band of interest is only from 40 to 120 cps, however; at higher frequencies, values need be obtained only at 500, 1000, 5000, and 10,000 cps. If data are plotted on two-cycle semi-log paper as you go along, curves like those of *Fig.* 4 and *Fig.* 5 will be obtained. Actually seeing the curves tells you more than looking at a table of numbers.

Make the first run on the speaker all by itself. Then, put it in the cabinet (with no port yet) and try again. Then, saw off one inch from the bottom of the front panel and repeat. Remove the panel bottom a ½ inch at a time and watch the peaks. It is important to approach resonance slowly since effective cabinet volume may differ somewhat from the measured value and speaker resonance depends on calibration of the signal generator. In any event, when you have two peaks of equal height spaced evenly above and below the speaker's free air resonance, you're in!

The test set-up of *Fig.* 3 is recommended because of the way signal generators and VTVM's are grounded. Each measurement in a given run is made in the same way:

1. Set the generator to the desired frequency.

2. With the switch in the position that connects the VTVM across the speaker, as in (A) of *Fig.* 3, adjust the generator output until a voltage can be read. A very small voltage is necessary—something on the order of 0.01 volts rms, maximum. This shows why audio VTVM's exist. They read millivolts easily.

3. Decrease the sensitivity of the voltmeter (switch to the next higher scale) and, leaving the generator output level and frequency set, throw the double-pole double-throw switch. The meter should now be reading voltage across the 100-ohm resistor. If you multiply by 10, the voltmeter reading is the current through the resistor in milliamps. The current through the resistor is, of course, the current through the speaker.

The magnitude of the speaker impedance can now be calculated easily. Simply divide volts across the speaker by the current through it, or, as will probably be more convenient, divide millivolts by milliamps. Plot ohms vs. frequency.

Once the proper double-humped curve has been obtained, the front panel can be fixed in place. The humps are still an indication that the speaker will absorb power differently at different frequencies. This can be remedied to some extent with the remaining scrap of Fiberglas. Insert it in the port and take another impedance magnitude curve. A different curve will result if you split it in half and use a thinner piece. The best damping seems to occur when the lower peak is not quite eliminated. Glue the Fiberglas into the port

(*Continued on page 66*)

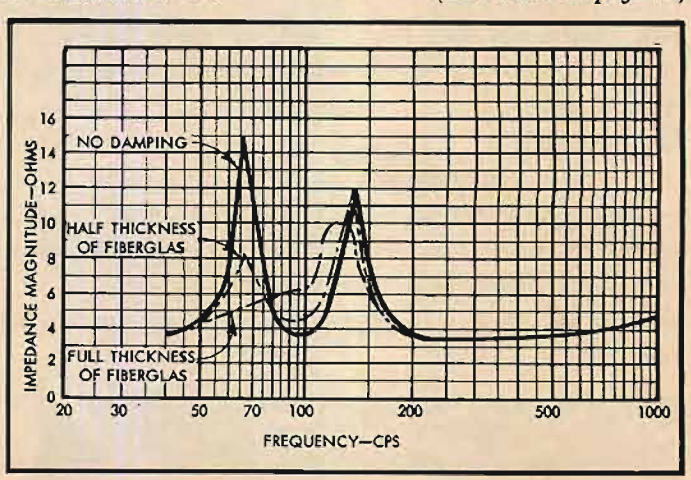

Fig. 5. Experimental damping curves.

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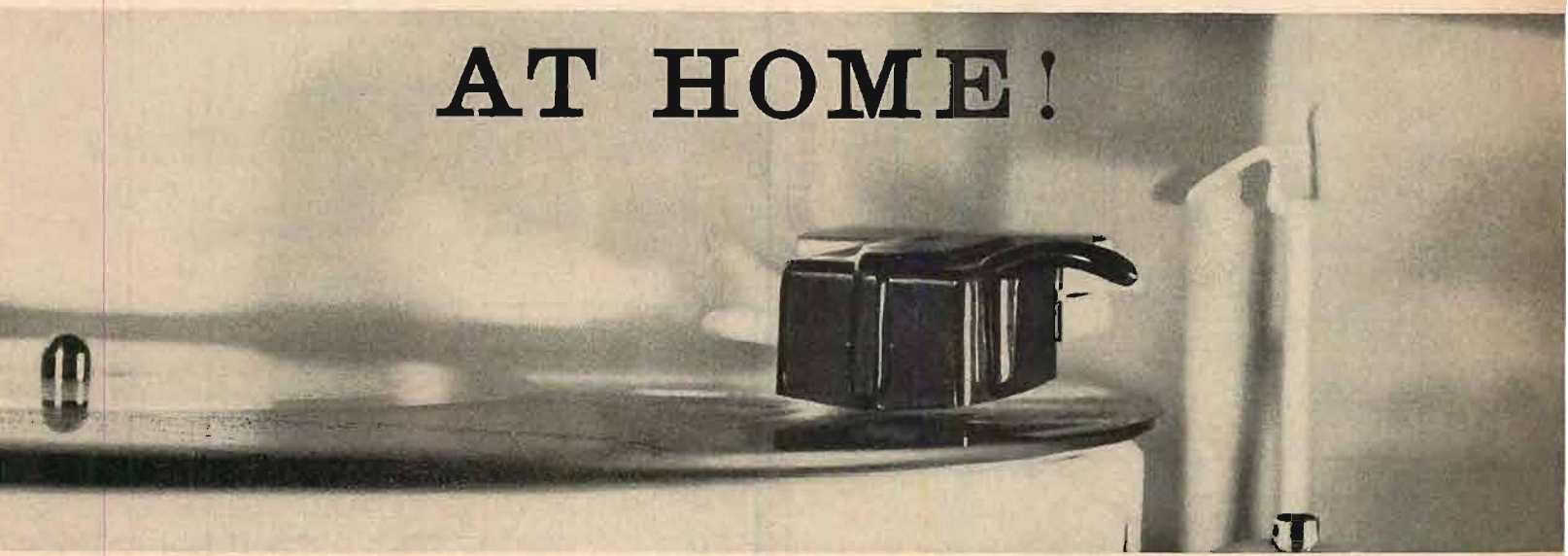

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AUDIO TECHNIQUES

(*from page 14*)

submitted by Frank J. Dypold, Park Ridge, Illinois.

The circuit of *Fig.* 3 was submitted independently both by *David G. Hyman, Detroit, Michigan* and *Robert L. Cantillo, Bronx, New York.*

This arrangement differs from *Fig.* 2 in that two resistors are used whereas in *Fig.* 3 four resistors are used.

William M. Marts, Export, Pennsylvania and *J. H. Trotman, Ottawa, Canada* sent in similar schematics. *Figure* 4 is the circuit of Mr. Trotman. This circuit employs a single resistor which serves as a load for either of the amplifiers when not switched to the speaker.

Figure 5, Mr. Marts's circuit, was slightly different from that of *Fig.* 4 in that the stereo and the inverted stereo positions are placed next to each other. He explains his reasoning thus: ". . . often the program source is inverted and in the process of correcting this, the switch need be moved only one position, thus saving wear on two other positions."

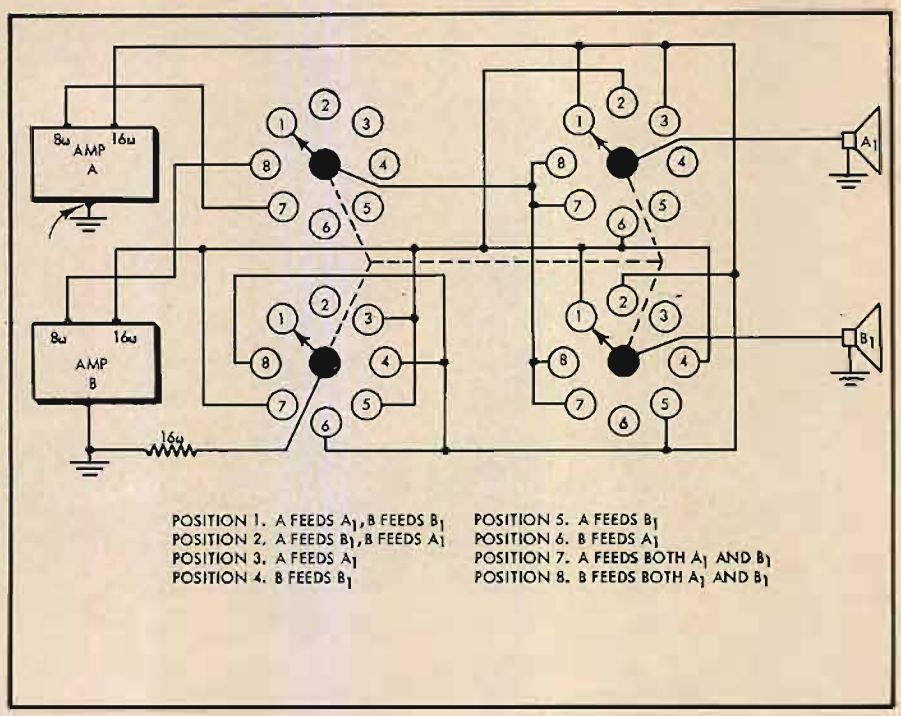

Fig. 5. Speaker switching circuit by William M. Marts.

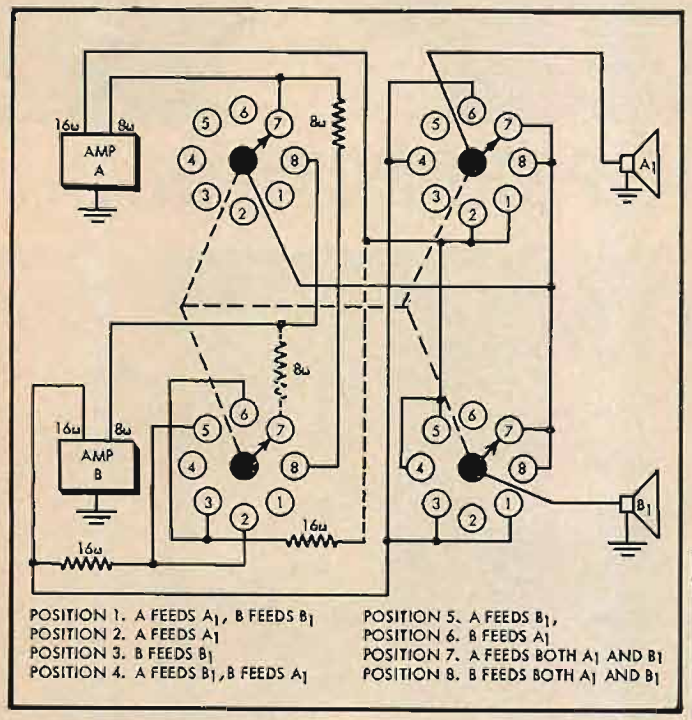

Fig. 3. Speaker switching circuit by David G. Hyman and Robert L. Cantillo.

brought up until feedback just begins. This feedback will occur at a certain frequency —reasonably pure.

Mike 2 undergoes the same procedure.

The frequencies produced by the feedback from both microphones are compared. When the two tones are the same with regard to frequency and level, I find the microphones to be very closely matched.

The tape recorder is used in this process to play back the signal from mike number 1 while listening to the signal of mike number 2. The tape can only tell you whether the frequency of feedback of the two microphones is the same. It will not tell you whether the levels are the same. To do this you must mark the position of the volume control when mike number 1 just starts to oscillate and note the position of the volume control with respect to this mark when testing mike number 2.

Bob Speiden, Rahway, New Jersey. Æ

Matching Microphones

I like to build every bit of the equipment I use—including microphones. Because of the demands of stereophonic sound recording, the microphones must have matched characteristics—especially frequency response. Obviously, a testing procedure must be devised which will determine when microphone characteristics are matched. This would be easy if I had an anechoic chamber. Well, I don't own one. My system is very unscientific, but it works.

This method consists of placing mike number 1 in a definite position with respect to a good loudspeaker. This mike is then connected through preamplifier, power amplifier, speaker, and tape recorder in the conventional manner. The speaker level is

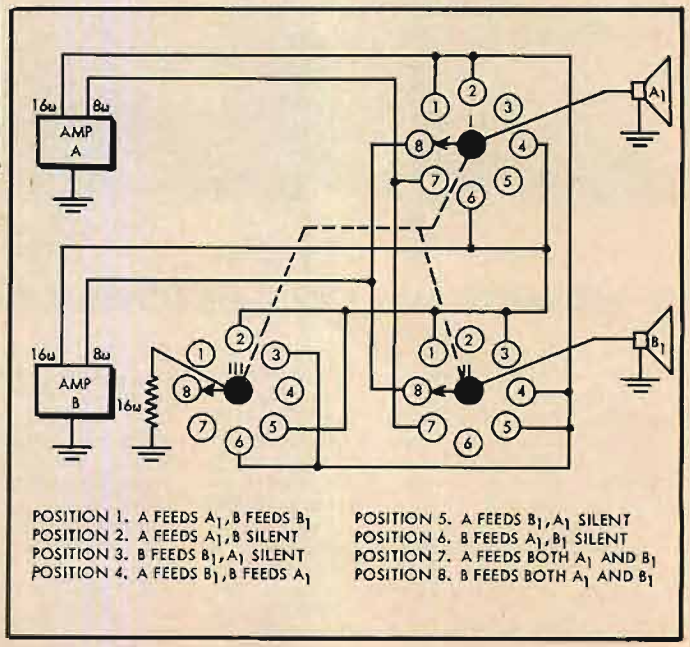

Fig. 4. Speaker switching circuit by J. H. Trotman.

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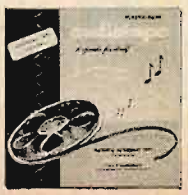

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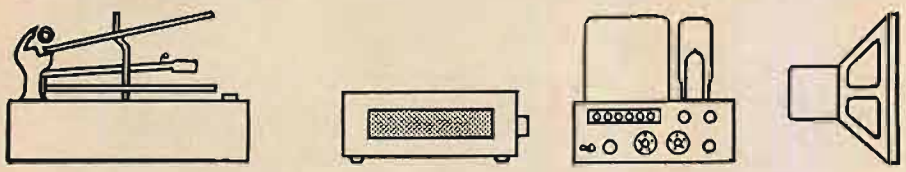

SHERWOOD MODEL S-2200 FM-AM-MX STEREO TUNER

High fidelity components, in general, have reached such a high level of performance that it becomes more and more difficult to evaluate tuners, for example, with any degree of certainty when it comes to sensitivity, selectivity, and over-all sound quality. However, there are subtle differences throughout which may make one model most suitable for one person's listening habits and another may appear to be more in keeping with the needs of someone else. From the standpoint of sensitivity, the Sherwood S-2200 need take a back seat to any others, nor does it need to with respect to ease of handling and the features offered in the instrument itself.

In the first place, the S-2200 is quite compact, measuring only 4 in. high, 14 in. wide, and 12½ in. deep. And when one considers that this space accommodates what are essentially two separate tuners—FM and AM—and in addition provides space for the future installation of a multiplex adapter on the same chassis, one begins to realize what an excellent job of designing and constructing has been done.

The front panel is neat and simple. It accommodates two tuning knobs, two slide switches, four push buttons and one rotating control which looks like a fifth push button, and, of course, the dial with its two scales. Within the dial opening are two tuning indicators and two light indicators which show which mode of operation is in use. When listening to AM on both channels, only the AM tuning indicator is illuminated: the same goes for FM, with its tuning indicator being illuminated solely when listening to FM on both channels. These modes are selected by simply pressing one of the four pushbuttons. For FM–AM stereo, which puts FM on the left channel and AM on the right, both AM and FM buttons are depressed simultaneously, illuminating both indicators and the word "stereo"; for FM-multiplex, both FM and multiplex buttons are depressed, illuminating the FM tuning indicator and the word "multiplex." To turn the tuner off, one depresses the PWR OFF button. The fifth "button" is a small knob which controls the interchannel hush effectiveness, as described later. The left tuning knob and the left slide switch are associated with the AM circuits, the switch changing the selectivity of the first i.f. transformer and giving either "wide" or "narrow" band transmission. The right tuning knob and slide switch are associated with FM, with the switch defeating AFC in one position. (It would seem that the positioning should be reversed, since FM is the left channel and AM is the right on FM–AM stereo broadcasts.) The rear panel provides for connection of an FM antenna, a switched a.c. receptacle, two holes to accommodate multiplex level and frequency controls when the MX adapter is installed, a fuse, a dual-concentric output level control, and two output jacks.

Circuit Description

This is the type of circuit one can get his teeth into when it comes to describing it. The FM section consists of an r.f. amplifier, mixer, one i.f. amplifier stage and three limiters—with the first two providing considerable gain—a Foster-Seeley discriminator, hush control amplifier, and a cathode follower for audio output. The oscillator and AFC tubes are combined in one envelope, and the tuning indicator is an EM84. The r.f. amplifier is a cascode pair, with AGC voltage applied to the input section. The mixer stage is a triode 6AB4, and the oscillator/AFC tube uses the two sections of a 12AZ7A. Three 6AU6's are used in the i.f. amplifier stage and the first two limiters, with the first of these limiting in the grid circuit and providing the AGC voltage and the second limiting in both grid and plate circuits. The third limiter uses the pentode section of a 6EB8, and it is followed by the two diode sections of a 6BN8 as the discriminator. The triode section of the 6EB8 is the hush control amplifier, and the triode section of the 6BN8 is the cathode-follower audio output stage. The hush control tube derives its control grid voltage from the grid and plate circuits of the second limiter, and its plate circuit voltage drop is used to cut off the cathode follower. The threshhold control in the cathode circuit of the hush tube gives a wide range of control, and the operation of silencing occurs without any disturbing sounds.

The AM section employs a 6BA6 as an r.f. stage, a 6BE6 as converter, another 6BA6 as the i.f. stage, and the two diodes of a 6CN7 as detector and delayed AGC. The remaining triode section of the 6CN7 is the cathode follower output stage, and a 10-kc whistle filter is in circuit at all times. In addition to varying the bandwidth of the first i.f. transformer, the WIDE-NARROW band switch also introduces an additional capacitor across the output.

Operation of the pushbuttons switches the plate supply to the required section(s) and actuates the indicator lights when in either stereo or multiplex positions—both being on for multiplex stereo. When the adapter is installed, it is possible to listen to the multiplex channel by itself simply by depressing the MX button alone, so that with the proper adapter, one could listen to the any desired multiplex program.

Performance

Sherwood tuners have long been noted for their sensitivity, and this model is one of the most sensitive we have encountered. Using the usual figure of sensitivity for 20 db of quieting, for comparison purposes, the S-2200 is rated at 0.95 μv; for 30 db, 1.8 μv; and for a signal-to-noise ratio of 50 db, 3.6 μv. In addition, Sherwood publishes the IHFM sensitivity figure, which is based on noise and distortion 30 db below 100 per cent FM modulation, and this figure is 1.8 μv. These specifications are ones which we do not attempt to measure, since the equipment necessary is beyond our range of facilities. However, in comparison with others, it must be admitted that the performance and pick-up ability of the S-2200 is above reproach. Drift is sufficiently low that stations may be tuned in with the set hot and they appear at the same setting after the tuner is left to cool overnight.

We are particularly impressed with the AM quality, and in the wide position there was very little difference in audible sound quality from WQXR, New York, (which is noted for its excellent AM quality), and its FM outlet on the same programming. AM sensitivity is more than enough for satisfactory listening, although it would not be classed as an outstanding distance getter. However, the requirements for a tuner which is ideally suited to DX listening differ radically from those for one which is to be used primarily for entertainment-quality programs.

Not the least of good things about the Sherwood—not only this tuner, but the entire line—is the quality of the instruction book furnished. We feel that the high fidelity component user needs adequate service notes since even though he may have to call in the local radio serviceman who might normally be able to fix anything that went wrong, the serviceman would not be likely to have a schematic and alignment instructions. We do feel that a voltage and resistance measurement chart might well have been included, however.

