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# audio record

Published by  
**AUDIO DEVICES, INC.**  
444 MADISON AVENUE, N. Y. 22, N. Y

audiorecords  
audiotape  
audiofilm  
audiopoints



This is the way many of the country's leading recording artists see Bill Putnam, President of Universal Recording Corporation. Bill is motioning for the placement of a microphone. See pages 4 and 5.

# THE TAPE RECORDER AT GOUCHER COLLEGE

Excerpts from the  
**FIRST-AWARD ENTRY**  
 in the College Division of  
 Audio Devices' \$16,000  
 Educational Awards

GOUCHER COLLEGE  
 Baltimore, Maryland

For this winning entry, which demonstrated the most constructive use of sound recording, Audio Devices has awarded \$2,750 worth of recording equipment and supplies to Goucher College — including the following items:

- (1) Ampex 601 Tape Recorder.
- (1) Magnetic Recording Industries ML-65 Tape Recorder.
- (1) J. C. Warren 777-2 Battery-Operated Portable Tape Recorder.
- (2) Pentron PS-1 Stereo Tape Players.
- (1) RCA 8STP1 Stereo Tape Player.

In addition to these machines, Goucher received over \$800 worth of Audiotape and accessory items.

The equipment selected will be pooled to permit regular use by all areas of the College and its surrounding community. By way of illustration, the tape recorders, converter, and tape players may be under the supervisory and maintenance control of the Audio-Visual Section of the Goucher Library which would be responsible as well for qualifying operators of the recorders. Thus, the needs for recorders may be met through advance scheduling by all concerned. Likewise, tape players, for the first time, would be available for use in the listening rooms of the library as well as for classes or public events on a scheduled basis. Finally, the Audio-Visual Section would serve as a center for tape collections and a clearing house for tape orders, disbursements, editing, and repair.

Specifically, the College has planned equipment use in the following ways:

## DEPARTMENT

### 1. Education & Child Development

- a. To teach the operations of tape recording and playback equipment and the uses to which it may be put in the classroom and at home (e.g., children's stories, songs, dramatizations, sounds, events, reading with expression, etc.)
- b. To record student discussion groups in courses for group analyses of methods for improvement of discussion techniques.
- c. To tape existing discs of children's literature, music, and projects.

### 2. English

- a. To assist in sharpening critical senses of students by recording playback of class discussions for evaluation.
- b. To utilize library listening room facilities for student playback of tapes on poetry and drama as they are considered in specific English classes. This will permit students to study and compare oral presentations by authors and other artists for interpretation and imagery (e.g., interpretations of *Hamlet* by Barrymore, Evans, Gielgud, Howard, and Olivier).

### 3. History

- a. To play back in the classroom voices and events of historical significance to emphasize and give lifelike quality to the men and events which have shaped our present living patterns.
- b. To use listening room facilities for student playback of speeches and events which have been taped in the general recording program of the Field Politics Center or by other organizations. These data come under the classification of primary source material and must be considered as one aspect of modern research material and methodology.

### 4. Modern Languages & Literature

- a. The twin-track recorder will serve as a pilot for a projected language laboratory at Goucher, being used directly for language instruction in Spanish, French, Italian, and German both in the classroom and in the library listening rooms for such items as pronunciation drills, inflection, emphasis, conversation, and comprehension.
- b. Existing discs in French, Spanish, and German literature will be transferred to tape for use in classroom, in listening rooms, and for loan to members of adult education classes with home tape playback equipment.
- c. Faculty members will record literary fragments both to supplement the existing collection and further illustrate drama, poetry, and the novel of certain types and periods (e.g., the novel and short story of the

French realistic and naturalistic school as illustrated in the works of Flaubert, Maupassant, Daudet, Zola and Goncourt).

