audio record

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Notes on the Development of Hot Stylus Recording

The hot stylus method of disc recording, developed by Columbia Records, Inc., is the result of extensive research to determine the limiting factors affecting the variations in surface noise and frequency response at different groove diameters.

Since hot stylus recording is now being applied by a number of professional recordists — and equipment for its commercial use has been made available by the Fairchild Recording Equipment Corporation — it will be of interest to examine the underlying principles which explain the resulting improvements in recording characteristics.

To go back to some basic fundamentals, it has long been known that disc recording styli involve a compromise between signal-to-noise ratio and frequency response. In 1941 it was shown that as we modify stylus dimensions to cut a smoother groove, with lower background noise, the loss of high-frequency response increases — particularly as the cut approaches the inner diameter of the disc, with correspondingly reduced groove velocities.

Although signal-to-noise ratio was identified as a function of the cutting stylus and recording lacquer, the decrease in high-frequency response was originally attributed to the reproducer. In other words, it was considered as a playback loss rather than a recording loss.

One school of thought maintained that reproducer tip radii of .002" to .0025" were too great successfully to trace wavelengths of approximately the same magnitude.

Tests were therefore made by Columbia under carefully controlled conditions, to allocate the frequency response loss as a function of the recording stylus — the recording lacquer — the reproducing stylus and the reproducing head.

Fig. 1 shows a set of curves in which frequency response is plotted as a function of wavelength of recorded waves, for various types of cutting styli and disc coatings. The lower group of curves on the same chart shows the relation between wavelength and groove diameter for various frequencies, at 33⅓ and 78 rpm. The five different frequency vs. wavelength

(Continued on Page 2, Col. 1)

University of Kentucky engineering student, John Curry, at the controls of WBKY's portable Magnecorder, making an on-the-job recording at the Ashland Oil and Refining Company, Catlettsburg, Kentucky.

Employees of the Ashland Oil and Refining Company listen to a playback of the tape recording while WBKY's announcer, Bill Gordon, U. K. Radio Arts major, listens in on the headphones.

Visiting Kentucky's Industries via Tape Recordings

Unique Programs by University of Kentucky Record the Pulse Beat of Industrial Activity

"If a tape recorder could only talk!"

This was the way a WBKY engineer characterized one of the University of Kentucky station's Magnecorder units after an especially adventuresome day in the field. This engineer had just completed recording one of the University's "Visiting Kentucky's Industries" broadcasts from a Kentucky coal mine.

Several hundred feet in (and down) the mountain the radio group from WBKY was at a cutting face. First the sound and description of the undercutting machinery was etched on tape. Then came the drilling. Next the powder tube was inserted in the hole, and the electrical discharge wire strung out. Came the recording of the blast (successful only after several trys). Quickly the loading machinery came in and scooped up the coal just shot down.

Now came a difficult part of the program, a recording of a ride on the coal train from the shooting face out to the

(Continued on Page 5, Col. 2)

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Hot Stylus Recording

(*Continued from Page* 1, *Col.* 1)

curves all have the same general characteristics, but with varying degrees of frequency response loss at the shorter wave lengths, as the cut approaches the center of the record. The optimum condition, with minimum loss of response, was obtained with a wax cutting stylus on a wax disc.

These differences are apparently due to two factors — the shape of the cutting stylus and the cutting characteristics of the recording disc lacquer.

When lacquer-coated discs were first introduced, it was found that the cutting styli which had been used for wax were not suitable, resulting in a noisy cut. Special styli were therefore developed for the lacquer discs, the cutting edges being modified or "dubbed" to include burnishing facets on the leading edges of the cutting point, as shown by the drawing in Fig. 2. The burnishing edges gave a high polish to the side walls of the groove, resulting in extremely quiet cuts. The surface noise, though satisfactorily low, still tended to increase as the groove approached the center of the disc. And since this was true even for an unmodulated groove, it was apparently due to the reduced cutting speed at the smaller diameters.

Columbia's engineers assumed, therefore, that the smoothing action of the burnishing facets on the cutting stylus was the result of heat generated by friction, which tended to "flow" a smooth surface on the cut groove. As cutting speed diminished, so would the amount of heat generated, and the smoothing action as well.

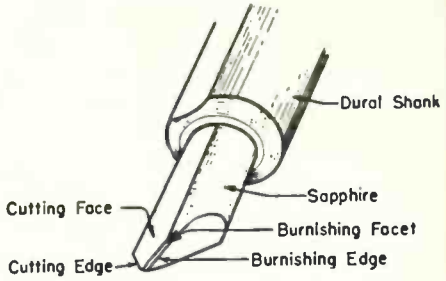


Fig. 2. Enlarged drawing of lacquer cutting stylus, showing burnishing facets which give high polish to groove side walls.

This theory would explain the increase in surface noise. But what about the reduction in high-frequency response?