But it's still a fine tuner for the critical listener. D-27

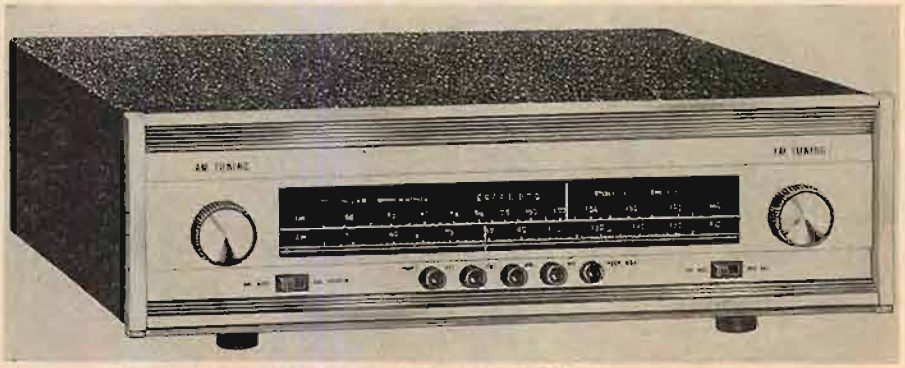

Fig. 1. Panel view of the Sherwood Model S-2200 stereo tuner.

MODELS B60, B61

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MODEL B50—$40.40

MODEL TT3—$59.95

MODELS TT4, TT5 $99.50, $129.50

MODEL T68AH—(16") $170.00

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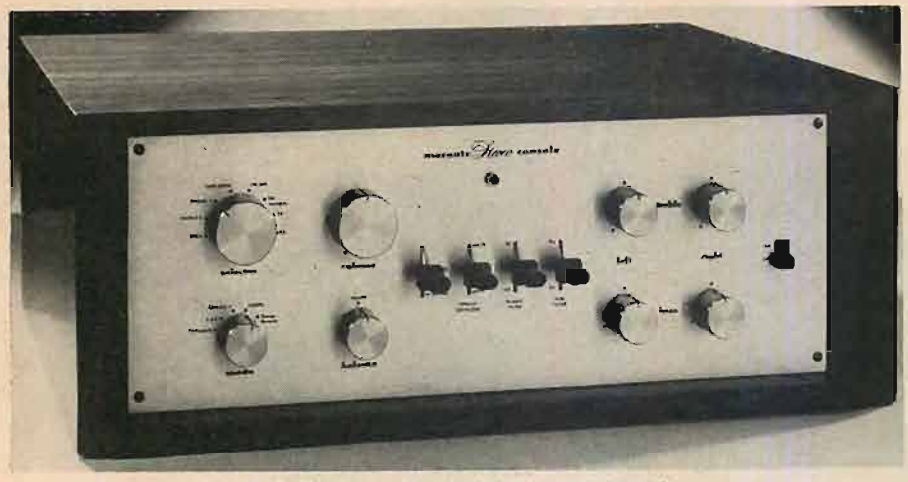

Fig. 2. The Marantz Model 7 Stereo Console.

MARANTZ MODEL 7 STEREO CONSOLE

When in the course of events a new product comes out of the Marantz shop, all audiofans, including ourselves, become excited or at least very much interested. Experience with this line has taught us that anything offered under this trademark is well worth looking into. And, completely aside from the performance—about which more later—looking into is a good description, since the equipment is constructed in accordance with the most meticulous precision, and with an engineer's attention to detail throughout. While there are many fine amplifiers on the market, and while the concept and engineering on many makes may possibly equal the Marantz, there can be no question about the over-all quality of Marantz equipment from design, component, or construction standpoints.

The Stereo Console, Model 7, is not very new—it has been on the market for about a year and a half, which is long enough to have been thoroughly proven in the field. And while almost any equipment can be made to work well on the day it leaves the factory, the real proof of the pudding is an evaluation of the performance of the same equipment a year, or two years, or ten years after the unit goes into service. In the nine years (about) since we first put an original Audio Consolette into service, *not one single thing has been done to it in the nature of repairs or replacement.*

Be that as it may, each new item is just as carefully looked over as though it were a brand new product which had been introduced within the last week. To be sure, the Model 7 Stereo Console is not much more than a two-channel Audio Consolette—but why change the design radically if the original was so satisfactory in the first place? One or two things have been added, some left off, perhaps slightly less flexibility has been provided in the way of equalization. But the entire design philosophy of the Model 7 derives from the original Consolette. Since practically all records in use nowadays are LP's, why provide for a wide variety of equalization curves? Since contour controls are frowned upon by the purist, why provide one? And we must certainly add a mode control as well as a balance control if we are going to have stereo. And that practically completes the design of the Model 7.

Circuit Description

Ahead of the preamplifier section, four separate inputs are provided: microphone, two phonos, and tape head. After the preamplifier provision is made for four high-level inputs: FM on one channel and AM on the other, FM on one channel and multiplex on the other, and TV and Aux duplicated on both channels. Equalization is switched simultaneously with the inputs, with a rear-panel control making it possible to adjust tape-head equalization for a turnover anywhere from about 4000 cps to about 1300 cps, thus accommodating any curve from 7½ down to 1¾ ips. A lever switch offers three degrees of record equalization—RIAA, COL LP, and OLD 78—which is adequate for any record likely to be played on modern equipment. The same switch can be used with tape-head inputs to reduce the equalization below 100 cps as may be required by some machines. In the normal RIAA position of this switch, tape-head equalization follows the NARTB curve accurately, as required by most professional machines. In contrast to the original Consolette, the equalization is removed when switching to microphone; the older model required a change of both low- and high-frequency compensation in addition to switching the source.

The preamplifier section employs a 12AX7/ECC83 with the two sections cascaded and one other triode section as a cathode follower. This provides a low source impedance for the equalizing feedback networks to the cathode of the first triode section so the feedback is applied to only a small segment of the cathode resistor. Thus most of the cathode resistor is by-passed, resulting in a considerable decrease in noise level in the first stage.

The "front end" is followed by the high-level sections of the selector switch, with the latter offering the five positions of MONO A, MONO B, A + B, STEREO, and STEREO REVERSE. These switches are followed by another 12AX7/ECC83 as a cascaded pair which drives the feedback-type tone-control networks. These are step switches with six boost and four cut positions on the bass controls and five boost and five cut positions on treble. When in the "flat" position, the tone-control networks are out of the circuit altogether, which is a desirable feature. The tone-control circuits are followed by the low-frequency filter switch which provides cutoffs at 50 and 100 cps in addition to flat, and by rear-panel output-level controls which permit adjustment of the two channels separately. These controls feed two cathode followers which, in turn, feed the high-frequency filter switch with cutoff positions of 9000 and 5000 cps in addition to flat. The filters are LC networks employing toroid coils and suitable capacitors and damping resistors for smooth cutoffs.

Figure 2 shows the external appearance of the Stereo Console. The four large knobs at the left are the basic controls—SELECTOR, VOLUME, MODE, and BALANCE. The lever switches are, from left to right: tape monitor, phono equalization modification, low-frequency filter, and high-frequency filter. At the right are the four tone-control switches, with separate controls for each channel. The slide switch at the extreme right controls a.c. power to the built-in power supply and to five of the six a.c. receptacles—the sixth receptacle is unswitched.

Performance

Testing the Model 7 became quite a chore in the distortion department because our own IM equipment has a residual distortion of 0.2 per cent, and up to a 10-volt output no distortion was readable. Actually, the factory sets a maximum limit on IM distortion of 0.15 per cent at 10 volts out, and since it is not likely that anyone would ever use an output of more than 2 volts with typical modern amplifiers it may be said, practically, that the amplifier is distortionless. With the volume control at maximum, hum and noise measured 55 db below 1 volt on phono; at a volume control setting which resulted in a 1-volt output from a 5-mv input signal, the noise measured 73 db below 1 volt. On the high-level inputs the noise level was more than 90 db below 1 volt—a fantastically low figure for any preamp.

Frequency response was measured in every control position, and phono, and tape curves were within 1 db of the standard values throughout—and within less than 0.5 db from channel to channel. The volume control tracking was within 1.5 db down to 40 db from maximum. In short, the unit could almost be considered as suitable for use as a standard in every particular.

Construction

Figure 3 shows the rear panel, with the tubes being accessible without removing any portion of the housing. The tubes are carried on a flexibly mounted sub-chassis, and all leads to them are very flexible. To reduce microphonics of the low-level cables, caused by variations in capacitance between the internal wire and the shield, the low-level wiring is isolated from the side of the chassis with a sheet of poly foam. This is just one example of the high quality of construction throughout. Its performance is every bit in keeping with its handsome appearance. D-28

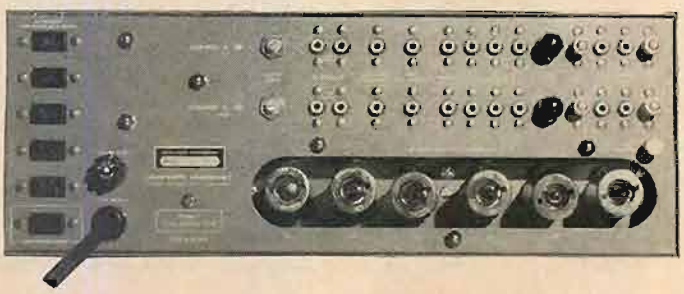

Fig. 3. Rear panel of the Model 7.

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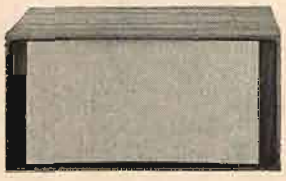

THE MADISON

THE DALE

THE JBL MADISON

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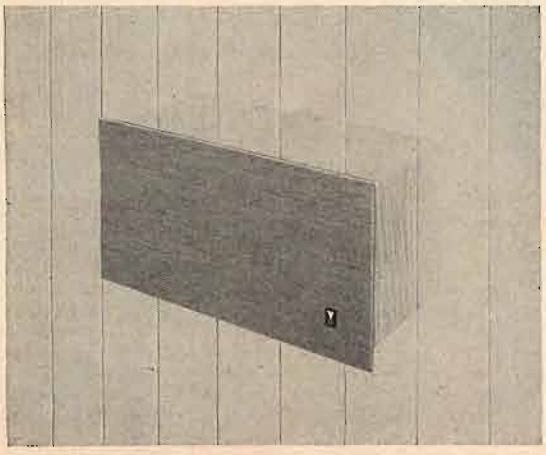

THE LANCER 66

Similar in appearance to the 33, the Lancer 66 is a "buttoned-up" enclosure with a two-way, dividing network system with an LE 10 and new high frequency unit. Performance is remarkably smooth and transparent. Lancer speakers are factory installed.

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WEATHERS 2-SPEED TURNTABLE AND PICKUP, MODEL K-834

The Weathers Model K-834 is a complete turntable and stereo pickup system which requires no more than a power amplifier and speaker system to play both 33⅓- and 45-rpm records with RIAA equalization. Unusual as this sounds, the pickup system contains an RIAA equalization network plus sufficient amplification to drive most high-quality amplifiers. High-quality is specified because it would be decidedly incongruous to associate this superb mechanism with less than the best.

At this point it would be worthwhile to digress momentarily and consider the meaning of adjectives. For example, in the previous paragraph we used the adjective "superb." Obviously this means we think highly of the subject noun—but still it does not define quality as clearly as we would like. Certainly there are many first rank turntables and pickup systems available nowadays, any one of which would qualify for the adjective "superb," but one need only take a brief glance at these units to realize that there are quality and other significant differences even between them. This glance would reveal, for example, that there is a "plus" factor inherent in the Weathers approach which promises long and trouble-free operation in addition to "superb" performance. Most probably, close examination of other "superb" units would reveal individual "plus" factors. The point of all this is that this Weathers system is better than a single adjective could encompass.

Well, so much for adjectives—

The Turntable

For a turntable of this quality, the Weathers is probably the least space-hungry unit of any we know. The primary reason for this compactness is the extremely light turntable platter and the resultant small drive motors required. Most of you are undoubtedly familiar with the new approach to turntable design indicated by these facts; the turntable is actually very light although it is *relatively* massive when compared with the rotor of the motor. This unit differs from others we have seen, however, in that it is a 2-speed unit. Two small, precision, clock-type motors are utilized, one each for the 33⅓- and 45-rpm speeds. The motors are selected, and turned on, by a lever which rotates the selected motor puck into contact with the rim of the platter, at the same time tripping a mercury switch to supply power to the motor. In operation, the platter rotates on a spindle with a polished spherical bearing surface on either end. Each spherical surface rides on a thrust bearing which is housed in a brass spindle housing as shown in *Fig.* 5. The spindle is about ⅛ in. in diameter and is centerless ground to provide a highly accurate bearing surface which is matched by the precisely bored hole in each brass spindle housing. In fact the fit is so precise that we experienced difficulty in removing the spindle from the housing—although it rotated freely.

An advantage of the lightweight platter is the relatively short delay required to attain operating speed—less than ¾ of a revolution. This, coupled with the fact that the motor will rotate backwards, makes it extremely easy to "cue" with this turntable. One need only rotate by hand until a particular location is reached, back off ¾ of a turn, and release on "cue."

The Pickup System

Some years prior to the introduction of the turntable principle described above, Weathers introduced the now well-known FM pickup system. Although the present pickup system, Model PS-11, operates under a different principle, it nevertheless is clearly the brainchild of the same father—both are unique solutions to the pickup problem.

The PS-11 system includes a carved walnut viscous-damped arm, a capacitance-type cartridge and a polarizing power supply with high-level (1 volt) RIAA equalized output or low-level (8 mv) unequalized output. The arm, because it is viscous damped, descends gradually to the record surface when released. This prevents damage to both the stylus and the record due to the pickup accidentally dropping. More important, it prevents the pickup from "skipping grooves" when the turntable is subjected to mild shocks. In addition it is great fun to amaze your friends by casually flipping the arm towards a particular section of the record and walking away as it settles gracefully and gently.

The capacitance-type cartridge is the newest addition to the system. It contains a pair of ceramic capacitor elements, coupled through a soft linkage to the stylus armature. Movement of the stylus stresses the elements, varying their capacitance, and hence the low-voltage d.c. charge applied to them from the polarizing supply. The varying voltage is then amplified and equalized (or fed through) in the polarizing supply. The cartridge is extremely easy to remove and replace and is very small compared with most cartridges one sees about. Of course, considering the size of the required polarizing supply, the total space required is considerable, except for the saving fact that the "box" may be mounted beneath the motor board.

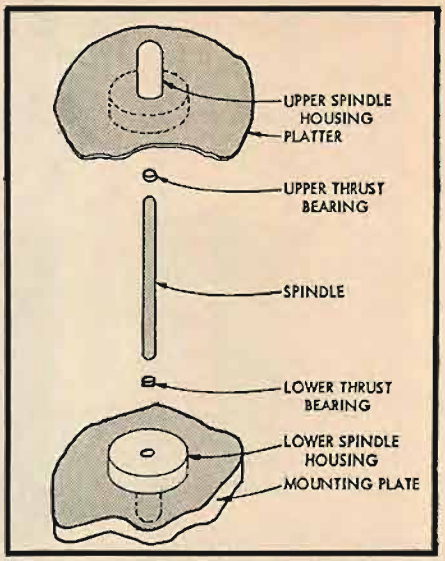

Fig. 5. Spindle and housing for Weathers turntable.

The "amplified bridge" circuit in the polarizing supply is responsible for taking the high source impedance of the capacitor-type pickup and reducing it to the low-impedance level required by a conventional preamplifier phono input. We must admit that we were not able to discover how this was done since the heart of this circuit is a sealed module, and we managed to overcome our natural inclination to "open it up." Suffice to say that it does work.

The stylus force of the unit we tested was 1 gram. The manufacturer claims that it can operate well at ¾ gram. The "secret" is in the extremely high compliance and low moving mass. Of course this not an unmixed blessing—the stylus must be kept scrupulously clean, even to the extent of using a special solution to clean off the normal accumulation of wax as well as dust. At one point in the test we eliminated some very puzzling distortion by simply cleaning the stylus. On the other hand, the increased record life is well worth the slight inconvenience of periodic "tip cleaning."

Performance

Now we are at the crux of the matter—how well does this system perform? First let us dispense with the obvious—the Weathers Model K-834 meets, or exceeds, its published specifications, which are quite excellent: frequency response plus or minus 1 db from 20 to 20,000 cps; channel separation 35–40 db from 20 to 15,000 cps; distortion unmeasurable using standard test records; and so on. In reality there is much more to this system than would be indicated by these ratings and measurements—and that is its exceptional lack of character. Putting that another way—it faithfully reproduces the recording without adding the slightest amount of coloration.

In sum then, the Weathers K-834 2-speed turntable and stereo pickup system truly is a professional instrument. D-29


Fig. 4. Weathers 2-speed turntable and pickup, Model K-834.

a touch of Crosby...

The R80. An 80-watt stereo receiver that is simplicity to operate and beauty to behold. Filled with avant garde performance features — including front panel Multiplex dimension control to eliminate the possibility of obsolescence — yet priced at $375.00. Optional enclosures.

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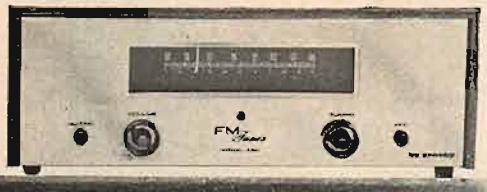

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ALTEC "CARMEL" SPEAKER SYSTEM, MODEL 838A

The Altec "Carmel" speaker system shown in *Fig.* 6 is a two-way system containing two 12-in. (Model 414A) high-compliance woofers plus an 811B sectoral horn driven by an 804A high-frequency driver. On the surface these statistics are relatively meaningless unless one is familiar with the long line of fine products which have characterized the Altec name over the years. Not flashy or extravagant, but instead conservative, substantial, and of high quality. In our modern search for "bests" (best performance, best buy, and so on) it is both refreshing and reassuring to come upon a company which calmly and forthrightly advertises the performance characteristics of its products without resorting to attention-catching adjectives. Apparently they are willing to let the product be its own best salesman.

That brings us right back to the Carmel speaker system—a system built by a manufacturer with a reputation for fine products. Of course this is a fine system. We would, however, like to call special attention to the appearance of the system—it is an excellent example of clean modern design. In all probability it would be a handsome addition to almost any modern home with sufficient space.

Actually it is not a small unit, but of course this is inevitable when one considers the two 12-in. speakers contained within. Also it is rather difficult to achieve the full-bodied bass exhibited by this system with insufficient cabinet volume. Not necessarily impossible, but certainly difficult. This is not meant to imply criticism of bookshelf-sized systems—they have distinct value and function in the small rooms so commonly found nowadays. Although most of them certainly do not reach the depths of bass that the Carmel and other larger systems do, it is really questionable whether the capabilities of the large system would be fully realized in a very small room. Of course we are talking about a room wherein the dimensions are less than the wavelengths involved.

The Speakers

For this Carmel system, Altec has brought forth several new items. First of all, the Model 414A woofer is a new entry that features a "controlled linear excursion" cone similar to the well-known Model 803B. Secondly, the 811B sectoral horn is driven by a new high-frequency driver, Model 804A, which appears to be an updated Model 802 driver. It should be noted that there is a difference in the sound produced by horns such as the 811B and other currently available high-frequency reproducers. None of these systems is inherently "better" than the others—it is really a matter of personal taste as to which type of sound is "best" in your home. We will state, however, that to date horn-type sound is our choice.

The crossover frequency is 800 cps and is accomplished by means of an Altec Model 800E dividing network. All of the speakers and components mentioned are available separately for those who already hace appropriate enclosures or like to "build in."

Performance

The Carmel speaker system achieves natural, full-bodied sound with a rich non-boomy bass region. Although most of us are more interested in the sound emanating from a speaker system than in its vital statistics, this system is guaranteed by the manufacturer to have a frequency range from 30 to 22,000 cps. Of course most of us would be hard put to disprove, or prove, the frequency range of a loudspeaker system—not many homes contain anechoic chambers.

As we all know, it is quite possible to have a system with wide frequency range which does not sound as well as the specifications might indicate. In many cases this is due to an inadequate midrange. The midrange, or "presence" region of the Carmel system is particularly fine—the overall effect is of extreme naturalness. We got the distinct "feeling" of the concert hall as we listened—which is all the more remarkable since we are constrained to low-volume levels most of the time.