### 5. Music

- a. To play back tapes for class listening in certain categories of music which are not available otherwise commercially. Such tapes will be made from recording sessions with musical groups in or visiting Baltimore and Goucher College using Ampex 601, or Magnecord PT6-VAH and a Pentron "Audio-Mix" Electronic Mixer to handle multiple microphone placement.
- b. In the teaching of applied music to demonstrate to students exactly the effect they are making through recorder and playback.
- c. To demonstrate via recorder and playback the more recent kinds of compositional techniques and illustrate the latest developments in the creative process of music.
- d. To tape processions and incidental music for reproduction at major College functions in the absence of an organ and orchestra. Pilot examples have proved to be more satisfactory than the use of discs with existing disc playback equipment.
- e. To tape Glee Club rehearsals and concerts to allow the effectiveness of choral performance to be studied by members of the Club.

### 6. Physical Education

- a. In classes on dance technique and body mechanics, to tape accompaniment for entire class period. This will eliminate time consumed in turning discs, locating proper groove for review of "rough spots," and adjusting turntable speed. Furthermore, it will permit the more effective use of a part-time accompanist by permitting her to record selections in a single block of time rather than endeavoring to resolve the problem of odd time sections throughout a working day.
- b. To tape dance recital music to eliminate the hazard of incorrect disc order and record speed as well as the location of the pertinent dance fragment on a disc.




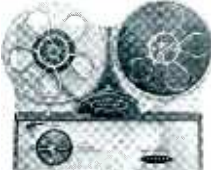


(Continued on Page 6, Col. 1)

**audio record**

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DECEMBER 1957

Published by Audio Devices, Inc., 444 Madison Avenue, New York City, in the interests of better sound recording. Mailed without cost to radio stations, recording studios, motion picture studios, colleges, vocational schools and recording enthusiasts throughout the United States and Canada.