The shape of the cutting stylus gave an important clue here also. Since wax cutting styli, without burnishing facets, gave less high-frequency loss than lacquer styli, it could be seen that the burnishing facets introduced additional resistance to *lateral* movement of the cutting tool. This would also explain why the response tended to fall off more sharply at reduced groove diameter, too. For, with a fixed frequency, the relative proportion of lateral movement for a given forward travel *increases* as cutting speed decreases with inward travel of the groove. The reduced temperature of the stylus at the slower speeds would tend to increase this resistance to lateral movement still further.

Columbia decided, therefore, to apply the required amount of heat to the stylus by *external* means — making stylus temperature independent of cutting speed. The first method tried, in 1948, was to wind a small coil of wire directly on the sapphire stylus, heating it by means of direct current passed through the coil. This method worked so well that it is still in use today, although many other heating methods were investigated.

As was expected, discs cut with the heated stylus indicated a greatly reduced surface noise — so great, in fact, that it was possible to make remarkably quiet cuts with negligibly small burnishing facets. Fig. 3 shows the results of hot stylus recordings made at various temperatures, for 5 inch and 12 inch diameters. With proper heating current it was possible to obtain remarkably quiet cuts, even at the smallest practicable recording diameters. Moreover, Columbia's tests indicated that hot point recordings would give a frequency response as good as that shown in Curve E, Fig. 1, for wax cutting stylus on wax.

Columbia's development of hot-stylus recording therefore appears to be a prac-

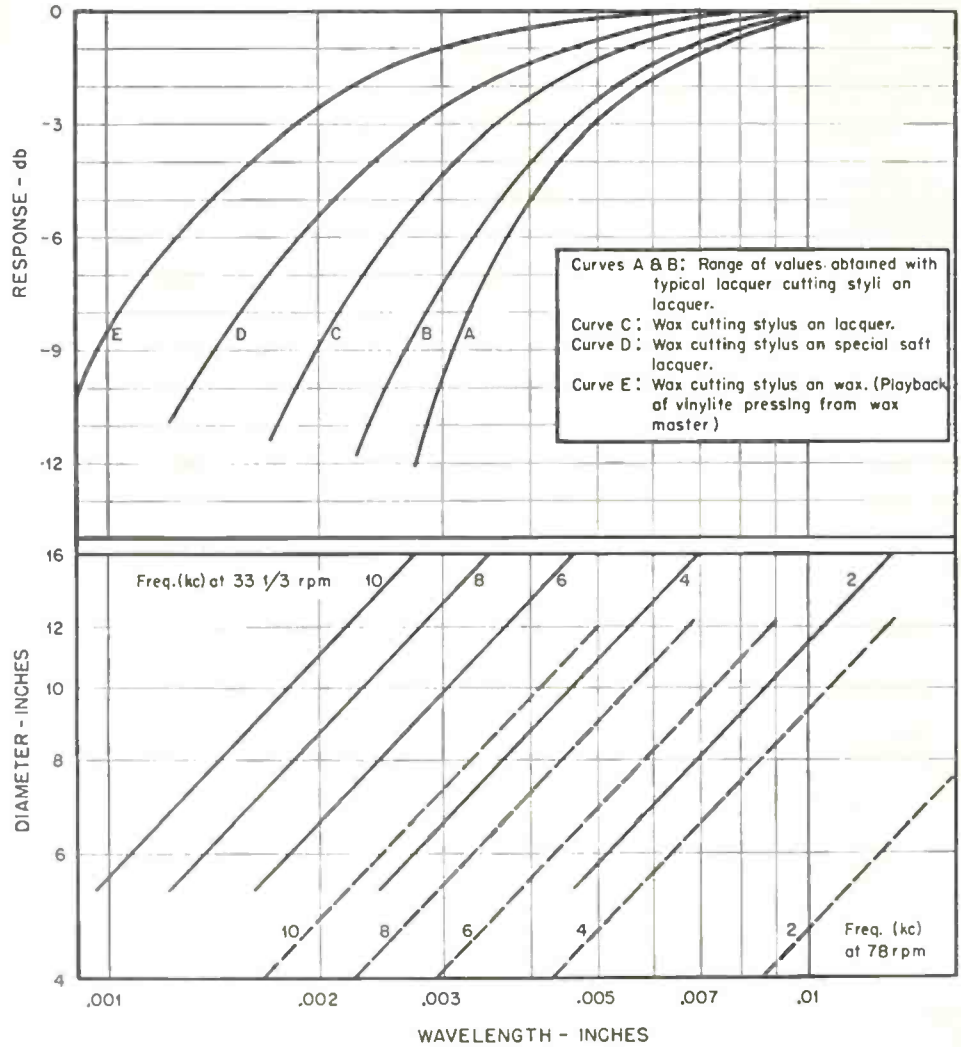


Fig. 1. Curves showing playback response vs. wavelength of recorded waves for various cutting styli and disc coatings. Lower group of curves relates recorded wavelength to frequency and diameter.