Summing up then, the Altec "Carmel" speaker system is an excellent sounding and appearing unit which is ideal for those with sufficient room and a "midrange" budget.

ALTEC ENCLOSURE MODEL 854A AND DUPLEX LOUDSPEAKER MODEL 605A

The Model 854A enclosure is shown in *Fig.* 6, it is the enclosure used in the Carmel system. As we said previously, while discussing the Carmel system, it is a very handsome box. Available in either walnut or mahogany finish, it comes with the modern round legs shown, or it may be purchased with a traditional base at a small additional cost. The dimensions of the enclosure, excluding legs, are 35 × 24 × 18 inches. Although not readily apparent from the photograph, the grille cloth follows a slight curve, providing an attractive three-dimensional effect. The over-all construction of the enclosure is extremely sturdy.

The Model 605A loudspeaker is the heir to the well-known Altec Model 604 in all its forms from A to C. Essentially it consists of a 15-in. low-frequency reproducer mounted on the same frame with a horn-type high-frequency unit. The low-frequency speaker features the Altec "controlled linear excursion" which essentially indicates a high-compliance suspension system. Cone resonance of this speaker is 25 cps which indicates why it handles low bass notes effectively. It utilizes a copper ribbon 3-in. diameter voice coil and a 2¼-lb. magnet. The high-frequency section employs a professional-type multi-cellular horn which produces a 40-degree vertical and 90-dgeree horizontal sound distribution. The 1¾-in. aluminum voice coil of this section is edge-wound for high efficiency. Magnet weight is ½ lb. Frequency range of the 605A is 20 to 22,000 cps; impedance is 16 ohms, including the 1600 cps crossover network; power handling capacity is 35 watts.

Now that we have described the 854A and the 605A separately, we will put them together and see how well suited they are to each other. Without further ado we will reveal that they make a very happy marriage. In many respects it is quite close in sound to the Carmel system previously described—the main area of difference being in the midrange. This system is a little thinner in the "presence" region. Of course, it really is unfair to pit members of the same family against each other, especially big brother versus little brother. Considered by itself, as a reproducer of sound, the 605A in the 854A enclosure achieves excellent sound. It is a good choice in its price category. D-30

Fig. 6. Altec "Carmel" speaker system, Model 838A.

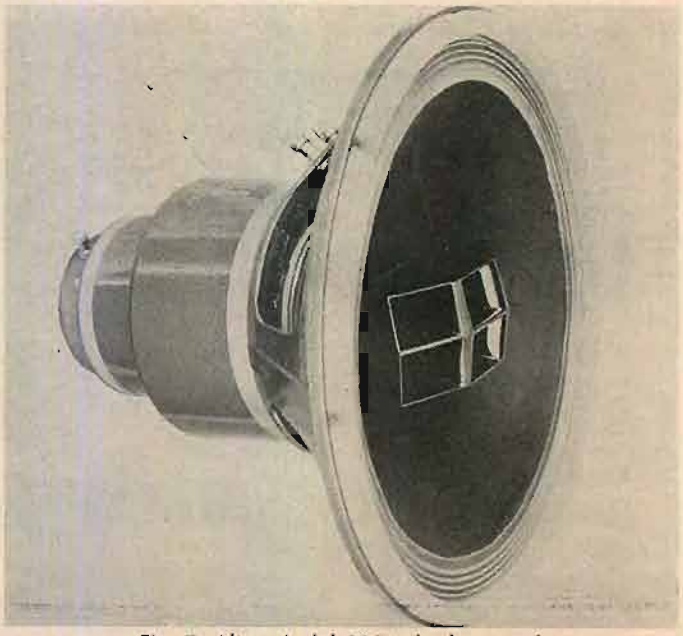

Fig. 7. Altec Model 605A duplex speaker.

WHAT IS THE SECRET OF MAKING A SATISFACTORY MULTI-WAY SYSTEM?

The prerequisite, of course, is that the individual loudspeakers used are of high-performance type. The woofer, squawker and the tweeter must be capable of faithfully reproducing the sound range for which they are respectively responsible. Another important factor is that the loudspeakers used are well-balanced in the matter of tone quality and efficiency. Otherwise, full effect of a multi-way system can never be achieved.

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Flux Density	10,000 gauss

6½-inch Mid-Range Speaker PM-16B

Voice Coil Impedance	8 or 16 ohms
Resonant Frequency	360–420 cps
Frequency Range	400–6,000 cps
Power Input	25 watts
Sensitivity	104 db/watt
Crossover Frequency	Low; 500–800 cps High; 2,000–5,000 cps
Total Flux	65,000 maxwell
Flux Density	10,400 gauss

Horn Tweeter PT-4

Voice Coil Impedance	8 or 16 ohms
Cutoff Frequency	1,500 cps
Frequency Range	1,500–16,000 cps
Power Input	20 watts
Sensitivity	105 db/watt
Crossover Frequency	over 3,000 cps
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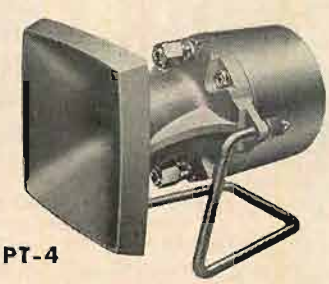

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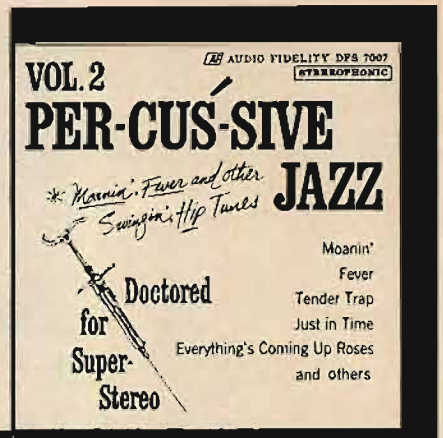

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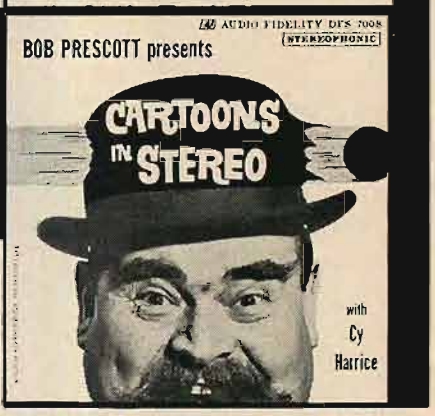

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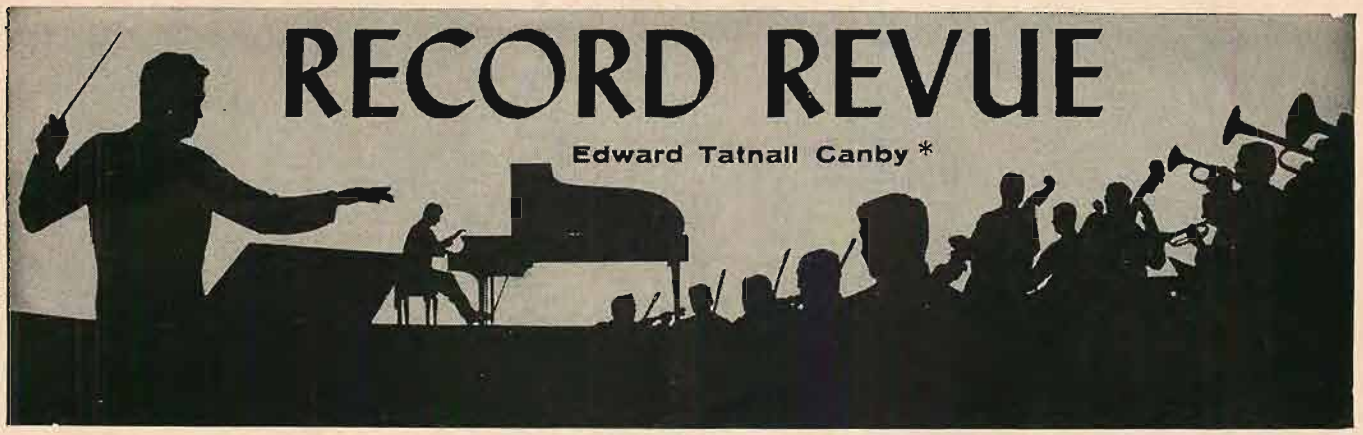

RECORD REVUE

Edward Tatnall Canby *

MORE WORDS AND MUSIC

Christmastide, Midnight Mass (Gregorian Chant). Monks Choir, Benedictine Abbey St. Martin, Beuron.
Archive ARC 73142 stereo
Christmastide, Third Mass. (Same).
Archive ARC 73143 stereo

The restoration of living Gregorian chant, the foundation of our Western music, is one of the by-products of the present return to "authenticity" in music of the past. Here are two complete sung Masses (the printed collection of Gregorian music runs to a thousand pages, and each page takes perhaps ten minutes to sing), rendered by those who are most intimately able to sense the full meaning and intent of such music in its proper "home" atmosphere, a religious institution where the music is still official and part of daily worship. This extra sense of urgency and truth is quickly apparent, for these monks are not "performing," in spite of mikes. They are carrying forward their very life itself. Given technical proficiency, this is authenticity to a degree!

These Monks are proficient all right, and their abbey has a lovely resonance, of stone walls, ages old. The "solo" voices sing rather on the slow side, a bit didactically (other schools of Gregorian move faster) but the texts are the clearer. Subtle differences of this sort, as between these and, say, the originating Solesmes Gregorian out of France, are for close students of the chant to rejoice in—the more one knows of the details, the more fascinating is the music. True, for most of us Gregorian at first sounds all alike and utterly monotonous. But then, so does any music in a style that is unfamiliar. Gregorian, within its own world, offers an endless subtlety of expression, incredibly plastic and varied for such a seemingly "limited" medium.

Of course it's incredible! As I say, it was the very foundation of our Western musical development, and its potency is no less now than in the dim past.

Some slight pitch discrepancies between sections here are doubtless due to tape editing, splicing together musical passages sung at different times. The music is, of course, unaccompanied throughout.

The Mass. Sung in Gregorian by Canon Sydney MacEwan and Choir of Church of Santa Susanna. Book included.
Columbia KL 5311

This elaborate album, a handsome illustrated book and an LP disc, was released last year. The record presents the complete continuity of one Mass, for the 21st Sunday after Pentecost, with occasional spoken words, a large amount of chanting upon a single tone (psalm tone, if I am right) and segments of Gregorian music including the familiar "Orbis Factor" Kyrie. The book contains the texts, in large type, with a description of the actual procedure in red Italics set between the Latin and English, which are in parallel columns. Also, three excellent articles of explanation including one by the ubiquitous Bishop Fulton J. Sheen on the meaning of the Mass. There is wonderfully interesting material on the history of the Mass—including such odd items as the close relationship between the Mass and the Hebrew Passover supper and the fact that the priestly clothing is virtually the same that a Roman citizen of importance would have worn in the later Roman period, the Second or Third century, all this in the piece by Monsignor J. J. Dougherty. Edward L. Jamieson writes of the quality of the Mass in readable and even humorous terms, with more oddities such as the laws of the Church that cover every known emergency, in case something should go wrong during a Mass, from sudden death, flood, and enemy invasion to the situation in which a spider might fall into the chalice after the wine is blessed. (The priest has to drink anyway, if he can do it without getting sick.)

The music, I should say, is a bit on the logy side. The priest sings very slowly, to make clear every word of the text, but takes forever in the process. (Most local priests rip along at ten times his speed.) The choir sings accurately but with a trace of steady beat,

DON'T MISS THIS PAIR!

Moussorgsky-Ravel: Pictures at an Exhibition. NBC Symphony, Toscanini.
RCA Victor LME 2410
Electronic Stereo

Respighi: Fountains of Rome; Pines of Rome. NBC Symphony, Toscanini.
RCA Victor LM 2409
Electronic Stereo

It's good. It works! With one swoop (though it took many months of preparation) RCA Victor has brought Toscanini back yet once again for a new "run" and this time the hi fi competition really is met on an equal stereo level—though nobody would have believed it.

I won't say that every stereo ear will be fooled by these discs into thinking the Old Man must have known all about stereo ahead of time. But, with a slightly apparent artificiality of effect, the new product nevertheless falls squarely within the acceptable area of positive, constructive *stereo* usefulness. It's the more astonishing to hear this smooth, clean authoritative "stereo sound" when one thinks back over the series of almost-disasters on the technical side that have marked the long history of Toscanini recording. From the wet-blanket, padded-cell Studio 8H days to the early and not very pleasant electronic "enhancements" that attempted to put life into the Toscanini sound, they have been strictly so-so at best, these sound-manipulations. A whale of a lot has happened to electronic wizardry since then, and this time it shows to top advantage. I repeat, absolutely top.

For the modestly "right" sound of these discs is, you may be sure, the thoughtful and enormously intelligent result of compound electronic dickering that, given a trace of the hairbrained, given even a faint suspicion of narrowness in the viewpoint, could have led to unthinkably monstrous and hideous sound! It's not how much has been done, but how little, and how expertly.

I keep thinking, here, of French cookery. The secret of culinary greatness, as with electronic treatment of music, is in an almost intuitive exactitude and complexity—a tiny pinch of this, a wee trace of that, mixed by a master (or a group of team-masters). No printed recipe can produce foolproof French eating, or the famous chefs would long since have sold out and gone to pasture. No electronic formula and especially no *simple* formula of stereo tampering could produce this simulated stereo. It is rightly a result of many combined approaches, a welter of equipment used with microscopic finesse, by ear and variably, as the music itself progresses. A slip of the finger, a touch on a wrong pot, and the whole thing would instantly be grotesque.

Want to try? You'd better get the records quick, and for the details of engineering read Bob Darrell's account of the varying electronic factors in the "stereo" recipe, including dashes of phase delay, frequency separation by bands, out-of-phase feed-in (my own term) all variably applied from moment to moment with score in hand.

Yes, things come from left and right, audibly. But what is far more important is that the *whole sound* is audibly spread out between the speakers and beyond them in each direction (where the mono sound would center as a blob in the middle) and, even better, the added hall reverberation—a lot of it—is "stereo" too, instead of merely mono reverb, so that the all-important stereo sense of music within a space is simulated along with the right-left spread of the actual instruments.

I'm 100 per cent enthusiastic and it's the first time I've felt that way about an RCA development for quite awhile. This time they've got something, and more power to them. More sales too. Nothing like modernizing the dead, for up-to-date competition with the living.

P.S. Don't fail to note that a big part of the new Toscanini impact is the newly silent surfaces and the higher fi of the sound-copy, in spite of the added electronic elements. These will probably rate well above the originals even when played mono. Progress marches on!

* *780 Greenwich St., New York 14, N. Y.*

which is not to be desired. Their vocal tone color is somewhat dull. The traffic of modern Rome can be heard faintly in the background. Still, an authentic and authoritative work of its type, this disc, and good for all, not only Catholics. Excellent educational material, I'd say.

Handel: Ode for St. Cecilia's Day 1739. Addison, McCollum, Rutgers Univ. Choir, N. Y. Philharmonic, Bernstein.

Columbia MS 6206 stereo
(mono: ML 5606)

This second of Handel's Odes for St. Cecilia, not to be confused with those by Henry Purcell, is in that peculiar British tradition that celebrated the lady patron saint of music each November 22nd with an elaborate musical work for solos, chorus, and orchestra, set to texts by the big poets of the day, praising assorted aspects of the art—*"The soft, complaining flute/In dying notes discovers/The woes of hopeless lovers. . . ."* This sort of poetry was considered great at the time; we today can at least admire its aptness for musical purposes.

This is a very New Yorkish performance, mixed-up, thoroughly provincial, zany in style, full of incongruities, yet on the whole it adds up to a pleasantly musical experience—if you aren't too bothered by details. The performance has the big-concert feel to it, the Carnegie Hall approach, much too big for the music itself; and yet in the recording some elements of the music are, inexplicably, intimately close, as though in a living room music recital. Bad recorded balance—and not very happy balance of instrumental forces either, as presumably used for the actual concert performance.

It is not a good thing to release these big-scale local concerts in recorded form. There's no excuse and no reason for the big-hall sound here, nor the big-audience drama (uncomfortable at too-close range), in music that does not require it, nor for the larger forces needed to project to the concert audience of thousands. The recorded medium has nothing to do with all that, which is in effect a local problem.

A performance like this is fine in New York's own Carnegie Hall but it stacks up unfortunately against its international recorded competition in the neutrally placeless and timeless recorded medium. Stylistic standards for such music are more rigid by far on records, and rightly, than in the case of special local concertizing—even in New York.

There is much to disturb and distress, then, for all who are generally familiar with this type of Eighteenth century music on records: the meaningless bouncing staccato of a violin obbligato solo, the ultra-close bleat of Bruce Prince-Joseph's organ, badly balanced (Prince-Joseph can make any organ sound Baroque, even the wheezing machine in Carnegie Hall), or Adele Addison's unfortunate "shake" (trill), more like a gargle than a trill. Handel calls for it again and again and she obliges. (But even so, she's the most musical Handel singer in New York.)

You'll be annoyed by a too-distant flute (why?), the overly loud and too-close sound of plucked strings in the lute-accompanied aria (why ?), by the college kids, who sing on the boisterous side, like a good college choir (they can't help it) and, again and again, by the unnaturalness of the whole recorded effect. Distractions galore, contributing to the judgment that this really is not a good recorded performance.

And yet the music itself is so delightful, the prevailing spirit so genial, the musical feeling so warm—style or no style—that I'm ready to take it all back and recommend the record as a fine buy. It really is, in its peculiar way.

Orff: Carmina Burana. Petrak, Presnell, Harsanyi; Rutgers Univ. Choir, Philadelphia Orch., Ormandy.

Columbia MS 6163 stereo
(mono: ML 5498)

Now here's a concert performance that deserved to be transferred to the recorded medium. This is a modern work, intended for this very type of big, concert-hall performance with large orchestra, and like many a modern piece it is as apt in its sound for recorded effect as it is for live listening. It can be transferred bodily from concert hall to discs with maximum impact and no changes at all.

This is a crackerjack version of the strangely sophisticated-primitive rhythm-piece. It'll knock you over, whoever you are; it knocks everybody over, and over again. There isn't any dissonance, no development, no harmonic evolution and modulation, no twelve tones, no chromatics. It's all in one key and there are only about three chords, all the same ones over and over again. It just sits and jiggles in one place—but what a tantalizing sort of jiggle! Wonderful orchestral tricks add to the impact.

The Philadelphia under Ormandy is just the organization to promote this slick, stylized, elegantly simple music and the Rutgers students have exactly the right brassy momentum to keep it youthful and zesty. The solo singers are transported—they must have been amazed at their own eloquence under the Orff magic.

Bach: Cantata #12, "Weinen, Klagen, Sorgen, Zagen; Cantata #29, "Wir Dankin Dir, Gott." Devrath, Dermota, Rössl-Majdan, Berry, Wiener Kammerchor, Vienna State Opera Orch., Wöldike.

Vanguard BGS 5036 stereo

Here is some first-rate Bach—and if Vanguard's popular demo recordings of war horses and chestnuts can pay for the cost of this sort of high quality recording (with its inherently limited sales), then more power to the demo, and the cornier the better! Whatever else Vanguard puts out, whether you like it or not, you must admit that this company is still very much in business where others have departed, and it has kept its quality catalog intact, too, over these many years.

The Bach cantatas are endless, even though a good third of them were lost after perhaps only one original performance back in the 1720's. They are always dogmatic in a sense,

because they were part of a long and rigorous Sunday service (four hours) and their role was strictly business-like, to help with the Sunday message. You will always hear that aspect in them, if only in their length and complexity. But, as always with old Bach, the divine inspiration soars above the weekly chore-work, the local business-of-the-moment in Lutheran terms. One of these cantatas, for instance, has the original version of the ineffable "Crucifixus" of the B Minor Mass, here sung to a German text, the Weinen, Klagen, Sorgen, Zagen of the title; hearing it you will marvel at how much greater the very same notes are in their later impact as the expression of the Crucifixion itself, followed by the Resurrection. What an opportune imagination, on such an incredibly imaginative plane! That's what makes a Bach, or a Handel, an ear for a good thing in a good place.