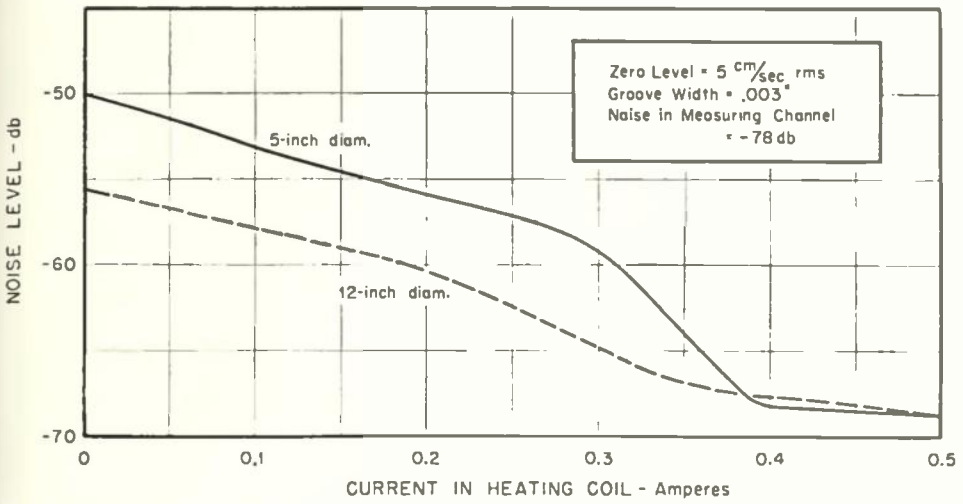


Fig. 3. Curves showing noise level in unmodulated groove vs. current in stylus heating coil. Noise measured with playback channel having uniform velocity response from 500 to 8000 cps.

tical solution to the problems of background noise and frequency response loss. It apparently offers all the advantages of wax recording, without sacrificing the convenience of lacquer discs for direct playback and easy processing.

Perfected equipment for the application of this principle was announced by the Fairchild Recording Equipment Corporation last April. The Fairchild "Thermo-Stylus Kit", illustrated in Fig. 4, includes a cutter-head adapter, two special cutting styli with built-in miniature heating elements (one stylus for standard and the other for microgroove recording), and a thermo-control box, with on-off switch, variable heat control, pilot light, and an illuminated meter, color calibrated to indicate the thermal settings for standard and fine-pitch recording. The control setting is non-critical, as good results are obtainable with a relatively wide latitude of stylus temperature.

It is stated that recording with the Thermo-Stylus method results in a reduction in surface noise of as much as 20 db, and that noise increases with decreasing diameter are negligible. Fig. 5 shows diameter losses in db for both hot and cold recordings at disc diameters of from 16 to 4 inches. Curve for hot point recording is made from disc cut with the Fairchild Thermo-Stylus Kit.

The complete Thermo-Stylus Kit is priced at $100.00. Detailed information can be obtained by writing to the Fairchild Recording Equipment Corporation, 154th St. and 7th Ave., Whitestone, New York.

As is the case with any new development, the real measure of the success and practicability of hot-stylus recording lies in its acceptance and performance "in the field". We will therefore welcome any comments on this subject from those of our readers who have experimented with or are now using the hot stylus recording process. Any information of this nature that we receive will be included in future issues of Audio Record.

Audio Fair Draws Record Attendance

The second annual Audio Fair, held at the Hotel New Yorker, New York City, on October 26th, 27th and 28th, proved to be an even bigger success than was anticipated.

Registrations were about *double* those of the first Audio Fair held last year. Although total attendance has not yet been tabulated, the 1950 Fair drew a conservative estimate of 6,500 visitors — which compares to 3,300 for the 1949 event. There were more exhibitors, too — 69 in 1950 compared to 56 last year. And in many cases, one exhibitor included several manufacturing divisions of a company, each with a separate line of products.

As for individual attendance at the Audio Devices exhibit, professional, educational, and amateur recordists alike all evinced keen interest in the large Audiotape display — including the standard 1/4" tape in sizes from 300 to 5000 feet, as well as many larger widths (up to 3 inches), produced for specialized magnetic recording applications. Also displayed for the first time was the new Audiofilm, which is described on page 8 of this issue.

Four hundred and seventy three *new* subscribers asked to be put on the mailing list for Audio Record. And hundreds of free, 300-foot sample reels of Audiotape were distributed to interested recordists.

Many visitors were surprised to see how *extensive* the Audiotape line had grown to be — particularly with reference to the specialized tapes for industrial, research, and communications applications.

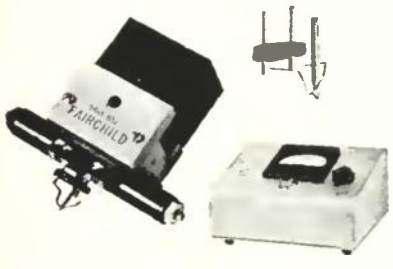


Fig. 4. Fairchild Thermo-Stylus Kit for adapting disc recorders to hot stylus operation. At left, the Thermo-Stylus, with adapter, is shown mounted on a Fairchild Magnetic Cutterhead. An enlarged, close-up view of the Thermo-Stylus is shown at the upper right, above the Thermo-Control box.

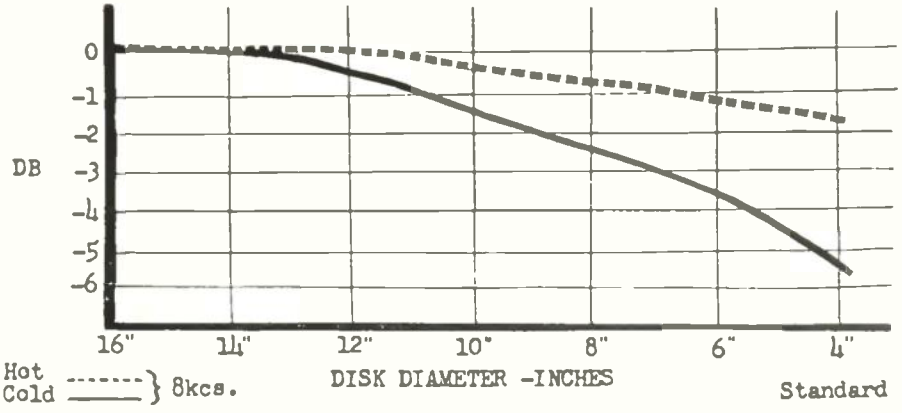


Fig. 5. Curves showing relative frequency-response losses of conventional and Thermo-Stylus recordings at various groove diameters.

audio pointers for the Recordist

by C. J. LeBel, Vice President, Audio Devices, Inc.

THE FIRST AES STANDARD

C. J. LeBel

After two years of work the Audio Engineering Society has just issued its first standard. for a universal disc *reproducing* characteristic. Since this represents the first solution to a problem which has plagued the recordist for many years, we wish to discuss it at length.

Background

An understanding of the background of the problem is helpful in indicating why this particular solution, of the many possible, was chosen.

During the days of acoustical recording there was no standardization — even by a single man. Every recordist had his own personal cutting heads, with one for sopranos, one for tenors, another for baritones, and so on. He would use the head which his personal judgment suggested might be best for a given type of voice — and this judgment changed with time. Reproducing characteristics were similarly varied.

The advent of electrical recording and reproduction made it easier to *measure* recording and reproducing characteristics, but it brought no standardization. By the late thirties the chaos had reached its height in the transcription field, so that a radio station playing five different platters might have to use as many different reproducing characteristics. At this point the National Association of Broadcasters stepped in and set up its Recording and Reproducing Standards Committee. After a great deal of effort a task group headed by R. M. Morris brought forth a standard *recording* characteristic in 1941, an epocal step after the long period of inaction by the organizations which would normally do the job. The war then clamped down on further non-military research.

The end of the war saw quite a change in the equipment situation. Most prewar cutting heads tended to saturate at high frequency and high level, so that at peak levels the full high frequency preemphasis was not recorded. The newest developments did not saturate — they actually recorded the full high-frequency input. Even more distressing, they had good response up to 12 to 15 kc — and the NAB preemphasis curve stopped at 10 kc. The postwar pickups would reproduce up to 15 kc, too.

Conscientious recordists heard signs of distortion at the higher frequencies — a harsh fringe to the tone on peaks. But instead of being momentary, the fringe might persist for ten or fifteen seconds at a time, a very disagreeable effect. A decrease in recorded level was an effective remedy — at the expense of loss of signal to noise ratio. The cause of the difficulty was obviously tracing distortion — the reproducing stylus could not follow the increased high-frequency level of the groove.

Several remedies were adopted. Some decreased recording level, others decreased preemphasis, a few placed part of the preemphasis ahead of the monitor amplifier connection to the recording system, and many found that a change of microphones would help a bit. The latter two changes are technical evasions of the NAB characteristic, taking legitimate advantage of loopholes. But a standard with loopholes is no longer standard; it is just a statement of good intentions. One of the boldest organizations asserted, quite rightfully, that the NAB recording characteristic could be used successfully if conditions were absolutely perfect. It is hard to be infallibly perfect, so production trouble ensued at inconvenient moments.

Meanwhile, in the revivified phonograph record field, mild anarchy raged, with at least four values of crossover frequency and at least five high frequency preemphasis curves in use in twenty possible combinations. Public protest rose angrily.

So, when the Audio Engineering Society Standards Committee began its work two years ago, the first project was that of standardizing the characteristics of transcriptions and phonograph records. The result has been checked carefully and accepted by leading organizations in the field.

Why a Reproducing Characteristic?

The most significant point is that the committee followed the lead of the motion picture industry and standardized on a *reproducing* characteristic. There are many reasons for reproduction being easier to standardize than recording, revolving around the impossible problem of allowing for studio acoustics, microphone characteristics, orchestral balance, and monitor system point of feed. These same problems forced the motion picture recordists to adopt a reproducing standard after failing with the opposite approach.

Salient Points

The standard covers the reproducing system from the stylus to the amplifier electrical output, assuming a loudspeaker with uniform response. It is for use with all types of generally used disc records: 33⅓ and 45 rpm microgroove recordings, transcriptions, and old style 78 rpm records.