The performance is Vienna's best, tempered and heightened by the Danish conductor Wöldike, who seems to be able to un-leaden the Viennese, bringing out their high musical sense as they often can't do themselves. Note especially the disciplined and eloquent singing of the Vienna Chamber Choir, alias the Wiener Kammerchor.

There are more records in this series, if you enjoy this one.

Bach: Cantatas "Liebster Gott, wann werd' ich sterben" and "Es ist dir gesagt, Mench, was gut ist." Buckel, Haefliger,, Töpper, Engen, Munich Bach Chorus, Orch. of the Ansbach Bach Week, Richter.

Archive ARC 73145 stereo
(mono: ARC 3145)

No doubt about it, Deutsche Grammophon's stereo is the very best in the European style (probably with crossed-mike or M-S type technique), a modest but pervasive effect in this case, reproducing with startling realism the sense of the inside of a church, orchestra and solos in the foreground, choir of men and boys at the rear and sides.

The Archive Series, the only open-ended survey of history on records, goes on and on through the endless material available in its assorted "Research Periods," looking as stuffy and academic as ever on the outside (those yellow covers and blue data sheets), as full of inside life as always—and as full of ups and downs, too. This is an "up" recording, definitely, I'd call it 90 per cent perfect, which for a Bach Cantata is at least equal to 300 per cent in any ordinary music.

The Cantatas, work-pieces as they were for a very specific situation on a very local scene, are extremely difficult to put into timeless and international terms. It's only in recent years with our acceptance of "authentic" restorations (rather than the formerly attempted "modernizations") that these superb works could make much sense to us at all in their complete form. Even now, of course, the intervening parts of the Sunday service that separated the cantata sections are missing, giving them a lumpier effect, like a TV play without the commercials. (The Lutheran service had an almost parallel intensity of sheer persuasion, for slightly higher ends.)

No use describing a Bach work in detail! One of these is an earlyish piece, which means, oddly, that it is full of unusual devices, things that are unexpected in Bach, high colors, much variety. Note the 24 successive peeps of a flute, again and again, denoting the passage of time towards that desired death mentioned in the title. The other work is later, i.e. more in familiarly solid, dogmatic, concentrated Bach style, with big fugues in the chorus, lots of "runs" in the solo voice parts. (The alto can't go fast enough and the orchestra has to slow down for her.)

All is authentic and the playing is tops, except perhaps for a too-marchlike beat, common enough in Bach. Only the solo voices are, necessarily, uncomfortable approximations of what must have been wanted in vocal terms by the old man himself. They do pretty well, even so, and the recording is unbelievably clean and realistic in its treatment of them.

See also a companion release, ARC 3144 (I have it in mono) and numerous earlier discs in the series, all rating high in successful cantata-projection.

Beethoven: Ninth Symphony. Sutherland, Procter, Dermota, Van Mill; chorus, L'Orch. de la Suisse Romande, Ansermet.

London CS 6143 stereo

The Ninth on one LP is now perfectly feasible, with but one necessary sacrifice, the cutting in two of the slow movement. There isn't a whisper of distortion on this disc from beginning to loud and boisterous ending, the surface is quiet, suggesting no surface-to-level troubles at all, and there isn't a trace of groove echo. A technological triumph and, truly, I've never heard a lovelier hi-fi sound than this, for a major symphony orchestra, quite aside from the special problems of extreme length and dynamic range that are involved in the great Beethoven score.

The performance is another consideration. Keep in mind that the Ninth is vigorously competitive on many a label! This version is surely in the upper brackets but it must be judged by very high standards. In that scale, I find it lacking.

It's cold, somehow. It lacks expansiveness, misses that tremendous sense of violent contrast, of extreme tension and ineffable relaxation, of startling harmonies and angelic counterpoint, that make Beethoven the greatest Romantic of them all. It is hurried, not in tempo (as might be expected in a one-LP job) but in the glorious moments, the big ones and the uncounted small ones, which simply do not get their due. Magical changes of mood are not magical, dying echoes are too soon interrupted, the instrumental recitative seems perfunctory . . . a thousand small touches add up to a less than great performance of a work that must always be superhuman in the playing.

I'll quibble mildly, too, about the close-up style of mike pickup, absolutely lovely in outward hi-fi effect but somehow, too personal, too detailed and intimate, for this grand canvas. This is a tonal picture that demands a heavenly distance, above all other works. The sound might be exactly right here for the Eighth Symphony—but not the Ninth.

Excellent accessories: an enthusiastic and youthfully accurate chorus (its several names too long to quote in full), a workable quartet of soloists who sing in tune and whose words are intelligible.

Johann Strauss: Die Fledermaus. Terkal, Scheyrer, Dermota, Lipp; Philharmonia Orch., Ackermann.

Angel S 3581 (2) stereo

The English have such a wonderfully common-sense attitude towards nationalism in art! If it's Austrian music, they say, let us import singers from Austria. (Ackermann, the conductor, too.) Let it be Austrian where it counts, in the styling, in the actual singing and speaking of German. But—the British say—"our own Philharmonia can produce fine Viennese sounds with proper direction, and it's the best orchestra in the Western world, at that."

So this is another of many, many British-produced continental works combining British and native talent in optimum ways. It works, and beautifully, even though the name singers are here mostly not of the super-well-known sort. I found the opera just plain delightful, straight through, libretto in hand. Even the German dialogue is quite deliciously Austrian, as far as a good American can tell.

This one is to be compared with London's recent stereo recording, the album that includes the gala interpolations into Act II that are a tradition on the Viennese stage. *(See below.)*

Johann Strauss: Die Fledermaus (Gala performance). Gueden, Kötti, Resnik, Zampieri, Kmentt, Berry, etc., Vienna Philharmonic, Von Karajan, plus gala guest artists.

✪ London LOR 90030
(disc: OSA 1319 stereo)

I was happy to get this two-tape package; London didn't get around to sending us the disc album. Release of such items on tape and disc is now beginning to be near-simultaneous.

This is a louder, more brassy, intense "Fledermaus" than Angel's sweeter, gentler version. Von Karajan is a dynamic conductor (he did an earlier Angel version) and his cast has an international flare to it—internationally known, that is. The Vienna Philharmonic sounds positively enormous in London's recording and it plays with a polish that is almost super-Straussian, a virtuosity that is overwhelming. The singing is of internationally compelling calibre.

In line with all this, there is the novel gala section, a long, lavish insert, according to an old tradition, of celebrities who just "happen" to be on hand in the Act 3 grand ball at Prince Orlovsky's. Everybody is in this one, like a TV benefit show, and the stuff they sing is just about on that plane. Tebaldi, Nilsson, Sutherland, Simoniato, Bjoerling (just before he died), Welitsch, Del Monaco and so on, and the fare ranges from "Annie Get Your Gun" to "The Merry Widow" with way stops in Gershwin and assorted French and Italian corn. Only one I could stand was Leontyne Price in "Summer Time," but if you like a good vocal show you've got it in this "extra" section, whether on tape or disc.

Though I was impressed by the huge orchestral sound (gorgeous bass) and the naturalness of the stereo voices in this recording, as well as by the high-power musical tone of it all, I think I liked the Angel recording better, for its gentleness, its greater feeling of musicality as distinguished from musical drama and show. But London's is probably the better album for sheer recorded impact and it's a fine performance even if it is a bit too brassy and star-ridden for quiet-loving souls like me.

The Newport Folk Festival 1960. (Two volumes).

Vanguard VSD 2087/88 stereo
(mono: VRS 9083/4)

This year it's on two records, instead of three, but the Newport Festival is higher in fi than ever, and much louder.

I suppose I can best give my personal reaction to all this hearty noise, these many guitars and banjos, the big sound of the big P.A. system (or so I gather), the cheery introductions of the three MC's. Folk music is expanding enormously and no doubt about it; but for the present—and I say that guardedly—it is growing away from music towards mass showmanship.

I am surrounded by enthusiastic folk kids these days (they want to borrow my recorder all the time) and I appreciate their already-remarkable skill, in their 'teens. My generation had nothing of the sort at all to play around with. They're lucky—and they're often using good musical talent that otherwise would languish on the vine.

But in our times success means bigness and bigness means the big show. As you'll hear on these records, made close-up on the stage where the singers are performing for the multitudes out in front, folk singing is now big-time stuff, slick, tough, hard, loud, professional and polished. It hits you, all right (at such close range), but as for me, I find a lot of the musical delicacy is gone. In its place is a new coat of TV polish, sometimes so thick it practically crackles.

Yes, it is true that the genuine original folk music, a product of its own environment, could not be transplanted without either changing or dying in the process. The interest in such folk music in its pristine state is dying away, in favor of a more dynamic and undeniably alive propagation and evolution—from the country to the city and back, from disc to disc and festival to festival without boundaries and without direct roots.

The old original folksingers are mostly dead now, or turned pro (and do they learn fast). Today's folksingers are already second generation or third away from folk roots. That's what you'll hear on these records. These are the new folk show people.

It's a great movement and bound to lead somewhere. But I'm beginning to lose my own once-avid interest in the actual product. Hepped up for dramatics, watered-down in musical values, I say.

SLIGHTLY CRITICAL

Sibelius: Symphony No. 5; Finlandia. Rochester Philharmonic, Bloomfield.
Everest SDBR 3068 stereo
(mono: LPBR 6068)

This is the darndest stereo disc I've ever set ears upon. I'm appalled, but also fascinated.

I'm always the first to insist that recording is a medium in itself, with its own laws, on a par with but unlike concert hall "live" sound. I am always for any intelligent use of the recorded medium for musical ends, and I am suspicious of all claims for "the best seat in the concert hall." Just put a mike in the best seat (if you can find such a seat) and see what you pick up. No engineer in his right mind would do so; it's the misguided publicity that gabbles of concert-hall realism.

But how far can one go, should one go, in exploiting the powers of the mike to bring out new—or different—things in music originally designed for live concert performance? That's the exciting part of recording. The leeway, as in all matter of taste, is tremendous. Every judgment must involve subtle questions of historical and musical background, for the recording is a kind of translation or transduction of the music from one medium to another. What can be preserved? What can be added? What is lost?

OK for that. Now try Everest's Sibelius. Here we have one of the last of the big Romantic symphonies, moody, full of atmosphere, the sound meant to swell and shimmer in the largest of great halls, at a glorious and impressive distance. And here, too, is the last heyday of old-fashioned string supremacy. The violins are still the leaders of the orchestra; the brasses and woodwinds and percussion add solo color, highlighting contrast, but never push the strings from first place. This is the music of Brahms and Tchaikowsky, updated.

And Everest has placed this orchestra in a tight little symphonic closet of a hall, then stuck its superb stereo mikes not in front of the strings but spang next to the whole mass of woodwinds and brasses like a dance band pickup—the strings are relegated to second-string importance, down behind the others' backs where you can sometimes hardly hear them. *Very* modern. This is the way music is going, nowadays. But in *Sibelius?*

Results are astonishing. This is a musical visit backstage, a multiple close-up interview with the bit players and the minor roles, who are blown up huge. You'll hear sounds nobody but an orchestra player ever heard before, inches away. Musical gears grind, the the insides of the symphonic machine clank and scrape, weird puffings and blowings blast out at arm's length where, nominally, they should be lost in the unconscious background somewhere at the other end of the hall. And the strings? They play loudly enough, but they haven't a chance against all this woodwind and brass machinery as it snarls and blats and snorts.

Technically, then, I would rate this as an outrageously, imaginatively dreadful recording, a grotesque and wildly exaggerated transference of the Sibelius "message" into the new medium. But even grotesque experiments can add to our knowledge and to eventual progress. Thanks to the superb and, indeed, unique, Everest sound, the stereo recording is absorbing to listen to.

This is Sibelius viewed from the bottom up, the not-so-soft underbelly, the gross whiskers on the chin of a fine symphony, magnified in hi fi.

Debussy: La Mer.
Strauss: Don Juan. Chicago Symphony, Reiner.
RCA Victor LSC 2462 stereo

This can be disposed of succinctly. As noted in earlier reviews, Reiner is now RCA's leading house conductor. What Reiner does well is very, very good, what doesn't go with his temperament fares pretty badly.

Debussy's poetic sea-piece is of the latter sort. It comes out like Strauss, like some sort of mechanical ocean-maker. The sea heaves grimly, the machinery creaks. Full of dynamic energy, but in terms of poetry it doesn't get off the ground, if you see what I mean.

(*Continued on page* 67)

CHARLES A. ROBERTSON*

STEREO

Benny Goodman Swings Again
Columbia CS8379

The King of Swing still reigns with enough authority to command the attention of television producers, and they accorded his new band a brief appearance on the medium—rare privilege for a jazz group. Actually no favors were done anyone, as what transpired on screens across the nation was only a wan picture of what occurred at Manhattan's Basin Street East, and at this encore performance before an excited audience at Ciro's in Hollywood. The Benny Goodman name tops an all-star cast of nine, including Red Norvo, Flip Phillips, Jerry Dodgion, Murray McEachern, Jack Sheldon, and Russ Freeman. All the old clarinet magic is there to bedazzle fans once again, and his frolicsome moods even betrays him into attempting an indecisive vocal on *Gotta Be This Or That*. Maria Marshall does much better on *Bill Bailey*. John Markham comes to the fore on a new version of *Sing Sing Sing*, and the drums receive a boisterous stereo outing. Among other favorites of former years reviewed are *Air Mail Special, Slipped Disc,* and *I Want To Be Happy*. Goodman might listen to the sound on a Capitol recording of Guy Lombardo at Harrah's, and plan to schedule his next session while playing the Lake Tahoe club.

Count Basie: Kansas City Suite
Roulette SR52056

Dakota Station: Dakota
Capitol ST1490

If the salaam in the east is to Mecca, the bow in the west is toward the place where Benny Carter sits with a buddha-like smile, and these albums are the result of two recent pilgrimages to the shrine. Count Basie came away with a newly composed reminder of the halcyon days when he worked for Bennie Moten and then started out as leader at the Reno Club. Although bearing the name *Kansas City Suite*, it actually consists of ten varied originals of standard length, each dedicated to a special aspect of the city and filled with the heady flavor of its environs. The individual titles are descriptive enough by themselves and include *Vine Street Rumble, Jackson County Jubilee,* and *The Wiggle Walk*. Carter writes in his customary brilliant style for the sections, and Marshal Royal must have returned a matching smile when the saxophone parts were laid out. Stereo gives the band's unison attack full play, but Roulette again fails to list soloists or personnel on the liner. With all the changes now going on in the Basie band, such information is nothing less than essential.

Dakota Staton absorbed one lesson when Carter supplied a soft setting of strings on her preceding album, and the second at Capitol Tower means a promotion of big-band class. Most of the singer's practiced mannerisms are now in the discard pile, along with the stiffness which prevented her from swinging before. Norman Simmons, her regular accompanist, figures prominently on piano in Carter's subtle and compelling arrangements, which spread out luxuriously in stereo. Among the dozen tunes are *If I Love Again, On Green Dolphin Street,* and *Rock Me To Sleep,* a Carter original.

Al Cohn: Son Of Drum Suite
RCA Victor LSP2312

This lively youngster's father, a veteran of several years in the RCA Victor catalogue and a hardy survivor of percussive wars, is a collaboration of Manny Albam and Ernie Wilkins called "Drum Suite." Still sought out and consulted as a respected authority by all students and admirers of good jazz drumming, the parent was the first to list various drum techniques and display the lot in coherent arrangements, but the whole process now seems a bit too solemn for the son. Like the progeny of other famous personages, this offspring is a frisky individual, already intent on charting a new course, and ahead lies the great, wide expanse of stereo to explore.

Detailed to act as guide and mentor, Al Cohn places a total of five drummers in a big semicircle and directs listener attention toward the swift-moving group interplay. Because of the high calibre of the drummers involved, technical brilliance is taken for granted and needs no special emphasis. Cohn is free to keep as many as five different written lines going at once, knowing they will criss-cross safely without becoming entangled. Or he can indicate basic rhythm patterns and turn everyone loose on a series of ad-lib solos. Bassists Buddy Clark and George Duvivier are posted at opposite ends to ride herd and make sure the beat is never lost. They also offer choice comments, but encouraging words on their part would only be superfluous.

Don Lamond and Gus Johnson, who performed on the elder "Drum Suite," return and are joined by Mel Lewis, Jimmy Cobb and Charlie Persip. Louis Hayes substitutes for Johnson during three of the six sections. Most of the outbursts are of short duration, but a response is likely to come from any number of sources and an element of surprise is always present. While Cohn conducts nineteen additional musicians, he avoids big-band conventions and devices for the most part, preferring instead to depend upon the variety provided by intricate drum figures, stereo placement, and a goodly array of soloists. Among those picked to take turns at spelling the drummers are Clark Terry, Nick Travis, Bob Brookmeyer, and Gene Quill.

As before, certain sections are designed to illustrate specific examples of drumming, but Cohn's arrangements move quickly on after making a point. The obvious comes into play on *Brushmanship*, mallets on *Dr. Skin And Mr. Hide*, Latin effects on *Drums Loco*, and a blow-by-blow accounting is detailed on the liner. Everyone concerned with the project, including the engineer, worked to make a jazz set rather than just a showpiece for drums. No one is really to blame if it also happens to be a stereo spectacular impressive enough to turn many recent percussion albums pale by comparison. And engineer Bob Simpson does it all without resorting to channel switching or other gimmicks.

Budd Johnson and The Four Brass Giants
Riverside RLP9343

The idea of pitting a lone soloist against four trumpets was apparently first conceived when Dickie Wells recorded with the Teddy Hill trumpet section for the Swing label in Paris. Collectors who remember the session with affection often wonder why producers have used a similar instrumentation so seldom in the intervening twenty years. It proves just as effective today, even though this date features Budd Johnson on tenor sax rather than a trombonist as before, and a cornet and fleugelhorn slip into the studio. The former pillar of Earl Hines' Grand Terrace band most recently bolstered the new bands of Gil Evans and Quincy Jones, and a whole new audience is learning to appreciate his full, warm tone and capacity to swing in any surroundings. The present company is ideal, and Clark Terry, Harry Edison, Nat Adderley and Ray Nance all hit hard in the ensembles or take turns on relaxed solos.

Four standards receive typical mainstream treatment, and crack section work distinguishes *Blue Lou, All My Love, Don't Blame Me,* and *I'll Get By*. Johnson varies this formula with four blues-based originals, including a beautiful two-part tribute to Lester Young. Nance switches to violin for one of his better solos on *Driftwood*. Ray Fowler engineered the date at Plaza Sound Studios, and stereo catches the four trumpets on the wing. Cannonball Adderley, who is producing a series of albums for Riverside, should discover more veterans like Johnson, as this sixth effort is by far the best yet.

Quincy Jones: I Dig Dancers
Mercury 60612

If radio no longer follows the big bands and the nearest ballroom is now a bowling alley, records still make it possible to travel along much of the way with Quincy Jones and his new band. Prior to appearing before the public in this country, the band was known from two LP's recorded before a European shakedown tour began. The current release transports all eighteen members to Paris, where eight numbers were recorded at Barclay Studio Hoche, and then returns to Manhattan's Bell Sound Studios, where the remaining four were recorded after several replacements in personnel. Jones now is bound overseas again, leaving stirring mementos of a live debut here in his wake, and with a packet of recorded examples still to come.

Because of the two visits paid the band during a rigorous first year, all dancers and faithful fans will want to take this trip, make comparisons, and draw their own conclusions. The majority will immediately put in reservations for the next, as Jones provides a vehicle that is remarkably propulsive and swinging. Not the least of the attractions are originals from within the band, including pianist Patti Brown's *G'Wan Train*, Melba Liston's *Tone Poem*, and the leader's *Pleasing Plump*, and *Midnight Sun Will Never Set*. Among the standards are *Moonglow*, and *Love Is Here To Stay*.