While response has been defined out to the modern production limit of 15 kc, it does not debar one from using a narrower range system. Objections to the NAB preemphasis have been met by using a lower value. As a compromise between the 300

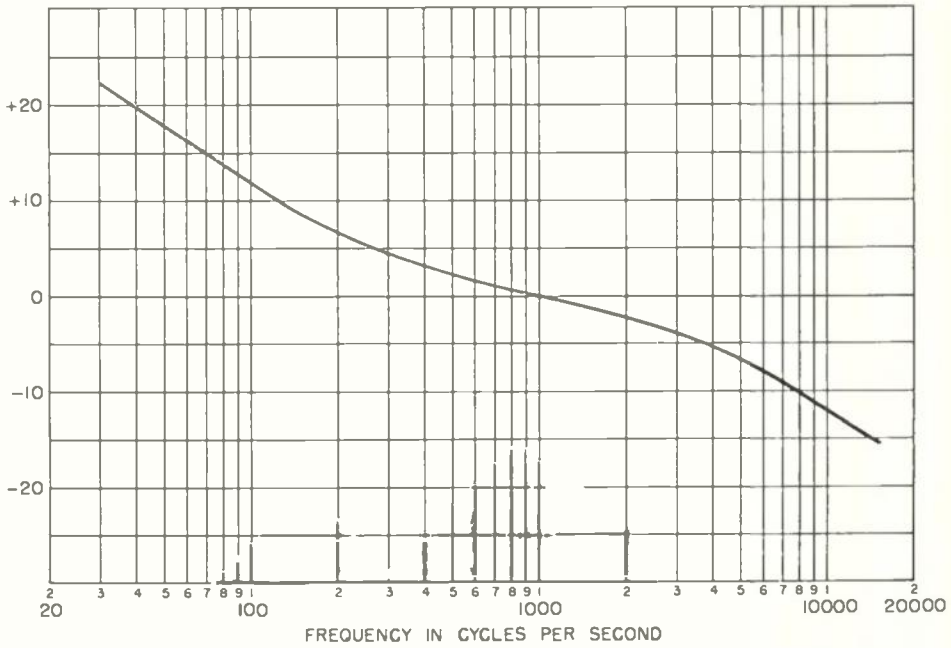


Fig. 1. Audio Engineering Society Standard Playback characteristic for Disc Records. Standard also includes tolerance of ± 2 db not shown on graph.

and 500 cps crossovers which have been in wide American use, 400 cps has been adopted. This is close enough to both 300 and 500 cps so that all three can often be handled at a single equalizer setting. The resulting response curve is of so simple shape that it is easily produced by two RC networks of the most simple form.

The recordist is free to use any recording characteristic he wishes, so long as he makes the result sound good on a standard reproducing system, but most will use a recording characteristic inverse in character to the standard. Reducing the preemphasis, if studio acoustics are bright, may be desirable.

After Thoughts

In time we can expect that a studio engineer will be able to play all discs with a single response characteristic, but this will not occur overnight. Although it fits a great deal of present production, much old material remains in the catalogs, and until the metal parts are scrapped, some discs will be beyond limits.

This is not a lifetime standard. Less preemphasis would be desirable if processing techniques could be improved and noise levels reduced. The last ten years has seen a 10 db reduction in pressing noise levels, and progress will surely not stop at that point. In another 10 years we may see another 5 or 10 db improvement. We may wish to exchange some of this for less peak distortion, by reducing preemphasis another 4 or 5 db. The crossover frequency is much less likely to be changed.

Nevertheless, we should not fret at change. For the first time in history the American disc recording industry has pinned down this most difficult question, and it would be very ungrateful to ask for a lifetime solution in such a rapidly moving field. We should be happy that the Society has achieved so useful an answer.

EDITOR'S NOTE

This combined October-November issue does not mean that we have abandoned the policy of publishing Audio Record on a monthly basis.

Because of the time required to compile the material on the tape recorder supplement in the last issue, this was quite late in getting mailed out. By giving you two issues in one this time, we hope to be able to "catch up" on our monthly schedule.

Kentucky's Industries

(*Continued from Page 1, Col. 3*)

tipple. The new Magnecorder self-contained power supply was called into use for this purpose. It performed a yeoman service and the pick-up was made without a hitch. A six minute scene was recorded at the tipple, and lastly, a spot was made at the new coal treating plant.

Back in Lexington the head engineer of the University of Kentucky's WBKY edited the tape into a thirty minute finished show. Finally it, with twelve other similar shows, was sent to WHAS, Louisville, where the programs were transferred to lacquer discs for broadcasting each Saturday afternoon.

The making of the industrial shows, an idea of Elmer G. Sulzer, director of U. K.'s radio activities, has proven of value to many diverse groups. Students in Mr. Sulzer's Department of Radio Arts have acquired professional interviewing, production, and engineering techniques in producing programs from such varied locations. The thirteen selected industries, themselves, have seen a sufficient public relations value in the series to warrant their paying the transportation, board and lodging expenses of the U. K. crew doing the broadcasts. The University, itself, gains in goodwill, not only with the industries involved, but also in its role of serving the state. In fact the University station's call letters WBKY — mean "We Broadcast Kentucky."