The Poll Winners: Exploring The Scene
Contemporary S7581

Another year, another Poll Winners album —the fourth to result from what has turned into an annual event for Barney Kessel, Ray Brown, and Shelly Manne. The trio meets this time to survey jazz compositions of the last five years, and the nine selected for joint improvisation all attracted considerable attention when introduced. Oddly enough, the oldest is Ornette Coleman's *The Blessing*, which was written in 1952 and reached the public in 1958, but in this case the composer achieved more fame than his works. Not many groups are willing to attempt to make them better known either, and other tries are just about nonexistent on records. Additional laurels are due the trio for patience and fortitude, not to mention the one for rhythmic ingenuity already awarded.

As the remaining titles all turn up frequently, the group figures out fresh approaches to such tunes as Ray Bryant's *Little Susie*, Horace Silver's *Doodlin'*, and Bobby Timmons' *This Here*. Manne experiments with

* 732 *The Parkway, Mamaroneck, N. Y.*

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Reprinted from Audio Magazine

CHESTER SANTON

Light Listening

This special series by Riverside is the best one yet. The first feature you'll notice in these stereo discs is the fact that they play from the inside out. But that's only a very small part of the story. The tone arm starts right next to the label with a short band containing a 400-cycle test tone for channel balancing. Once the locked groove at the end of this band is hurdled, the pickup then proceeds toward the outer edge of the record.

Cutting the master disc from the inside out has long been advocated as a solution to the problem now encountered in classical recordings wherever a symphonic work closes with a loud finale at the end of a lengthy side. Unfortunately, the four initial releases in this series do not contain classical material. We won't know how the theory works until some one puts out a stereo disc with an "1812 Overture" that starts next to the label. **The Fortissimo series anticipates playback equipment considerably better than what we have today.** Their master tapes are recorded at 60 inches per second with the heads oriented horizontally. Of even greater significance to the record fan are the measures that have been taken to improve the transfer from tape to disc. These include a 92,000 cps tone superimposed over the regular signal while cutting the master disc. It seems that the conventional hot stylus technique cannot do as good a job in the harder material they are using for this series. The finished pressings contain a new and harder compound called Polymax. **All these steps produce a stereo disc unlike any I've heard before.**

Of the four translucent discs released so far, these two records offer the most convincing evidence of the changes this series could make within the industry. **Conventional surface noise is totally absent and response is phenomenal.** The pipe organ played by Paul Renard is the second Wurlitzer located in the Radio City Music Hall building. This smaller version of the main theatre organ is located in a studio atop the building that was originally intended for radio broadcasts. Miked at extremely close quarters, the sound of the studio organ has a gleam impossible to capture in the vast auditorium. The music is sure-fire stuff by George M. Cohan. The 27-year old Paul Renard doesn't have the polish and poise of the veteran theatre organists but he sails into these show stoppers with a complete quota of enthusiasm. This record won't be studied for the performance of the music. The attraction is the sound just as it is in the companion release of jet planes and a helicopter recorded at Eglin Air Force Base in Florida. In high and low fly-by, take-off and landing, these jets have the "live" quality formerly available only on 15 ips professional tapes. **Once the word gets around, these will be the test records in the months ahead.**

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FORTISSIMO

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two unusual percussion instruments on Miles Davis' *So What*, introducing Bill Loughborough's invention called the lujon, which produces a marimba-like sound when struck with mallets. Also the mbira, or African thumb-piano, which is shaken and played at the same time, an effect even stereo is unable to separate.

The Dave Brubeck Quartet & Jimmy Rushing **Columbia CS8353**

This meeting is significant because it would have seemed so unlikely a year or so ago, and the time when jazz artists hesitated to stray from their own particular compartment is remoter than ever. With that part of the agenda out of the way, the remaining business consists solely of relaxation and an exchange of amenities. Jimmy Rushing and Dave Brubeck took out a charter for a mutual admiration society back in the days when the chances of getting together officially were slight. They never bothered to set up rules of procedure, and the session is spontaneous and unrehearsed. Rushing sets the pace with toe-tapping vocals on such specialties as *Blues In The Dark, Evenin', Am I Blue,* and *I Never Knew.* The Quartet's accompaniments are so completely different that any comparison with Basie, or others on the singer's list of former associates, is pointless. Brubeck just tries to be an enjoyable pianist, and alto-saxist Paul Desmond soars along with Rushing, which is more than enough for one LP. Only stereo can adequately survey Rushing's five-by-five dimensions.

Jo Jones & Milt Hinton: Percussion And Bass **Everest SDBR1110**

Lengthy conversations between drummers and bass players are not uncommon in jazz, but this appears to be the first album so worded in its entirety. For that reason, Jo Jones and Milt Hinton are careful not to tarry overlong on one subject, yet they manage to cover each more thoroughly and with greater imagination than is usually the case. Most such duos are required to solo within a given context and are lucky to get two or three ideas across during an equal number of choruses. Jones and Hinton create fully formed compositions as they go along, even though the idea behind the project was for them to go into the studio without preparation and improvise freely. Improvisation to this pair never means, as it does in some quarters, taking twice the time to say less.

Since leaving the Basie band, Jones has developed into a soloist who brings the whole range of percussion into play and handles a melodic line without half trying. But Basie's economical principles and system of signals are still in force, and Jones needs only a couple of strokes or a short phrase to communicate with both Hinton and the audience. Hinton's reputation is based on reliability and the knack of fitting in anywhere, plus the respect engineers have for the sound he plucks from a bass. This chance to give his ideas free rein was overdue, and he takes full advantage of it. Heard along with several tricky originals are *Joshua Fit The Battle Of Jericho, Blue Skies,* and *Love Nest.* Both men are surrounded by ample space, in stereo, and the sounds blossom and decay fully.

Bobby Christian: Percussive Big Band Jazz **Audio Fidelity DRS7005**

As long as the current rage for stereo extravaganzas continues, percussionists will rule the roost and some of the more imaginative may even realize their fondest dreams. Not that every drummer wants to be a band leader, but each harbors an ambition to try out arranging ideas without any restrictions imposed from above. When Bobby Christian worked for Paul Whiteman as a featured member of the rhythm section, he undoubtedly entertained a few unspoken theories on how he would change the scoring of such tunes as *Me and My Shadow, Wonderful One,* and *Pretty Baby.* Later he supplied arrangements for Whiteman and other leaders, all of whom wanted drums used in the standard way and kept in their place. No wonder Christian decided the classical field was more challenging and moved on to posts with the New York Philharmonic and the Symphony of the Air.

Today the strictures on percussive sounds are reversed, leaving Christian free to record whatever he wants, just so long as his band plays for dancers and the entire battery gets a thorough stereo workout. The tunes of the old Whiteman days are brightened up in a style that would have required Ferde Grofé to write every dance set as though rescoring *On The Trail,* from his "Grand Canyon Suite." Christian tries out his own scale of dynamics, with an assist from Ron Steele, marching wood blocks and snares across *Bolero Americano.* The same treatment also is applied to recent ditties, causing tympani to resound and vibes to splash about on *Till There Was You,* and *Everything's Coming Up Roses.* The best is saved for two originals, on which Christian dares to satirize the whole trend, and the usual chimes and cymbal clichés are hammered into some marvelous bits of business. Although percussion runs the show, ample space is allotted for contrasting woodwinds and brass to get into the act, and the bill is super-stereo all the way.

Glen Gray: Please, Mr. Gray **Capitol ST1506**

When Glen Gray put together an album recreating hit recordings of the swing era, a whole new career opened up before him and brought dancing couples flocking back, this time before a stereo bandstand. This third installment is in answer to numerous requests for particular favorites and kicks off with Gus Bivona playing Benny Goodman on *King Porter Stomp,* Mannie Klein emulates Bobby Hackett on *Embraceable You,* Babe Russin remembers the late Herschel Evans on *Topsy,* Ray Sherman is Eddie Heywood on *Begin The Beguine,* and Shorty Sherock recreates his own solo on Jimmy Dorsey's *John Silver.* As before, the Casa Loma studio band tops some original performances easily or runs into trouble on puzzlers like Duke Ellington's *V.I.P. Boogie,* but stereo provides a great

improvement. Jan Savitt's shuffle rhythm never sounded so good as it does on *When Buddha Smiles*. Artie Shaw, Gene Krupa, Bob Crosby, and Billy Butterfield are other leaders saluted.

Plas Johnson: Mood For The Blues **Capitol ST1503**

Curtis Amy & Paul Bryant: The Blues Message **Pacific Jazz PJ9**

Blues organ and tenor-sax combinations are becoming increasingly profitable, possibly because the blended sound appeals to numerous graduates of rock and roll, and most companies are looking for likely groups to record. Prestige started the trend with Shirley Scott and Eddie Davis, and now Los Angeles swells the tide by sending along two of the newest and best units. After looking over the market, Plas Johnson whips blues, jazz, and popular styles into a calculated mixture, and his thick, rich tenor-sax tone is certain to find a ready reception among the younger set. Any leftovers from rock and roll are thoroughly absorbed in the Gerald Wilson and Rene Hall arrangements, which even allow for rhythmic strings, and brother Ray Johnson knows how to make reiterated piano triplets sound musical. Organist Ernie Freeman sets a fetching blues waltz tempo on Percy Mayfield's *Please Send Me Someone To Love*, and drummer Earl Palmer and bassist Red Callendar fill out the firm foundation in depth. Hall and Bill Pittman are paired on guitar at the stereo extremities.

Curtis Amy and Paul Bryant joined forces after meeting in the studio and took their quintet into Dynamite Jackson's Club. They please the customers by playing old-fashioned rhythm and blues, with an occasional nod at developments in modern jazz. In stereo, Bryant's organ sounds full-bodied and swinging in the tradition of Fats Waller. A youthful career as an actor in "Our Gang" comedies and other movies, which conditioned him as a performer, also gave him a sense of humor. Both Amy, who is a fluent, tenacious tenor saxist, and valve trombonist Roy Brewster are jazz aspirants of promise, and they have located the ideal way to build reputations while gainfully employed. Except for *Come Rain Or Come Shine*, the entire program consists of blues originals.

Joan Baez **Vanguard VSD2077**

Bud & Travis: In Concert **Liberty LDS12001**

These youngsters are representative of the new crop being developed during the current folk music revival, and each shows growth toward an individual style. If Vanguard had looked a little harder, it might have picked a title for the recording debut of Joan Baez from Maynard Solomon's reference in the liner notes to Blake's "Songs of Innocence and of Experience." The word may seem incongrous when applied to a girl who has yet to reach her twentieth birthday, but the sum of a listener's experience is likely to be increased by the wealth of tenderness displayed on *All My Trials*, and *House Of The Rising Sun*. Her voice, for all its girlish sweetness, is full of womanly wiles that are calculated to win and hold audience attention. To several old broadside ballads, she brings a sense of personal involvement and breathes life into the narratives of *Mary Hamilton*, *Henry Martin*, and *Rake And Rambling Boy*. Although she started to sing and play the guitar in her early teens, her career in folk music began only two years ago and is rapidly gaining momentum. She will be heard from again and again. Fred Hellerman assists on guitar, and the stereo version is excellent.

Bud Dashiell and Travis Edmonson recently decided to go separate ways, and recordings of the two together are bound to assume increased importance as a result. One of the best presents the team in the concert last March at Santa Monica, California, and the two-record album is being sold at the price of a single LP. Only sixteen numbers are listed, but the introductions contain more humor than any four ranking comedy LP's. Alberto Calderon and Charles Gonzales supply apt rhythms, and engineer Ted Keep gives the purchaser a good stereo seat up front.

(Continued on page 70)

ABOUT MUSIC

HAROLD LAWRENCE*

The Return of the "Single"

Memories stirred in the minds of record collectors when Capitol and R.C.A. Victor recently announced the release of their new 7-in., 33⅓-r.p.m. singles. The "classical single," once an integral part of the record business, was virtually eliminated by the microgroove disc. Many regretted its passing, for more than nostalgic reasons alone. The 78-r.p.m. single represented an approach to records and recording which the shortlived 10-in. LP failed to duplicate, and which the new "compact 33" cannot altogether revive.

It is pleasant, of course, to welcome back the short-work disc. Rampant duplication and willy-nilly coupling often has made it necessary to buy unwanted pieces in order to acquire specific works, with the result that today's LP collection contains relatively more dead wood than its shellac counterpart. The classical single should provide the answer, although its future from the business standpoint is uncertain.

For nearly a decade the 12-in. LP has ruled the classical roost. It emerged the victor in the "battle of the speeds," and then went on to vanquish the 10-in. LP. The manufacturer, distributor, and record dealer looked upon this development with satisfaction, since uniformity of record size and speed simplified the problems of processing, inventory, and sales. And the overwhelming majority of classical record buyers rejected the 10-in. LP and the 45-r.p.m. disc. The question now is: will the 12-in.-LP-oriented consumer accept the pint-sized newcomer?

Probably not. Several factors conspire against the success of the Compact 33. First, there is an inherent weakness in the record size. Compactness may be a desirable feature in automobiles but it is a definite liability in discs. The average record buyer, it seems, feels he is not getting his money's worth unless he obtains a *full* LP. By "full," that means as much music as can be crowded onto the sides of a 12-in. disc—and let levels and "inner diameters" take care of themselves. Second, the price difference between the Compact 33 and the large LP places the former at a decided disadvantage. Why should the consumer pay $1.49 for some seven minutes of music when, for less than four times this price, he can obtain more than *six* times as much music? The principle of less music for more money is not designed to appeal to a quantity-conscious public.

Regardless of the outcome, the recording and repertoire plans of the disc companies will continue to revolve around the 12-in. LP, with the Compact 33 remaining essentially a by-product. When a recording artist steps into a studio today, he must be prepared to complete, or work toward the completion of, at least one LP disc—the equivalent of half a "live" recital (or concert). At this rate, an active, successful, recording musician finds himself running out of repertoire sooner than he believed possible. To maintain his recording activities at a given pace, he must expand rapidly into other musical areas. Like the television screen, the LP disc is a material-devouring medium. The recording career of Dietrich Fischer-Dieskau is a case in point. During the past five years, the gifted German singer has probably turned out more recordings than the total output of any 78-r.p.m. baritone. The titles of the Schubert and Schumann songs he has recorded would fill this page, and he has taped virtually all the best known works in the lieder repertoire. It is interesting to speculate on what this indefatigable artist will bring forth during the rest of the year. One thing is almost certain: Mr. Fischer-Dieskau will be singing some of these works for the first time.

For the cellist, the problem of repertoire consumption is far more acute. The list of "popular" concertos and other works with orchestra and co-soloists may be disposed of quickly. There are the Saint-Saëns, Dvořák, and Schumann concertos, Bloch's *Schelomo,* Brahms's *Double Concerto,* and Beethoven's *Triple Concerto.* The chamber repertoire is naturally less confined, but also less commercial; and the miscellaneous program, unless it consists of arrangements of *The Swan,* and *None But The Lonely Heart,* and similar "encore" pieces, comes at the bottom of the list.

And here lies the forgotten music of the LP era: the short composition. Paradoxically, the 12-in. LP is too long for the brief work. A recital on LP, for example, might contain eighteen songs, of which some are performed better, or have greater interest, than others. Certainly nothing prevents us from isolating a particular selection and playing only that. In practice, however, this doesn't happen often. Perhaps it's simply too much trouble to locate that elusive seventh spiral on a ten-band side. Whatever the reason, there is no question that "lump" listening has replaced "individual" hearing in the case of short pieces. Furthermore, 78-r.p.m. discs were played more frequently than are today's LP's.

To the 78-r.p.m. record producer, the problems of fitting music to a specific record size and over-all time factor were of minor importance. (This does not refer to the splitting up of complete works into sides of an album.) A 78-r.p.m. classical "hit" could be anything from a 10-in. single to a ten-record set. Recording artists therefore were not compelled to focus their attention exclusively on major works or

* *26 W. 9th St., New York 11, N. Y.*

large collections. In fact, most of the finest shellac recordings are "singles" of brief works, or excerpts from major compositions. Under the banner, "Great Recordings of the Century," Angel Records have released on LP some of these vintage 78's, thereby restoring to active life in the catalog a valuable part of our musical and phonographic heritage. Among the artists represented in this series are Claudia Muzio, Elisabeth Schumann, Pablo Casals, Alfred Cortot, Mattia Battistini, Tito Schipa, and Feodor Chaliapin. Angel intends to make selections from these LP's available on Compact 33.

The release pattern of classical singles now begins to take shape. The Compact 33 catalog will be drawn from two principal sources: the vintage 78 and the modern LP. Largely ignored by the record companies, however, is one of the richest periods in 78-r.p.m. history, extending roughly between 1944–1949. During these years, scores of "singles" were released which merit the designation, "legendary." Some of them were brought forth in LP collections, which, with rare exceptions, are now discontinued. Let us hope that the makers of the new Compact 33 discs will see fit to rescue them from oblivion. For a start, they might consider releasing the following memorable performances:

Falla, "La Vida Breve": *Vivan los que rien* (Act 1); *Alli esta* (Act 2). Victoria de los Angeles, soprano; Philharmonia Orchestra conducted by Stanford Robinson. HMV DB 6720

Mozart, "Mass in C Minor (K. 427)": *Et incarnatus est.* Erna Berger, soprano; Philharmonia Orchestra/Josef Krips. HMV DB 6536

Debussy, "Reflets dans l'eau." Arturo Benedetti-Michelangeli, pianist. HMV DB 6859

Bach, "Cantata No. 208": *Sheep May Safely Graze.* Elisabeth Schwarzkopf, soprano. Columbia LX 1051

Poulenc, "Napoli." Artur Rubinstein, pianist. HMV DB 6614

Villa-Lobos, "Bachianas Brasileiras No. 5." Bidu Sayao, soprano. Columbia 71670

Dowland, *"Flow My Tears; Shall I Sue; Now Cease, My Wandering Eyes.* Aksel Schiotz, tenor. HMV DB 5270

Handel, "Xerxes": *Ombra mai fù* ("Largo"). Kathleen Ferrier, contralto, with London Symphony conducted by Sir Malcolm Sargent. Eng. Decca K 2135

Handel, "L'Allegro": *Sweet Bird.* Elisabeth Schwarzkopf, soprano, with Vienna Philharmonic Orchestra conducted by Joseph Krips. Eng. Columbia LX 1010

Haydn, "Sonata No. 37 in D." Solomon, pianist. HMV C 3491

Schumann, "Arabeske." Artur Rubinstein, pianist. HMV DB 6492

Ravel, "Miroirs": *Alborada del gracioso.* Dinu Lipatti, pianist. Eng. Columbia LB 70

The above are some noteworthy singles chosen at random from the output of the last half-dozen years of the 78-r.p.m. era. It would be a pity if these and many other equally irreplaceable performances captured on discs during this fruitful period in recording history were overlooked. Æ

PERSPECTIVE

(*from page 36*)

These people, while *appreciating the material more than others,* could not divorce other factors sufficiently to allow "complete" listening.

The average person (who buys the most tapes) has no trouble, whatsoever, listening to the *whole* performance. In fact, he separates nothing (in the listening process) to evaluate separately, and therefore, either likes it or does not like it. This exercise, of course, consisted of just which recording he liked best.

Now, to the surprising part—all listeners to date have unanimously selected the close proximity (multimike) recording as "sounding best"—musicians included. The conductor, in fact, was most impressed with the dynamic range of the recording. At this point it must be pointed out that this observation was commercially unfair; a greater dynamic range was actually recorded than is normal practice on commercial tapes since a mediocre signal-to-noise ratio on playback would obscure very low passages. These tests, of course, do not represent a large number of people and are not indicative of a statement of any type. They have, however, convinced me that the close mike technique will enjoy some measure of increasing popularity, particularly with regard to classical music. As one individual put it quite simply, "A blast from the brass section is quite dull and colorless when stripped of its high frequencies by distance and reverberations!"