Publicity accruing to the state as a whole because of the industrial broadcasts has caused the state Agricultural and Industrial Development Board to finance the preparation of thirty complete sets of the thirteen programs, and these discs, to be pressed by Muzak, will go to a selected list of Kentucky's radio stations.

Diversity has marked the types of industries included on the schedule, the complete list of which follows:

Railroads
L & N Railroad Company

Newspaper Publishers
Courier Journal and Louisville Times, Louisville, Ky.

Cement Manufacturing
Kosmos Portland Cement Company, Kosmosdale, Ky.

Dairy Products
Lexington Dairies, Lexington, Ky.

Cigarette Manufacturing
Brown and Williamson, Louisville, Ky.

Record Manufacturing
The Muzak Corporation, Elizabethtown, Ky

Tourist Industries
Kentucky State Department of Highways

Coal Mining
Inland Steel, Wheelwright, Ky.

Lumbering
McCracken and McCall, Bell County, Ky.

Oil Refining
Ashland Oil and Refining Company, Leach, Ky.

Thoroughbred Industry
Calumet Farm, Lexington, Ky.

Small Fabrication
The Kawneer Company, Lexington, Ky.

Clothing Manufacturing
Merit Clothing Company, Mayfield Ky.

A number of these programs included scenes from widely separated spots. For example, the L & N show alone included pickups in the freight yards at DeCouresy just south of Cincinnati, a dispatcher's office in Louisville, and a trip on the front end of the "Panamerican" between Cincinnati and Louisville. The Ashland Oil and Refining Company program was opened by a scene on one of that Company's diesel towboats en route up the Ohio River, while the broadcast of the Tourist Industry included "takes" from Lexington, Natural Bridge, "My Old Kentucky Home" at Bardstown, Mammoth Cave, Cumberland Falls, and Kentucky Lake — literally all corners of the State.

Only with the most modern tape and disc equipment could so comprehensive a series of broadcasts be made. But additional plans of a radio nature are in the offing.

In cooperation with the Kentucky Agricultural and Industrial Development Board, a new series of thirty minute tapings by the University of Kentucky's WBKY is in the offing. To be entitled "Community Kentucky" and largely planned by Miss Camille Henderson, U. K.'s program supervisor, each program will be devoted to a Kentucky community that has distinguished itself by its progressive and forward-looking attitude.

And so once more, a trusted U. K. Magnecorder will go forth, this time to invade pottery plants, cooperage works, turkey brooders (ugh), radio tube works, and gas wells.

Kentucky's "Tourist Industry" gets a plug from way down under — with this recording being made in the grand rotunda of Mammoth Cave. Holding stop watch is Elmer K. Sulzer, director of U. K.'s radio activities. Bill Gordon at mike, and John Curry at recorder. Others are park officials.

New Techniques in Educational Recording

by Wesley L. Lewis
Associate Professor
Mt. San Antonio College

When a new college, beginning its fifth year, does something in the way of improving teaching techniques so outstanding as to attract the attention of older, established schools as well as that of several faculty members of the formidable University of California at Los Angeles, news indeed has been made. Yet, this is exactly the news on the Mt. San Antonio College campus near Pomona, California.

The idea of teaching with magnetic tape and with instantaneous disc recording is certainly not new, and Mt. San Antonio makes no claim for originality on that score. However, it does maintain that it is making fresh use of recordings and is perfecting techniques of operation, tailor-made for the college's own scheme of things. In short, the tape and the acetate disc have joined the faculties of modern language and English classes, science sections and photography groups, as well as those in the usual speech, radio, dramatics, and music courses.

The physical set up as it now stands consists of three different "sound installations" and a fleet of recording machines circulating at large. The heart of the production end of the recording work is the campus radio section with its group of studios, its control room, and its recording devices. Playback and distribution headquarters, which coordinate the over all program, are located in the college library, together with the audio-visual staff, storage facilities, and a small, nine unit, listening room.

The third functional location is a large listening room located in a separate building in the center of the campus. This room is set up with multiple equipment, individual ear phones, and separate desks. It is placed in charge of a trained adult who controls all operations from a large control board. In this room thirty students may listen at a time, either collectively, or in three groups of ten, or in one group of ten and one of twenty.

Recording equipment consists of six circulating tape recorders in addition to the radio section's standard disc and tape machines.

In operation, allowance is made for individual departmental and teacher differences. However, all the usage is coordinated through the library by means of a flexible agreement with the radio section. In the modern language classes, for instance, the departmental chairman checks out a tape machine for full time use. Then with his teachers, he plans well in advance the day by day lessons. With mimeographed lesson sheets made, the language professors, assisted by certain advanced, qualified students, prepare on the tape pronunciation drills, conversations, reading assignments, vocabulary work, and cultural presentations.

The finished tape, after much re-doing to get it "just right," is then sent to the radio studios where it is re-recorded on to instantaneous transcriptions. For obvious reasons, the transcriptions have proved more generally useful for this particular function. (Again this gives evidence that tape and disc recordings supplement and complement one another).

Returning the tapes to the language department for re-use, the library next arranges for its staff to play the transcribed discs in the large listening room on designated days at announced hours. These playings, of course, coincide with the class room presentations. On occasion the professors are present in the listening room; however, the students usually arrange for auditions on their own study time.

These sessions have become known as the modern "blab school" since each student, isolated as he is with his own headset and desk, is busy talking (and on occasion singing) aloud — oblivious of all others.

Control table in the "listening room" at Mt. San Antonio College. Built by Mr. Wesley L. Lewis, it includes two tape recorders and two disc recorders, with switching facilities for feeding either tape or disc programs to any or all student listening stations.

An English round-table group listens to the playback of its tape recording, while a French class practices pronunciation at the other end of the room. (Note: the partitions separating the desks are not shown here.)

Reports are sent from the listening room by the control manager back to the instructors so that the students may receive credit for the assignments.

Tape machines also are found in constant use in the language class rooms. The teachers here record the students in action and make tests of oral development on an equal plane with that of academic progress. Plans are now being made for the additional use of small disc recorders in the classes in order to create even greater flexibility in this function.

Recent public reports by the Mt. San Antonio language faculty have stated that the student tests have proved the effectiveness of the system. On both a time schedule and a percentage of learning basis, these students have rated higher than others in the previous experience of the instructors.

The application in the English classes is completely different but no less interesting. Lessons in Freshman English combine the usual academic preparations with round-table discussions in which students sharpen tongues and match wits in discourses ranging from politics to literary criticism. The panels are, of course, tape recorded. The instructors make corrections and evaluations of the work from the standpoint of delivery and content. Each student panel later presents itself in the large listening room for the playback of its tape. With their teachers' evaluations before them, the individual students in turn judge the effectiveness of their own presentations.

The comments after these auditions are not unusual. One hears such remarks as, "I don't see how I could have said that, because I didn't mean what my words seemed to say. But there it is!"

Others say, "Is that really me? Do I honestly sound like that? How can you stand to listen to me? How can I improve my voice?"

Some people even remark, "My logic was certainly weak in that discussion. I believed I had thought it through much better than that, but I certainly can see, or hear, where I slipped."

After their first skeptical use of the round-table discussion recordings, both students and teachers express their gratitude that such a teaching technique is used at Mt. San Antonio College.

Many instructors register wonderment when told that a science class uses tape and disc recordings for purposes other than the study of sound recording as such. Yet the science faculty believes in keeping modern scientific facts closely related to the daily news and the world of human activity. Recently an internationally famous scientist-inventor was a guest speaker on the Mt. San Antonio campus. His discussion of the impact of modern scientific development upon the physical and mental aspects of our civilization was recorded. Today a standing "outside" assignment in the physics course is the hearing of that speech. Other discussions are recorded from the air for such correlated "hearing."

Aside from the regular listening room playings for class assignments, all tapes and discs are available to anyone at any regular school hour in the library listening room.

Closely related to the science work is that of the photography department. Student and faculty photographers have become active in the making of sound motion pictures. After the editing of the film is complete, the sound track is rehearsed on tape and finally synchronized with the picture, later to be re-recorded on to the film itself by a Hollywood studio. With such an inexpensive and flexible method of rehearsal and final recording, much of the usual amateur character is removed from the student produced films.

These are by no means the only uses of tape and instantaneous discs in the Mt. San Antonio program. The usual speech, radio, dramatics, and music applications are made for periodic evaluations and for permanent records of past performances. The radio section has found it especially to the advantage of everyone concerned to tape-record college broadcasts in the campus studios at the convenience of musical and dramatic groups, then to send the completed tape to the local release station.

Although Mt. San Antonio's program of audio-teaching is still almost "birth-room" new, it has rapidly proved its value. In the short space of one year, for example, its usage grew to a maximum of 650 student listening hours per week. Every new semester seems to see an ever increasing service the program can render. Slow to join any "new" movement, the more conservative professors are beginning to ask questions and to try small experiments. For example, the remedial English section is now full of rumors about top drawer plans to be released in the near future.

As said before, Mt. San Antonio College does not assume originality for the use of audio-devices in education. However, its carefully planned routine and applications are believed to be new. It has been only through a unique spirit of cooperation of the entire school personnel that the "Learning by Ear" program has been possible. This spirit, which is basic to the growth of any idea, begins at this college with the sympathetic and democratic Board of Trustees which enthusiastically supports matters of sound educational advancement. The administration in turn encourages teacher participation and suggestion.

Audio Again Sponsors Script Contest

Scholastic Magazines' Radio Script Writing Contest for 1951 Sponsored by Audio Devices for Fourth Consecutive Year

High-school students throughout the country are eligible to compete for the valuable cash awards which Audio is offering, as sponsor of Scholastic Magazines Radio Script Writing Contest for 1951.

This contest was first sponsored by Audio Devices in 1947 — for the 1948 contest. Since that time, students and teachers alike have shown ever increasing interest in the contest — and entries have grown steadily in both quantity and quality. All of which indicates that the 1951 contest will probably set an all-time record for wide-spread participation.