Oh yes, in all fairness, I must say that the tape reviewers who maintain that "one should attend a live performance occasionally to maintain their perspective—" were not among the listeners. Æ

MAXIMUM FUN

(*from page 42*)

and you're all done—that is, until you try to take the thing into the living room. Your wife will probably demand that it be sanded, painted, covered with grill cloth, etc., etc. I understand it is theoretically possible to resist such arguments, but an actual proof has never been offered. And, as as matter of fact, the 6-inch legs my wife suggested make the cabinet just about perfect as a lamp table. It sounds good, too. Æ

Bibliography

1. F. E. Planer and I. I. Boswell, "Vented loudspeaker enclosures." AUDIO, May 1948.
2. E. J. Jordan, "Baffles unbaffled." AUDIO, August and September, 1956.
3. James Moir, "Ported loudspeaker cabinets." AUDIO, October, 1956.

RECORD REVUE

(*from page 59*)

"Don Juan," of course, is another story, for Reiner is a great Strauss conductor. How any man except maybe Ormandy can be expected to do a top job on both of these is more than I can imagine. More power to Reiner for not being able to. He's honest, at least.

Berlioz: Overtures. Boston Symphony, Munch.

RCA Victor LSC 2438 stereo

Here's a case of the emperor's musical clothes. A great orchestra plays virtuoso French music under a French-trained conductor whose specialty is Berlioz—yet the performance is musically dull and even insipid. So I hear it.

The trouble isn't merely that Munch takes passages so fast that they are blurred, the harmonies muddled by the concert hall resonance, aided by RCA's conservatively distant mike pickup. These passages should indeed go like lightning, or faster. It isn't the dizzy tension of the virtuosic display, either. No composer was ever more high strung than Berlioz. It isn't the rush of one idea upon another, for that is also the Berlioz intention. All of these things could well be among the attributes of the greatest performance of the music on records—which this is not.

I can only suggest, in some futility, that the playing is just plain *unmusical*. It is note-perfect but unshaped, unphrased, pounding, hurried (not waiting to hear its own impact), the melodies like high-speed exercises, the harmonies undifferentiated, treated casually where their contrasts should curl the musical hair. It's all superbly and expertly mechanical, without a chance for that inward poetry that means real music. This, I think, is the conductor's fault, not that of the musicians.

The criticism could be made explicit, but only in explicitly technical terms, note for note, bar for bar. And since I don't plan to try conducting the Boston Symphony, I can go no further but must fall back on generalities. This Berlioz has musical virtuosity but little musical soul. It just isn't well played even though every note is physically where it belongs.

The recording includes three overtures, "Roman Carnival," "Corsair," and "Benvenuto Cellini," plus symphonic music from "Beatrice and Benedict" and "The Trojans at Carthage,"

Beethoven: Symphony No. 5, Symphony No. 1. L'Orch. de la Suisse Romande, Ansermet.

✪ London LCJ 80065

This four-tracker is on one and a half stereo discs but I guess it rates as a "Twin-Pack" even so. On disc, one of these came out last spring and the other in 1958 if my cards are right; but there were mono versions as far back as 1956.

Ansermet's Beethoven is forceful enough, but in both symphonies it seems to me he is coldly forceful, rather than dramatic in a musical sense. Beethoven is so much in the repertory that, paradoxically, sometimes he isn't rehearsed enough. This Fifth seems to me lax in detail, too driving in the conducting, unduly modern in that much is glossed over in favor of the driving continuity. The First seemed to me more plastic, more expressive, perhaps merely because I've heard it less often. Good, but not top interpretations. Sharp, close strings in London's familiar style.

Badings: Capriccio for Violin and Two Sound Tracks; Genese (Music for Five Audio-Frequency Oscillators); Evolutions —Ballet Suite.
Raaijmakers: Contrasts. Joke Vereulen, violin, plus tapes.

Epic BC 1118 stereo

Straight from Philips of Holland comes this Epic disc of three Badings works and one by his assistant, Raaijmakers. If you ask me, the assistant has more to offer in his short piece than all the Badings put together.

There isn't much point any more in groaning, or exulting, over the mere existence of electronic music. It's here to stay, and what matters now is evaluating its different manifestations and its composers in some sort of wider musical sense than that of mere sound-effect novelty. It isn't hard to evaluate Badings; he is a musical conservative-modern, not imaginative, given to academic sorts of cliché, verbose and learned but not very profound nor very dramatic. Call him an academic modern, gone electronic. His music is extensive and very complex but I find it more than boring; it is obstinately narrow in concept, repetitive of the same limited area of ideas. After five or six repeats I find it definitely irritating.

I wouldn't be so strong in my words, but for the fact that most people make an issue of electronic music itself—to be or not to be—and condemn everybody in sight, Badings included, if they dislike any of it.

This is very shortsighted. Electronic music now has plenty of vocabulary to allow for individual expression among composers, not say schools of composition, and its potentiality grows every day with further experiment. It's high time we began to talk of the individuals in this area and not merely the thing itself.

You'll find a vast array of drooping bells, tinkling icicles, whistles and plops here, a variety attesting, at least, to the growing mastery of the tools of the electronic music trade. But the repetitiousness, the endless sequences of the same sounds higher or lower, the padded-out, too-long, overly complex shaping, should bother you and probably will. But try the amusing "Evolutions," which imitates natural music—waltzes, ragtime and so on—with ludicrous effect. And try that assistant, Raaijmakers. Note in passing that the first item (1952) is an academic short sonata for "live" violin and two electronic sound tracks. It might just as well be a very academic sonata for violin and piano, for all I can hear.

Couperin: Troisième Concert Royal in A. Leclair: Sonata VIII in D. Boismortier: Trio Op. 50, No. 6; Concerto Op. 37. Camerata Instrumentale Telemann-Gesellschaft, Hamburg.

Archive ARC 73148 stereo

Two lesser Frenchmen and a major figure—Couperin—provide another considerable dose of authentic Baroque-Rococo for that seemingly insatiable market, this being the fastest growing type of music today. The lesser figures come through best here, perhaps merely because they are less demanding in style and content than the unique, inimitable Couperin with his perplexing wealth of elaborate ornamentation.

I must observe again that I think D.G. makes a mild mistake in producing its foreign music in this series via German musicians. Not that they don't do a splendid job in all possible respects here. (And I would not dream of criticizing such inspired assignments as the great Bach records by the American harpsichordist Ralph Kirkpatrick!) It is just, that somehow, a subly Germanic element seems inevitably to creep into music that must in all simplicity sound French. This doesn't.

Can't be pinned down, at least not in a brief review. But the excellently expert and routine Leclair and Boismortier works sound for all the world like so much excellent and expert Telemann, out of Vivaldi. (Telemann was indeed a follower of French style in this very time, as well as Italian, so this is not a 100 per cent criticism by any means). And the Couperin, more problematical, sounds just faintly like German musicology hard at work, which it probably is, since every ornament is carefully correct, the unwritten double-dotted rhythms are all there, the whole is note-perfect and a bit heavy. I.e. Germanic.

No, I can't prove thing. But I wish these had been done in France by Frenchmen, even if the authentic details might risk being less authentic, the French tending to be a bit airy and casual in such matters. But they do go to the heart of their own music, when they feel like it. AE

NEW PRODUCTS

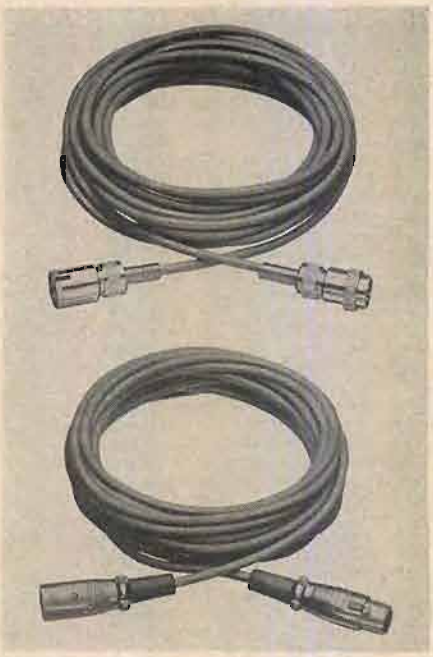
• **Tape and Film Synchronizer.** Designed to synchronize ¼-in. tape with sprocket driven film, the Magna-Tech Model 92B synchronizer is completely transistorized. Compatible with most transports, including the Ampex 350, 351, 354, 300, 400, and others, the Model 92B can correct speed deviations up to plus or minus 20 per cent

of sync speed. It employs a 60- or 14,000-cps synchronization track for control reference. Features include a built-in 14,000 cps rejection filter, automatic speed control for synchronized transfer of tape to film, and a manual speed control for varying pitch, special effects, trimming time spots, and for projector synchronization. The entire unit mounts in 12¼-in. of rack space and weighs 38 lb. Price is $1920.00. Magna-tech Electronic Co., 630 Ninth Ave., New York 36, N. Y. **D-1**

• **Regulated, Variable-Voltage, Power Supply Kit.** Featuring fully variable and regulated d.c. plate voltages up to 400 volts at a maximum of 150 ma, the new Paco Model B-12 power supply kit also provides bias voltages from 0-150 volts at 2 ma. Also provided are three 3-ampere a.c. filament outputs: two at 6.3 volts and one at 12 volts. These multiple sources provide unusual versatility for the experimenter and may well eliminate the need for individual power supplies. The B-12 is highly stable and output variations are less than 0.3 per cent (or 0.3 volts, whichever is greater) from zero to full load. Line voltage variation of plus or minus 10

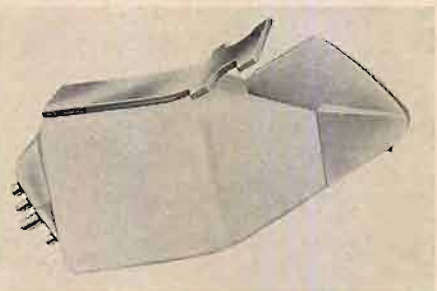
volts from 117-volt a.c. input will cause output variation of less than 0.4 per cent (or 0.5 volt). Ripple is less than .003 volts rms and internal impedance is less than 10 ohms from d.c. to 1 mc. Two meters are provided; one to indicate voltage in two ranges, 0–400 volts and 0–150 volts, and the other to indicate current from 0–200 ma. The B-12 is enclosed in a rugged metal case with a grey crackle finish and a top-mounted carrying handle. In kit form the B-12 sells for $69.95. Paco Electronics Co., Inc., 70–31 84th St., Glendale 27, L. I., N. Y. **D-2**

• **Microphone "Plug-in" Cables.** Two new cables introduced by Switchcraft make it possible for anyone to add an extra length to existing cables of public address, tape recording, or studio microphones without using tools, wiring, or solder. All that is necessary with both cables is to disconnect the present cable at the microphone,



plug the extension cable in and connect the original cable to the free end of the extension. The cables are two conductor types, are shielded, and are 25 feet in length. Cable No. 93BU94 has Amphenol MC3M and MC3F plugs. Cable No. 91BU92 has Cannon XL3-11 and XL3-12 plugs. These cables can also be used as replacement for worn-out cables. Further information is available from Switchcraft, Inc., 5555 N. Elston Ave., Chicago 30, Ill. **D-3**

• **"Calibration Standard" Cartridge.** Produced specifically for the professional level of the recording and broadcast industry, the Pickering model 381 Stanton Calibration Standard is now available for general use. The model 381 is an ultra-linear pickup designed to make precise record measurements and is available in the standard high-impedance model (47,000–100,000 ohms) as well as low impedance



models (250 or 500–600 ohms). Response is within 1 db from 20 to 10,000 cps and within 2 db from 10,000 to 17,000 cps. Output is 5 mv per channel; channel separation is 35 db. Recommended tracking force in professional arms is 2 to 3 grams. Weight of the unit is 12 grams. Model 381A complete with an individual calibration test report and 0.7-mil diamond stylus is priced at $48.00. Pickering and Company, Plainview, N. Y. **D-4**

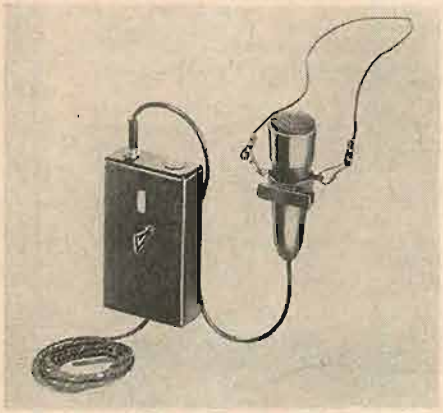
• **Tape Recorder Series.** Claimed to be the first low-priced recorder created for professional and studio use, the new Concertone "Series 500" is available either as a portable recorder or for rack installation. The series consists of three basic units: the Model M-506 tape transport; the Model M-508, which is an M-506 combined with a monophonic preamplifier; and the Model M-507, which is an M-506 complete with stereo preamplifiers. Among the features are high- and low-impedance inputs and

outputs, large VU meters, and separate line and mike inputs. The units are furnished with three fully shielded heads with space for a fourth for special effects. One of the unusual features is the utilization of three hysteresis motors: two for tape reeling plus a heavy-duty hysteresis-synchronous capstan motor. The Concertone "500" is two speed and available in 3¾–7½ or 7½–15 ips combinations. Carrying case, line transformers, Cannon connectors, and 19-in. rack frame are available as accessories. Prices are: M-506, $349.50; M-508, $520.00; M-507, $645.00. American Concertone, Inc., 9449 W. Jefferson Blvd., Culver City, Calif. **D-5**

• **FM Tuner-Stereo Amplifier.** Featuring a high-quality FM tuner with a built-in stereo amplifier, the Sargent-Rayment model SR-1040 is one of the first tuner-amplifier combinations designed for use with all systems of multiplex stereo reception. A switched input channel accommodates AM-FM stereo, FM-FM stereo, and FM multiplex stereo. To receive present-day stereo broadcasts it operates in conjunction with another tuner; when equipped with a multiplex adapter, the SR-1040 is a complete, self-contained system,

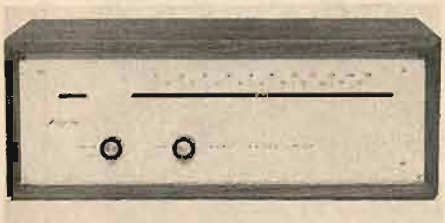
lacking only stereo speakers. The SR-1040 also incorporates a "center channel" output jack and a stereo separation control. Power output of each amplifier channel is 10 watts, and total peak power output is 40 watts. Sargent-Rayment Co., 4926 East 12th St., Oakland 1, California. **D-6**

• **Wireless Microphone.** Designed to free performers from the restrictions of a microphone cable, this new Victoreen "wireless mike" is essentially a small microphone and a crystal controlled, 10-oz. FM transmitter. A fixed-frequency FM receiver picks up the transmission and is so constructed that it can be linked into broad-



cast or public address systems. The "heart" of the system is Victoren's patented system of operating crystal-controlled oscillators at high frequencies and directly frequency modulating them, thus requiring up to 75 per cent less components than phase modulated transmitters. Some modern transistorized phase modulation systems use about 15 transistors to multiply the frequency whereas the Victoreen system requires only three. The Victoreen Instrument Company, 5806 Hough Ave., Cleveland, Ohio. **D-7**

• **FM Tuner.** Intended to round out the Karg line of FM tuners, the "Primata" CT-3 is a sensitive, stable tuner with a handsome exterior. Featuring printed r.f. coils, flywheel-action with in-line tuning, "magic eye" tuning indicator, dual function gated-beam limiter, wideband Foster-Seeley discriminator, and two audio out-



puts plus multiplex jack. Sensitivity is stated as 0.8 μv for 20 db of quieting with IM distortion less than 0.7 per cent at 100 per cent modulation. Frequency response is plus or minus 1 db from 20 to 20,000 cps. Price of the CT-3 is $99.50 without a case. A brown metal case and various wood cabinets are available as accessories. Karg Laboratories, South Norwalk, Conn. **D-8**

• **Ampex Tape Players.** Employing the same playback head and basic transport mechanism used in the Ampex Model 960 recorder player, the new Ampex Models 934 (shown) and 936 are two-speed (3¾ and 7½ ips) and will play two- and four-track stereo and mono tapes. The Model 934 is a deck only and does not include playback preamplifiers. The signal is picked up directly from the playback head and must be fed to the high-impedance

tape-head inputs of an external preamplifier. Model 936 includes playback preamplifiers, equalized and with sufficient amplification to permit direct connection to power amplifiers. Controls include fast wind, play, stop, speed selector, and a head-shift lever to enable playing either two- or four-track stereo tapes. The Model 936 also contains a listening-level control and an on-off control. Price for the Model 934 is $199.50 and for the Model 936 is $249.50. Ampex Audio Company, 1020 Kifer Road, Sunnyvale, California. **D-9**

• **FM Tuner-Amplifier Combination.** Designed as a complete home or office background music system, the Grommes FM tuner-amplifier Model 510 should be particularly valuable for professional offices. The unit is a complete FM tuner, preamplifier, and 20-watt (music power) amplifier on one compact chassis. The amplifier has Phono, Tape, and Microphone

inputs; the microphone input permitting the 510 to function as a public address system at the same time it is providing background music. Also included are loudness, bass, and treble controls. The FM tuner is tuned with the aid of a "magic-eye" tube. The circuit includes of two broadband i.f. stages, dual limiters, and a ratio detector. Further information is available by writing to the company, Grommes, 9101 King Ave., Franklin Park, Ill. **D-10**

NEW LITERATURE

• **Stereo Headset Described.** A data sheet describing the Dyna-Twin headset for stero and monophonic listening has been issued by Telex, Inc. The sheet describes features and applications of the headset which is designed specifically for use with high-fidelity equipment in the home or recording studio. The data sheet is available free by writing to Dept. KP-2, Communications Accessories Division, Telex, Inc., 1633 Eustis St., St. Paul, Minn. **D-11**

• **Just off the press** is a colorful 64-page catalog listing TV and radio chemicals, alignment tools, service aids, and hardware. Containing literally thousands of products needed by servicemen, hobbyists, and experimenters, the brochure is a complete reference of accessories. Copies of the catalog, number FR-61-G, are available without cost by writing to **GC Electronics Co.**, 400 South Wyman St., Rockford, Ill. **D-12**

JAZZ

(*from page 63*)

Penny & Jean: Two For The Road
RCA Victor LSP2244

The Kingston Trio: Make Way!
Capitol ST1474

The woods are full of Kingston Trio imitators, but success has yet to descend anywhere near as forcefully upon any contending male quartet or trio. RCA Victor dispatches two eighteen-year-old girls from California in a sort of flanking movement, which has just enough of an element of surprise to create a pleasant diversion in the folk song lists. Penny Palmer and Jean Amos bring an abundance of girlish charm to a dozen tradi-

tional songs, arranging and adding to each according to their own notions of harmony and propriety. Jack Marshall conducts accompanying groups to assist in filling out stereo depths and widths, but the girls might well dispense with extra vocal help after a period of seasoning on the club circuit. Their voices are especially appealing together on such songs of longing and romance as *Gypsy Laddio, Johnny Has Gone For A Soldier,* and *Big White Gull.*

The Kingstons demonstrate again why they remain on top of the heap, and the main question now about one of their albums is whether the best song will be picked for the hit parade. The choice this time seems to be *Hangman,* a number on which Peggy and Jean also mourn. Some listeners will prefer the Trio's efforts on *Speckled Roan, En El Aqua,* and *The River Is Wide,* but all should be content with the excellent stereo.

Jimmie Driftwood: Songs Of Billy Yank And Johnny Reb **RCA Victor LSP2316**
Irwin Silber: Songs Of The Civil War **Folkways (mono) FH5717**

Irwin Silber claims to have seen some 10,000 songs about the Civil War, still it is doubtful that the number of Centennial recordings will keep up with the flow of books about the conflict. Folk singers have their say on these albums, and Jimmy Driftwood confounds the issue further by making up his own songs about incidents and legends known to all scholars and most students. The Arkansas school teacher must have turned out some well-informed classes, and historians young and old will take pleasure in the stories related on *The Giant On The Thunderhead,* and *Rock Of Chickamauga.* As the title tune indicates, he covers quite a bit of territory on both sides of the battle line in just a dozen songs, introducing the raw recruit on *How Do You Like The Army,* and the lamenting warrior on *Oh Flovie.* Some listeners may object to the presence of assisting choral groups, even though the farthest stereo corners are filled, but Driftwood strides along as unperturbed as ever. An appreciative note on the liner is from Sarah Gertrude Knott, director of the National Folk Festival Association.

Silber, who edits the folk song magazine *Sing Out,* searched through library and personal manuscript collections, old newspapers and regimental histories, before deciding on the nearly 125 examples printed in "Songs Of The Civil War," published by the Columbia University Press. Thirty-three songs selected from the book are contained on two records in the Folkways set, and a good part of the label's large stable of folksingers rallies around. The call to action was too hasty for some, and the group singing shows occasional signs of stress, though Pete Seeger and Cisco Houston come through with flying colors as always.

The upheaval of the Civil War affected all forms of creative expression, and the first stirring of a native American music is faintly discernible in the songs of the period. Silber notes the many influences at work and classifies the songs according to natural grouping in the pamphlet enclosed, mentioning Stephen Foster and Dan Emmett in connection with the discovery of Negro melodic and rhythmic patterns. Most of his facts are familiar to jazz researchers, but those interested in blues origins might consider the possible effect of five sentimental songs included, especially those sung by Elizabeth Knight. While expressing the yearning of the blues, she still maintains parlor decorum on *Somebody's Darling,* and *Weeping Sad And Lonely,* two songs which drifted across southern fields for years. She also contends with an accompanying group but emerges as the brightest star of those assembled. Both she and Driftwood would do better alone or teamed together. Perhaps next time.

Trio San Jose **Capitol ST 10243**

For the past few years, Capitol has been issuing a special series of releases recorded at all points in the globe. Once the tapes arrived here from the country of their origin, they received standard domestic processing and were issued in pressings of a reasonably uniform nature. Under such a system, it has been possible to judge quite accurately the engineering work currently going into master tapes all over the world. The latest release doesn't tackle complicated projects such as Japanese or Dutch street sounds. The Trio San Jose consists of full-blooded Spanish serenaders, two from Barcelona and one from Tarragona. If you go for close harmony, this stereo disc should rate high on your list. Trumpet, sax, piano, and extra rhythm are occasionally added to the usual guitars of the trio. Perhaps the most interesting feature of the disc is the way top-notch stereo unlocks the "trade" secrets of harmonies in old and new songs of the Spanish-speaking world.

The Modest Jazz Trio: Good Friday Blues **Pacific Jazz PJ10**
The Frank Wess Quartet **Prestige/Moodsville Vol. 8**

When listening to current poll winners or the newest young technical marvel palls, either of these LP's can be recommended as a recuperative measure. The Modest Jazz Trio came into being at the behest of Dick Bock, who only asked for "a blues track or two" to fill out a blues anthology, and the informal session lasted all night. What went on the tapes is simply three professionals playing for their own enjoyment and not a performance in the usual sense of the word. Many admirers of Red Mitchell's bass playing no longer remember that he started out as a pianist, but few will forget his return to the keyboard on the title tune. A relaxed blues of his own devising, it sets the proper temper for thoughtful investigations of Gershwin's *I Was Doin' Alright, Willow Weep For Me,* and *I Remember You.* Jim Hall stretches out amiably on guitar, while Red Kelly takes up the bass chores. For all its modesty, a thoroughly delightful album.

Frank Wess performs a rare feat for a jazz flutist and negotiates a mood album without noodling or making strange sounds. Quite a few of his fellows feel that the assignment calls for extremes of one sort or another, and some end by just fluttering about. Wess sticks to the melody or develops long lyric lines on *It's So Peaceful In The Country, But Beautiful,* and *I See Your Face Before Me.* By way of reward, permission is granted the Basie reedman to reclaim his tenor sax on several tunes, including a long ad-lib blues, *Rainy Afternoon.* Tommy Flannagan assists admirably on piano, along with bassist Eddie Jones and drummer Bobby Donaldson.

Ken McIntyre: Looking Ahead **New Jazz 8247**

A new addition to the ranks of adventurous youngsters who like to think they are blazing the future trail of jazz is introduced here, and he brings along five original works that show pleasant signs of seasoning under a bright surface. Ken McIntyre, who holds a Master's degree from the Boston Conservatory of Music, is teamed in his debut with Eric Dolphy, a fellow exponent of freer means of musical expression. Both alternate on flute and alto sax, but McIntyre usually can be distinguished by his gentler and less assertive tone. In fact, he sounds much as Dolphy did on arriving in New York two years ago with Chico Hamilton from the West Coast, and the contrast is just right. Both owe a debt to Ornette Coleman, if only because record companies now give new ideas and talent a better reception, but they pay more attention to niceties of shading and offer much in the way of aural appeal.

As in the case of Coleman, not all their efforts are expended in plunging ahead and blues roots receive a thorough weeding on *Head Shakin',* portions of which hark back to Kansas City in the '30's. With a spanking solo from Walter Bishop to start things off, everyone stretches out at the insistence of Sam Jones, bass, and drummer Art Taylor. One encouraging factor in their joint quest for a personal style is a total lack of inhibitions about the past or present. Neither seems to care that attempts to make an instrument laugh went out of fashion with Ted Lewis, and hearty chuckles are heard on Gershwin's *They All Laughed,* the only number not credited to McIntyre. Nor is he afraid to create a melodic waltz theme pretty enough to satisfy Eddy Duchin on *Dianna,* with Dolphy switching to bass clarinet for the sort of gutty counter line never experienced in Chopin's day.

MONO

Otis Spann Is The Blues
Candid CJM8001

Some blues pianists are singularly fitted to work with singers and usually seem most comfortable in an accompanying role. Big Bill Broonzy's favorite companion on many dates never made a solo recording, which may explain why his identity was known to so few writers when he died in 1940. Time has brought most critics around to Big Bill's way of thinking and today they regard Joshua Altheimer as one of the great blues pianists, although his name has yet to be listed in any edition of the largest jazz encyclopedia. If a dozen of his sides with Big Bill and other vocalists were reissued on LP, the new generation of blues collectors might be more inclined to forgive such oversights.

Otis Spann, a pianist of equal prowess, plays a similar part today in the career of Muddy Waters, who is a half-brother and also comes from the Delta Country. They toured England together in the fall of 1958, where Francis Newton of *The New Statesman* bypassed the singer and wrote glowingly about the accompanist in his review. This album gives Spann the opportunities which Altheimer missed, and he steps out on piano solos and records his own stories in song for the first time. Reaching back to his 1930 birthdate and beyond, he sings about *Beat-Up Team, The Hard Way,* and *Country Boy.* Spann belongs to the same age group as Snooks Eaglin, the blind New Orleans street singer, and this youthful and capable pair may yet preserve pure blues styles from adulteration by the likes of Ray Charles.

Teamed with Spann is Robert Lockwood, Jr., a guitarist who brings the highest of references to his debut on LP, having learned the blues from the late Robert Johnson, his step-father and the best possible source. When he puts this early training to work singing four stories of his own, the reason why Spann served so long in a secondary capacity becomes clear. More completely at ease playing for someone else, the pianist applies the extra touches that make him a blues accompanist supreme. Except for a darkened studio during an impassioned blues, however, Spann needs no added incentive to solo unreservedly, and his performances are as fully charged as anything done in the idiom since Solo Art recorded Pete Johnson, Albert Ammons, and Meade Lewis.

Nat Hentoff resorts to supervisor's license in titling *Great Northern Stomp,* stating in the liner notes that it was named after the hotel in which George Piros engineered the session at Bob Fine's Studios. Charlie Davenport recorded the same theme for Vocalion, Paramount, and other labels as *Cow Cow Blues,* then sold the rights before his death for $25 during one of the stretches of adversity which were the lot of most early blues singers. Hentoff apparently believes any royalties forthcoming should go to Spann for rescuing it from limbo.

Sunnyland Slim: Slim's Shout
Prestige/Bluesville 1016

Lonnie Johnson: Blues And Ballads
Prestige/Bluesville 1011

Now that the dam is broken, blues singers are being rediscovered at a greater rate than even the most optimistic collectors could hope for in the recent past. Sunnyland Slim was born Albert Luandrew in Lambert, Mississippi, in 1907, and made his reputation in Chicago, but Prestige is the first label to record him adequately on LP. Sunnyland is a robust, uninhabited pianist and singer in the tradition of Roosevelt Sykes, who is represented on two Bluesville albums. He taught himself to play by listening to other blues pianists as a boy, and his individual specialties and stories are an experience in themselves. King Curtis, a leading tenor saxist in the rhythm and blues field, plays compact, driving choruses that he would do well to emulate on his own LP's. Robert Banks expresses the true blues feeling on organ, assisted by Leonard Gaskin, bass, and drummer Belton Evans.

Lonnie Johnson moves on to his second album and gives in to a love for ballads. Collectors once passed by anything not a blues, but the singer makes real period pieces of *Memories Of You, I'll Get Along Somehow,* and *I Found A Dream.* They are worth treasuring today. He also takes care of the blues with the aid of Wendell Marshall, bass, and Elmer Snowden, who returns to the studios on guitar after a long absence. The two guitarists exchange comments on *Savoy Blues,* and *Elmer's Blues.*

Eddy Duchin: Dream Along
Columbia CL 1432

The Eddy Duchin story takes a new twist with this release. Although he was one of the most famous pianists in the pop field this country has ever produced, following his death in 1951, Duchin's enormous recorded output gradually disappeared from the catalogs. When Columbia went to the vaults for this material, his listing had shrunk to a single LP on the Harmony label. The old 78's had never revealed all the detail in his ideas. The major surprise is the range of the response in the master recordings. A high-compliance pickup can make the piano sound like a recording made only five years ago. A rhythm group and, occasionally, a small chorus join Duchin in perennials by Gershwin, Kern and Tchaikovsky.

Benny Goodman: Swing, Swing, Swing
RCA Camden CAL624

This reissue package is chock full of vintage Goodman and lists *Hunkadola,* the first number the orchestra recorded for Victor in 1935, as well as *Who?,* from the first session of the famous trio. The mystery item is Martha Tilton's vocal on *Popcorn Man,* which was taken off the market on the day it was released. Goodman claims not to know what happened after he approved the playback in the studio. One rumor has it that a company executive objected to the lyrics. If so, the powers that be deny any knowledge of it today. Despite the album title, the Louis Prima opus is among the missing. Among those present are *Chloe, Bach Goes To Town,* and *Handful Of Keys.*

Jimmy Palmer: Dancing at the Roosevelt
Mercury MG 20423

Each side of this mono disc contains a dance medley that keeps the orchestra doggedly at work without a pause until the pickup gets within hailing distance of the label on the record. Palmer leads a standard hotel band in a potpourri that dips into ragtime as well as ballroom specialties unobtainable in the general run of present-day dance records. This is harmless fare guaranteed not to intrude upon conversation.

Benny Golson: Gone With Golson
Prestige/New Jazz 8235

When Benny Golson formed the Jazztet with Art Farmer, the first LP from the new group was awaited with much anticipation in jazz circles. Wide public acceptance is the avowed goal of both leaders and their sponsors, but the mere thought was enough to inhibit the players in the studio. Most of the impact delivered in club performance was missing, and only skill and polish remained. Perhaps all concerned will be content with pleasing themselves next time. Teamed in a quintet with Curtis Fuller, a former associate in the Jazztet, Golson gives a good indication of what will happen then.

With nothing more pressing on their minds than working out a few ideas together, they engage in an unstilted conversation that flows naturally around three Golson originals. All are in a blues vein, and the search is for roots rather than a gospel sound on *Soul Me.* The great rapport that has grown up between the two men is evident on *Autumn Leaves.* Golson is easily the most appealing of younger tenor saxists, and Fuller has developed into an interesting as well as facile trombonist under his guidance. The Jazztet has yet to locate a pianist of the caliber of Ray Bryant, who has all the blues roots needed at his fingertips. A decisive factor in the success of the session, he contributes *Staccato Swing,* assisted rhythmically by his broher Tom, on bass, and drummer Al Harewood.

Nancy Harrow: Wild Women Don't Have The Blues **Candid 8008**

Every record company would like to discover a new girl jazz singer, yet the search is usually conducted among pop singers in the hope that at least one will show signs of developing. The girl who wants to start out as a jazz singer and grow will find little assistance anywhere, unless it comes from a few sympathetic musicians. Most of the good ones began just that way, and Nancy Harrow is fortunate to be aided by Buck Clayton, Kenny Burrell, and others on her first session. Anyone so refreshingly noncommercial certainly needs help today. Despite liner note claims to the contrary, her style is scarcely unique and some listeners will be reminded of Nan Wynn and Lee Wiley of twenty years ago on such ballads as *All Too Soon*, and *I've Got The World On A String*. Or of Stella Brooks on the title tune, and on other blues. Her only recent competitors are Barbara Lee and Claire Austin.

Whether Miss Harrow is the next great jazz singer or not, she is undoubtedly a musician's singer. The excellent supporting nonet extends itself above and beyond the call of duty, making the LP a safe investment for all admirers of Buddy Tate, Dickie Wells, Tom Gwaltney, Danny Bank and Dick Wellstood. Bob d'Orleans recorded the singer at Nola Penthouse Studios without using a vocalist's booth, and the close rapport achieved is seldom heard in an echo-chambered world. Æ

A WALL OF SOUND

(*from page 24*)

marvelously accommodating material, and very inexpensive. It can be bleached almost snow white with standard two-solution peroxide and oxalic acid bleach, from which point any shade of blonde can be produced by brushing on a coat of "Rez," a pigment-bearing wood sealer available in many furniture colors. After brushing on freely, this is wiped off with a dry cloth in the direction of the grain until a wanted effect is achieved. It dries slowly, and if you make a mistake you can start over and try again until you have the color you want. A piece of mahogany selected for its attractive grain and finished this way, then lightly sanded and given a coat of well-thinned clear varnish will have a professional hand-rubbed effect that will grace any room.

One is not restricted to 12-foot width or 8-foot height. Both raw and pre-finished "V" scored plywood boards are available, and can be extended to any width without showing a joint. This is less true of cloth material. One is restricted to 54 inches at most, unless he is willing to have a seam showing.

The back of the wall can be finished as desired or as conditions dictate. Plywood can be used for economy if appearance is not important, or plaster board can be used, taped and textured, to give the appearance of a solid plaster wall. It is good sense to provide a door or a hinged panel large enough to permit easy entrance, since most audiofans will want to make changes or improvements as time goes on.

This would seem to be an ideal set-up for large arrays of small speakers—that is, 16 to 20 five-inch speakers connected in series-parallel to provide the desired impedance. Such an installation is low in cost, and high quality of sound reproduction is claimed by those who have been suggesting them during the last year or so. Such arrays can be set into existing walls by cutting out an area for them as the little speakers are shallow and the wall then could be finished to suit.

In cutting the holes for the speakers, they should be placed at about ear level of a seated person, or about 36 inches from the floor. This is the ideal location from the standpoint of sound, but is usually not possible with large-speaker set-ups. Furthermore—and wives take note—it allows the furniture to be placed at will without interference, barring tall solid cabinets, at least.

A little ingenuity may be required to apply this idea in some locations, but since it is quite flexible it would seem to be applicable to many homes. The author can vouch for its startling effect on visitors who are invited for the first time to hear a stereo record or two. In the author's set-up, the leads were carried from the speakers under the floor to controls at the back of the room, so the operator is in an ideal position when adjusting volume and balance. Æ

AUDIOCLINIC

(*from page 4*)

mutator contacts are connected between the output circuit and the speaker.

The 'scope must be provided with either a manually or an electrically operated switch for comparing the oscillator's wave form with that of the speaker under test.

The design of the amplifier can also be something of a problem when you want to do your switching in the input circuit of the amplifier. Even very fine amplifiers will find it hard to reproduce this kind of pulsed information because of the size of the coupling capacitors used to provide good low-frequency response. Just because an amplifier has difficulty in reproducing this kind of material, it does not mean that it cannot be used for fine music reproduction. The tone bursts place a heavier burden on an amplifier than does the music normally heard—heavier even than when sharp, percussive music is encountered. Æ

AMPLIFIERS

(*from page 22*)

tion, and the inverter plate voltages were checked.

Variation in plate voltage was found to be less than ±15 volts. The initial positive-feedback setting was correct for five of the tubes; an extremely small adjustment sufficed for the remaining two. Evidently, it is within the capability of the amplifier to accommodate a wide range of 12AT7 tubes in the sensitive input position.

The same series of tubes was tried in the cathode-follower driver position. Only slight changes in output-tube currents resulted; they were easily corrected by adjusting the bias potentiometer.

It is worth noting that the amplifier operated satisfactorily with 6L6, 5881, and 350B tubes in the output sockets. The maximum power output was, however, diminished. A considerable adjustment of the bias control was required to achieve the recommended cathode currents with these tubes.

Frenquency response

The response of the amplifier into a 16-ohm resistive load was measured at 4 and 16 watts. The resulting curves are shown in *Fig.* 7. They show that the effect of connecting an 0.022-µf capacitor across the output terminals is negligible.

The drop in response at about 10 cps was deliberately introduced by the input capacitor (C_1 in *Fig.* 6). Without this capacitor, the amplifier tended to maintain a flat response down to d.c. Because the output transformer was not able to handle extremely low frequencies, the amplifier tended to overload severely. Prior to the introduction of this capacitor, objectionably large variations in output-tube plate currents resulted from minor eccentricities in 33⅓-rpm records.

Distortion

The rms sum intermodulation distortion (60 and 3000 cps, 4:1) was unmeasurable at low levels. It rose to one per cent at a power output of 52 rms watts, as shown in *Fig.* 8.

Evidently, the power output of the amplifier was limited by the output tubes rather than the output transformer. Because of the 25-watt rating of the output transformer, the frequency response of the amplifier is doubtless quite restricted at a 50-watt output.

Whether or not a wide frequency response is required at power levels which the amplifier will, in home use, be required to deliver only during unusual transients, is a question each individual must answer for himself. At any rate, the 50-watt frequency response can be improved, if desired, by the substitution of a larger output transformer for the one specified.

Hum and noise

The hum and noise at the speaker terminals amounted to 0.01 volt ($=6\times10^{-6}$ watts) with the input shorted. An appreciable portion of this noise was contributed by the C– supply, which probably could have been better filtered. Even with the present circuit, however, hum is inaudible two feet from a highly-efficient speaker.

Output impedance

As is usual with amplifiers of this type, the output impedance is about zero ohms over the audible range. The infinite damping factor contributes to the cleanness of response by preventing hangover and undesired speaker-cone movements.

Sensitivity

An input signal of 1.1 volts drives the amplifier to 50 watts output, with the input gain control wide open.

Listening tests

Listening tests have been conducted, to date, by about a dozen critical listeners. Although the tests were separately conducted, most of the listeners used the word "transparent" to describe the reproduction. The amplifier must be heard to appreciate the relief with which the various instruments stand out in reproduced orchestral sound. Æ

PARTS LIST

R_1	250,000-ohm potentiometer
R_2	22,000 ohms, ½ watt
R_3	40,000 ohms, 5 watt, wire wound
R_4	220,000 ohms, ½ watt
R_5	6800 ohms, ½ watt
R_6	1 megohm, ½ watt
R_7	150,000 ohms, ½ watt
R_8	5-megohm potentiometer
R_9, R_{10}	330,000 ohms, ½ watt
R_{11}, R_{12}	1 megohm, ½ watt
R_{13}	12,000 ohms, ½ watt
R_{14}	25,000-ohm potentiometer
R_{15}	47,000 ohms, ½ watt
R_{16}, R_{17}	15,000 ohms, ½ watt
R_{18}	50-ohm potentiometer
R_{19}	1 megohm, 1 watt, deposited film
R_{20}, R_{21}, R_{22}	27,000 ohms, 2 watt
R_{23}	1000 ohms, 1 watt
R_{24}	4700 ohms, ½ watt
C_1	.047 µf, 400 v
C_2	0.33 µf, 400 v
C_3, C_4	0.1 µf, 600 v
C_5	.047 µf, 400 v
C_6, C_7, C_8	40/30/30 µf, 475 wv
C_9, C_{10}, C_{11}	20 µf, 150 wv
V_1, V_2, V_3	12AT7

V_1, V_2	6CA7	T_1	power transformer, 700 v ct, 150 ma 70 v tap, Triad HSM-241
V_3	5V4		
CR	diode, 200 PIV min., ½ amp (Sarkes-Tarzian F-2 or equiv.)	*M*	0–100 ma meter
		SW	d.p.d.t. switch, spring return
T_2	output transformer, 6600 ohms to voice coil, Triad HSM-186	*NE*	NE-10 neon bulb

AUDIO ETC

(*from page* 12)

the topmost performers for these LP innovations.