High school students can submit scripts in one or more of the following three classifications:

1. Original Radio Drama
2. Radio Drama Adaptation
3. General Radio Script

A total of eight cash prizes will be awarded in *each* of these classifications:

First Prize — $25
Second Prize — $15
Third Prize — $10
Five Fourth Prizes — $5 each

In addition, students whose scripts are selected for publication in "AUDIOSCRIPTS" will receive special awards.

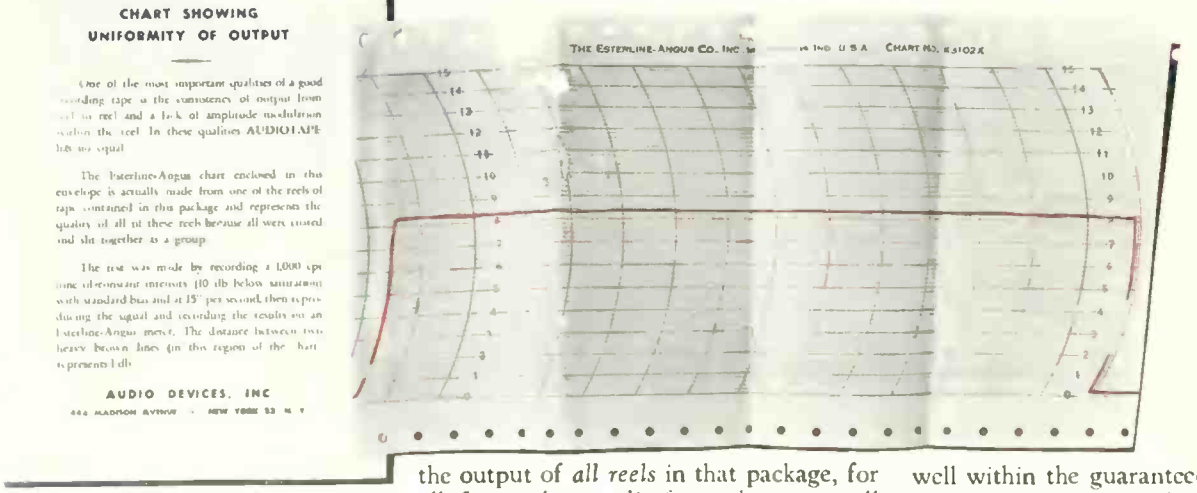
Of still greater importance to the aspiring script writer, however, is the national recognition which this contest affords the winners. In fact it is an excellent stepping stone toward a profitable career in the promising field of radio and TV script writing.

Students and teachers who are planning to participate in the 1951 contest will be particularly interested to know that the prize-winning scripts from the 1950 contest are now available. "AUDIOSCRIPTS 1950", published by Audio Devices for the benefit of future participants, contains twelve complete student-written scripts, selected from prize-winning entries in both the Scholastic Magazines contest (for high school students) and the AER contest (for college students) Copies are available at cost — $1.00 net each. Send check or money order to Audio Devices, Inc., 444 Madison Ave., New York 22, N. Y.

Two New Audiotape Developments:

SPLICE-FREE 1250-FOOT REELS and OUTPUT CURVES IN EVERY PACKAGE

of five, 1250 and 2500 foot reels



There's no guesswork about the *output uniformity* of Audiotape. For actual output curves, recorded on Esterline Angus Charts, are now included in every package of five 1250-foot and 2500-foot reels, on plastic base.

Each chart made from one of the reels in each package actually measures the output of *all reels* in that package, for all five reels are slit from the same roll after coating. This gives positive *visual proof* of the unequalled output uniformity of Audiotape — uniformity made possible by Audio's specially designed coating equipment, which permits accurate control of coating thickness to within *five millionths of an inch.*

This extreme uniformity of output — well within the guaranteed limits of ±¼ db — is also made possible by the fact that all 7-inch reels, as well as 10½ inch reels of plastic base Audiotape, are now *guaranteed* to be entirely *free from splices.*

These two new features are the result of Audio's continuing program of research and development to bring you the finest professional-quality recording tape obtainable.

Audiofilm* Now Available

for motion picture and TV sound recordings

One of the products which aroused a great deal of interest in the Audio Devices exhibit at the recent Audio Fair, was the new Audiotape. This is a standard cellulose acetate, 35-mm, motion picture film — with Audio's red-oxide magnetic coating instead of the usual photographic emulsion. It was developed to offer the motion picture and television industries a magnetic recording medium that could be synchronized with the picture—yet which would offer all the advantages of high fidelity, uniformity and easy editing which are inherent in Audiotape.

The magnetic material is applied to the film (between sprocket holes) by the same type of coating equipment used for Audiotape — assuring the same uniform output, freedom from background noise and distortion, and faithful frequency response over the complete range of audible sounds.

Limited quantities of Audiofilm, produced from a pilot plant, have already been used successfully in the motion picture industry. New plant facilities have just been put into operation to enable this new recording medium to be put into full scale production, in 16, 17½ and 35mm sizes.

*Trade Mark