#532: Jazz Immortal, 1946; Jam Session. Sonny Berman.—And wham! again, right into historic jazz. I'd thought that Columbia had pioneered the historical jazz reissue on LP with its famed "Benny Goodman Concert" at Carnegie Hall, but here's a small-company bid in the same direction. You'll see the like everywhere now (when they aren't already withdrawn), but again, this must have been a saucy, fresh, new idea back in December of 1954. So I'd guess, anyhow.

#536: Les Bords du Saint-Laurent. French Canadian Folk Songs. Pieretto Champoux. No stone unturned by the roving Esoteric tape recorder. Enter folk music.

#545: Smoky Mountain Ballads. Harry and Jeanie West. And more folk song, this time looking pretty authentic. I'm going to have to look this record up and listen to it.

#546: Renaissance Motets, Renaissance Chorus (N.Y.).

#2002: Music of the Arab People. . . . Going to have to stop here, with Esoteric's wild leap into Arabia, straight from upper Manhattan. The details aren't important and my historical attribution of Esoteric "firsts" may not always hold water; perhaps some other label got there first, instead of Esoteric. But the principle is upheld, namely that until the middle fifties, the small LP operator could and did attain a really remarkable freedom of enterprise, to the limit of his imagination and with a minimum of high finance.

Where do we go from here?

What has happened? Well, in a sad sort of way, recording has grown up, put on weight, raised its technical standards. We're used to LP and we are used to innovations. We had them until they came out of our ears. Now, a novelty must be really unusual, or really superb in musical value, or particularly well played, if it is to catch the roving collector's jaundiced ear. Good, in a way. But it does discourage the kind of free-wheeling recklessness that led to the whole development of LP repertoire.

On the technical side, stereo has added painfully to the cost of marginal recording, and the smaller the business the more agonizing the cost. The plain fact is that very few small companies can afford stereo at all, what with that beastly necessity for stereo and mono duplication. The big companies alone can swing stereo and the stereo-mono joint release. (I hate to suggest it, but I suspect they are well aware of this convenient strangle-hold on small business. Dreadful thought—maybe they don't *want* to convert to all-stereo and the single release, and thus let in the competition from below.) There has been good stereo on small labels, but the promoters' bravery is almost painful to watch.

Finally, there has been a relatively large rise in processing costs, notably for those who must farm their processing out—the smaller labels. I am very conscious of this because of a side-effect, the impact of the price boost on private and independent recordings. My chorus, the Dessoff Choirs, used to make itself a good little income (a) by selling its music to assorted small commercial companies and (b) by making membership recordings, for private sale. Now, most of our small companies are dead, and our records with them; those which are alive aren't taking on much business of our sort. And the processing costs to make a private recording are now so startlingly high that we can scarcely afford to make our own records any more. Our heyday is definitely over as far as LP is concerned.

Yes, a good deal of this cost goes back to the rise in technical standards, and to stereo. Things are no longer done in the old slap-happy way. Recorders have to be good, now, and associated equipment is always tops, too. Engineers charge plenty, and editing costs a whale of a lot. (I used to do our editing, in the old days.) Altogether, making a good record now is a slick, polished, professional job and as an audio man of sorts I can't say I object.

Perhaps it is just as well that standards are now high and worth it, that everything costs more (including music) and is better.

But music, the recorded musical library, suffers, and will suffer a lot more as the happy days of LP pioneering move further from us.

P.S. Perhaps you'll be surprised to find that most of the Esoteric recordings of 1953 and 1954 are still listed in the Schwann catalogue, under the same numbers. Here's one small company that has managed to keep going, even under its new name, and to keep the best of its past records in stock.

Double P.S. It's another subject—but now the middle-sized companies are folding their tents, too. Westminster, paragon of musical hi fi, went out and is back, barely. Unicorn, a would-be mid-sized outfit, died very thoroughly. Others are reportedly on the rocks, though I mention no names out of concern for them. Even the new middle-graders of recent launching seem to flounder these days. The big problem for them is just the one we have been studying—shall they ape the biggies, plug standard repertory (at huge expense) for wishfully big sales; or shall they push the out-of-the-way stuff, for more prestige and less expense?

And with that, I must return to my Deccas, RCA Victors, Columbias and Capitols, my Mercuries, Angels, Everests, Londons. Where are the half-a-hundred labels of yesteryear? Æ

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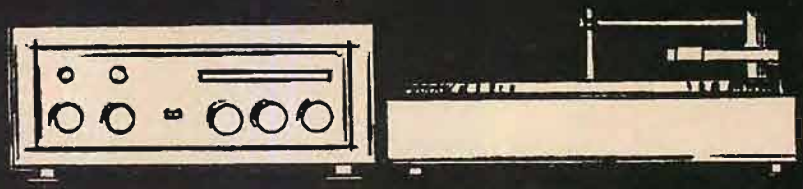

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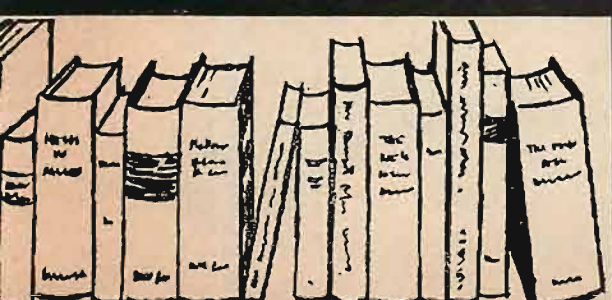

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LIGHT LISTENING

(*from page 8*)

Mingled with the more obvious choices—*Merry Widow Waltz* and *My Hero* from "The Chocolate Soldier," and the Overture to "Die Fledermaus"—are the less assertive *Serenade* from Lehar's "Frasquita" and the seldom-encountered *Oh Maiden, My Maiden* from the same composer's "Frederica".

London's sound on this latest Mantovani tape doesn't have quite the boost in the highs of the strings that I objected to in his earliest tapes. Apparently, some effort is being made to tame the excesses of the past. This reel should ride nicely with any bump-free set of tweeters.

Machito With Flute To Boot
Roulette ✪ RTC 514

If you don't object too strenuously to the exaggerated separation encountered in this stereo reel, you'll find some novel listening fare in the experiments conceived for Machito's Afro-Cuban ensemble by the noted jazz flutist, Herbie Mann. All the material in this album was written and arranged by Mann to spotlight the battery of flutes he has at his disposal. An African flute, piquantly approximate in pitch, supplies the "atmosphere" for the rhythms of that continent. Alto flute, E Flat flute, and Herbie Mann's regular instrument take turns in setting forth impressions of Brazil, Jamaica, and Haiti. The tenor saxophone of Johnny Griffin and the trombone of Curtis Fuller are the other attractions in this rather studied attempt to go "Far Out." I personally find the gaping hole in the center of the stereo area disconcerting but flute fanciers may be able to find it easier to overlook the deficiences in stereo miking.

Nelson Eddy: A Starry Night
Everest SDBR 8004

Two recent recordings on the Everest label have given a new twist to the career of Nelson Eddy. One of the top Hollywood stars in the Thirties and early Forties, Eddy's baritone voice gained widest fame as partner of Jeannette MacDonald during a period when the great operettas were being brought to the screen. Although active in radio and night clubs since that time, Nelson Eddy had only a few records on the major label's active lists until Everest decided to give him star billing on up-to-date pressings. His first stereo album for this label also starred Gale Sherwood, the distaff member of his night club act, and leaned heavily on the famous songs of Broadway and Hollywood musicals. In this release, Skitch Henderson's urbane and soft-spoken orchestra accompanies Nelson Eddy in a collection of tunes that have ignored the passage of time—familiar adaptations of classical themes such as *My Reverie, The Lamp is Low,* and *Full Moon and Empty Arms.* It's a distinct surprise and pleasure to hear these songs in a thoroughly masculine register that Everest has brought to discs with exceptional success.

New Shows in Town—1961
Medallion MS 7515

Remember the days when a single idea or format was enough to sustain a pop record release? Before competition among pop recordings reached its present proportions, the producer was able to meet expenses with straightforward releases. Now, although more people are buying music in recorded form, the entrance of many new labels has made the job more complicated. Take this stereo disc from Medallion. Not too long ago, it would have been possible to sell this item on the basis of any one of its three ingredients. It seems to be essential at the present time to combine all three and put out a recording that contains show tunes, played on percussion instruments, in tempos suitable for dancing. If you dont, object to the idea of taking liberties with show material, you'll enjoy this quick tour of seven productions of the current Broadway season wrapped up in Al Caiola's carefree arrangements.

Frederick Fennell Conducts Victor Herbert
Mercury PPS 6007

Mercury is currently offering a new series which they call "Perfect Presence Sound". The foldover, white-background jacket of the album follows the packaging trend of the past year. The recording facilities used are a significant departure from the setup employed for some time in Mercury's Chicago sessions. The locale of this Victor Herbert undertaking is the birthplace of many recent best-selling albums—Fine Recording Studios in New York.

A sensible formula has been worked out in this series in order to meet present-day competition in the matter of stereo separation. Directionality is a shade more pronounced than that of the regular Mercury stereo pop discs we've known in the past. The change seems to lie more in the angle at which the instruments of the orchestra face the mikes than in the actual spacing of the players. The effect, on the whole, is more natural than the one they got when up to a dozen mikes were used in the Chicago sessions. Signal level is healthy without any signs of breakup.

This record finds Fred Fennell cast in a role quite removed from his usual one at the head of the Eastman Wind Ensemble. Here he leads a straight orchestra in a potpourri of Herbert's greatest tunes. The Richard Hayman arrangements are at their best in relaxed, schmaltzy items such as *Thine Alone* and *I'm Falling in Love with Someone.* The weakest portions of the album, oddly enough, are the more exotic ditties—*Romany Life, Habanera,* and *Italian Street Song.* There, I miss the fire and authority found in the Kostelanetz and Percy Faith versions of the same music. One exception, however, is the clever treatment of the *March of the Toys.* A toy drum sets a military cadence beat. Three flutes are used in the first fanfare instead of the usual trumpets, establishing a mood that combines lightness and fantasy. Although this album fails to supersede all previous Herbert stereo recordings, it does indicate that the latest Mercury series is definitely headed in the right direction.

Raoul Poliakin: Irving Berlin
Everest ✪ T 43058

This is a new and ambitious treatment of songs that form the bed rock of American popular music. Finding an approach that is novel and fresh isn't the easiest job in the world when the material has the familiarity of most of these Irving Berlin tunes. Poliakin handles the chorus and orchestra with aplomb. I would have preferred a bit more activity on the part of the chorus. Not counting its wordless accompaniment in *I'm Putting All My Eggs in One Basket,* the chorus is heard in less than one fifth of the musical lineup. Fortunately, one of the two items sung is the relatively unknown *With You* from the 1930 Harry Richman film "Putting on the Ritz."

On the debit side of the ledger, this reel serves as a reminder that tape is still looked upon as a stepchild. The problem is not confined to this particular reel. Discrepancies are still cropping up in the listing of the selections on the box containing the reel. Most tape releases carry the liner notes that first appeared on the jacket of the disc recording. The trouble is that some tapes do not carry all the selections found in the disc version but the box does not spell this out. I make it a point to consult the listing on the label of the reel itself. This, of course, is scant comfort to the customer who has to purchase a reel before he can discover how many selections he has acquired. Tape recordings of classical music seldom present this problem but listings of popular or jazz collections often contain fewer items on the reel label than they do on the box. My copy of this Irving Berlin collection strikes out on both lists. It mentions the tune *They Say It's Wonderful* on both the box and the inner label yet the selection is nowhere to be found on either side of this reel. I'm sure most of us know our Berlin well enough to recognize what emerges from the speakers but, after all, there are all those uncommitted countries to consider.

DIG (INTO) THIS CRAZY RECORD PLAYER

While it may not produce sweet music, the latest innovation in record players is likely to be the sweetest one in existence. This was the birthday cake presented by Jack Entratter of the Sands Hotel in Las Vegas to Leonard Carduner, president of British Industries Corporation, who import the Garrard record changers and turntables, on the occasion of Mr. Carduner's *xx*th* birthday.

We assume that the accompanying chants by the guests at the party was "Cut Yourself a Piece of Player." (* These *xx*'s were intentional. ED.)

CLASSIFIED

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Industry Notes . . .

• **GIANNINI CONTROLS ACQUIRES CONRAC.** **Conrac, Inc.** of Glendora, California has been acquired by **Giannini Controls Corp.** following approval by Conrac shareholders on Feb. 27, 1961. Former Conrac president, **William J. Moreland,** will continue to direct operations of the new Giannini division as General Manager. All other Conrac personnel have been retained.

• **RADIO SHACK ENTERS KIT FIELD.** Jumping in with both feet, **Radio Shack** has released several kits and hired a group of high-level people to prove its serious intentions in the mail-order kit field. First of all **Gaylord Russell,** formerly of **Heath,** has been appointed to the newly created post of Director of Engineering. At the same time **Gordon A. Martin** and **Dick Rudel,** both formerly with **Allied Radio,** have been hired to backstop the increasing mail-order operations. Mr. Martin was named Order Processing Manager and Mr. Rudel was named Warehouse Production Manager.

• **AMPEX SHIFTS DIVISIONS.** In a move to provide separate manufacturing, research, and marketing organizations for both audio and video products, the audio division of **Ampex Professional Products Co.** has been consolidated with **Ampex Audio Co.,** and similarly the video products segment has been formed into a new organization to be called **Ampex Video Products Co.** As a result of the move, Ampex Audio Co., will now market the full Ampex line of professional tape recorders and duplicating systems plus the existing range of home tape equipment and recorded tapes.

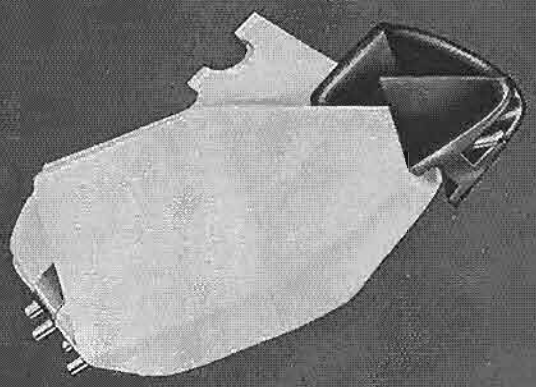
• **PACO ADDS PRODUCTION SPACE.** As a direct result of their fast-paced development program, **Paco** has found it necessary to add 20,000 square feet of production space.

• **AMPEREX UPS PLANT MANAGER.** **Mr. Peter van den Berg,** Chairman of the Board of **North American Philips Company,** has announced the appointment of **Mr. Jan Bleeksma** as Vice President in charge of manufacturing of **Amperex Electronic Corp.** Mr. Bleeksma formerly was plant manager.

ADVERTISING INDEX

At Last!

A CARTRIDGE DESIGNED ESPECIALLY FOR AUTOMATIC TURNTABLES!



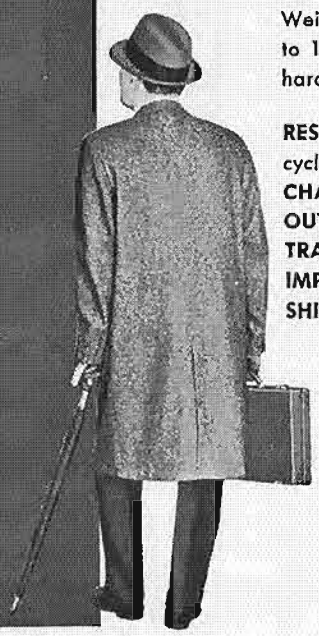
A NEW KIND OF CARTRIDGE FOR A TOTALLY NEW REQUIREMENT!

The Pickering Model U38/AT is a cartridge designed especially for the new generation of automatic turntables. A true STANTON Stereo Fluxvalve, it combines excellent hum shielding with high output for unequalled signal-to-noise ratio.

High compliance is provided for the special turntable features while preserving the ruggedness demanded by automatic operation. Improved frequency response and lower inductance make the new Pickering U38/AT a truly universal cartridge to match the universal features of the automatic turntable.

TECHNICANA: PICKERING Model U38/AT is a STANTON Stereo Fluxvalve with a white body and black V-GUARD stylus assembly. Weight is 14 grams; Mounting centers: 7/16" to 1/2". Supplied with universal mounting hardware. $46.50 AUDIOPHILE NET

RESPONSE: ± 2 db from 20 to 20,000 cycles.
CHANNEL SEPARATION: 35 db
OUTPUT: 10 mv each channel
TRACKING FORCE: 2 to 5 grams
IMPEDANCE: 47,000 to 100,000 ohms
SHIELDING: Complete mu-metal



"FOR THOSE WHO CAN HEAR THE DIFFERENCE"

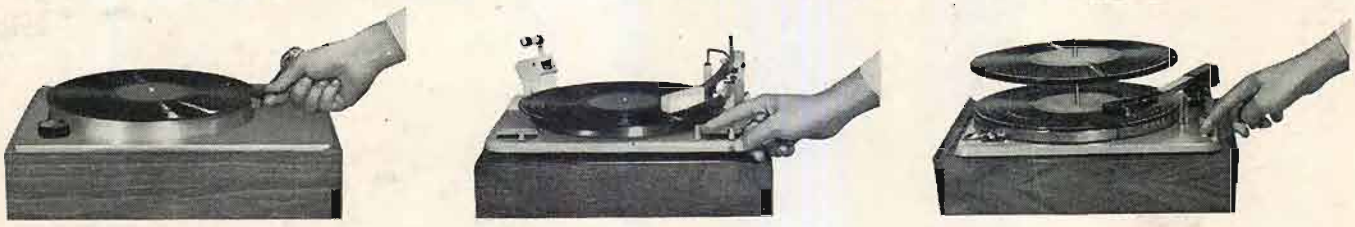
PICKERING & COMPANY, INC., Plainview, N. Y.

The hermetically sealed STANTON Stereo Fluxvalve is warranted for a lifetime and is covered under the following patents: U.S. Patent No. 2,917,590; Great Britain No. 783,372; Commonwealth of Canada No. 605,673; Japan No. 261,203; and other patents are pending throughout the world.

CIRCLE NO. 56 ON READER SERVICE CARD

IF YOU USE

THIS OR THIS OR THIS



MAKE A MAJOR IMPROVEMENT IN YOUR SYSTEM AT MINIMUM COST WITH THE NEW ADC-3 UNIVERSAL STEREOPHONIC CARTRIDGE!

For owners of turntables, automatic turntables, or record changers, we believe that the new **ADC-3** universal stereophonic phonograph cartridge, at **$29.50,** is **the best buy on the market.**

ADC-3 SPECIFICATIONS

TYPE: Miniature moving magnet ● SENSITIVITY: 10 millivolts per channel ± 2 db at 1,000 cps (5.5 cm/sec recorded velocity) ● FREQUENCY RESPONSE: 10 to 20,000 cps ± 3 db ● CHANNEL SEPARATION: 30 db 50 to 7,000 cycles ● STYLUS TIP RADIUS: .0007" (accurately maintained) ● STYLUS TIP MASS: .8 milligrams ● LATERAL AND VERTICAL COMPLIANCE: 15 x 10 $^{-6}$ cms/dyne minimum ● RECOMMENDED LOAD IMPEDANCE: 47K ohms ● TRACKING FORCE: 2 to 5 grams ● MOUNTING CENTERS: Standard ½" and 7/16" centers. Unit adapts to virtually all tone arms

We urge you to listen to the **ADC-3** cartridge at your high fidelity dealer and then make a major improvement in your system at a minimum cost with the new **ADC-3** cartridge at **$29.50—the best buy in the market.**

ADC

AUDIO DYNAMICS CORPORATION

Pickett District Road, New Milford, Connecticut

CIRCLE NO. 13 ON READER SERVICE CARD