Manufacturer	Model and Price	Frequency Response	Data
<b>THE PENTRON CORPORATION</b>  777 South Tripp Avenue, Chicago 24, Ill.	 <p><b>Mercury</b>  <b>Model NL-1</b>                      \$109.95  <b>Model NL-15</b>                      Stereo                      \$139.95</p>	<p><b>40-11,000 cycles</b>                      at 7 1/2" /sec.  <b>40-7,000 cycles</b>                      at 3 3/4" /sec.</p>	<p>New two-speed portable recorder. Features "Finger-Flite" single rotary control for Play, Record, Fast Forward, Fast Rewind. Removable head pole piece allows quick change from half to full track. Interlock record button prevents accidental recording or erasure. Has 6" speaker built in. Signal-to-noise ratio is 45 db. Fast Forward winds 7" reel in 75 seconds. Wow and flutter is under 0.4% at 7 1/2 ips. Four-pole motor. Inputs: 1 microphone, 1 radio. Outputs: 1 amplifier, 1 speaker. Weight: 25 lbs.</p>
	 <p><b>Champion</b>  <b>Model NL-2</b>                      \$149.95  <b>Model NL-25</b>                      Stereo                      \$179.95</p>	<p><b>40-13,000 cycles</b>                      at 7 1/2" /sec.  <b>40-7,000 cycles</b>                      at 3 3/4" /sec.</p>	<p>Features a dual extended range speaker system with cross-over network; one 6" round PM woofer, 1 exponential 4" tweeter with solid basket. New two speed portable recorder. Has "Finger-Flite" single rotary control for Play, Record, Fast Forward, Fast Rewind. Head has removable pole piece. Amplifier output is 5 watts. Automatic digital index counter with manual reset. Automatic braking; magic eye record level indicator. Signal-to-noise ratio is 48 db. Wow and flutter is under 0.4% at 7 1/2 ips. Inputs: 1 microphone, 1 radio. Outputs: 1 amplifier, 1 speaker. Weight: 29 lbs.</p>
	 <p><b>Aristocrat</b>  <b>Model NL-3</b>                      \$189.95  <b>Model NL-35</b>                      Stereo                      \$219.95</p>	<p><b>40-15,000 cycles</b>                      at 7 1/2" /sec.  <b>40-7,500 cycles</b>                      at 3 3/4" /sec.</p>	<p>A four-speaker, dual speed portable tape recorder. Contains two 6" round PM woofers; one 6" round mid-range; one exponential tweeter with solid basket. Double LC crossover networks with cutoffs at 600 cycles and 2000 cycles. Has 10 watt push-pull amplifier and illuminated VU meter. Signal-to-noise ratio is 50 db. Wow and flutter is under 0.4% at 7 1/2 ips. "Finger-Flite" single rotary control for Play, Record, Fast Forward, Fast Rewind. Head has removable pole piece. Automatic shut-off switch at end of reel. Two high impedance inputs; one high and one low impedance output. Weight: 35 lbs.</p>
	 <p><b>Tape Mechanisms</b>  <b>TM-1 Monaural</b>                      \$84.50  <b>TM-3 Staggered Stereo/Monaural</b>                      \$95.00  <b>TM-4 Stereo/Monaural</b>                      \$109.95</p>	<p><b>40-14,000 cycles</b>                      at 7 1/2" /sec.</p>	<p>New line of tape mechanisms. Single rotary control for Drive, Fast Forward, Fast Rewind. Two speeds: 7 1/2 and 3 3/4 ips. Signal-to-noise ratio is 55 db. Flutter is under 0.4% at 7 1/2 ips. Head pole pieces are removable. Four standard pin jack outputs. Two AC convenience outlets. TM-1 is for monaural recording and playback only. TM-3 is for staggered stereo recording and playback plus monaural recording and playback. TM-4 is for stacked and staggered stereo recording and playback plus monaural recording and playback.</p>
<b>SUPERSCOPE, INC.</b>  780 No. Gower St. Hollywood 38, California	 <p><b>Stereorecorder</b>  <b>Model 555</b>                      Stereo                      \$549.00</p>	<p><b>50-12,000 cycles</b>                      (±2 db)                      at 7 1/2" /sec.  <b>50-6,000 cycles</b>                      (±2 db)                      at 3 3/4" /sec.</p>	<p>Complete portable stereophonic recording and playback system. Features two channels of pre-amplification, and power amplification of 8 watts peak per channel. Hysteresis synchronous drive motor. VU meters for level indication. Two high impedance mike inputs. Two high impedance inputs for AM/FM tuners or stereo dubbing. Two high impedance preamp outputs. Two speaker outputs. Binaural or monaural headphone monitor output. Instantaneous switching to monaural recording and playback and special in-line erase head permit half-track monaural recording without erasing the other track, thereby permitting dual track operation. Instantaneous stop lever coupled to complete editing and cueing facilities. Wow and flutter: less than 0.25% at 7 1/2 ips. Signal-to-noise ratio: 50 db. Dimensions: 19" x 15 7/8".</p>
<b>ROBERT C. MERCHANT</b>  2701 Oxford St. Lafayette, Indiana	 <p><b>Custom Language Teaching Equipment</b>  <b>Model 758L</b>                      (Price on request)  <b>Model 758DL</b>                      (Price on Request)</p>	<p><b>50-13,000 cycles</b>                      (±2 db)                      at 7 1/2" /sec.</p>	<p>Rugged cast aluminum transport with full solenoid control on all functions. Will not spill or break tape. "Piano Key" controls. Automatic shut off releases all rollers and tensions. Automatic selection locator. Will start, stop, and rewind by remote control. Signal to noise over 45 db. Flutter below 0.2%. Wow below 0.05%. Amplifier designed for language laboratory with preset input and output levels of 1.228 volts for VU meters. Compensated for crystal microphones and earphones as furnished with recorder. Electronic eye recording level indicator. Earphone volume adjustable by student from 60 db to 80 db level. Model 758DL has same specifications as Model 758L with addition of second channel for dual channel use.</p>

**TAPE RECORDER DIRECTORY CHANGES:** Page 2: American Gelo Electronics, Inc. Change address to: 312 Seventh Ave., N. Y. 1, N. Y. Page 16: Roberts Model 90 Recorder. Change price to: \$299.50.

# BEHIND THE SCENES AT UNI



Mason Coppinger, V.P. and Chief Engineer, at work at the custom-made console in Studio B. This console allows simultaneous monaural and stereophonic recordings to be made of a performance.



Tom Parrish runs the duplicating department. Here he examines one of the Ampex "slave" units while a batch of Pentapes is being duplicated for the Pentron Corporation. All the tape is Audiotape.

## By MARSHALL LEWIS

*The Recording of Sound is the art of capturing selected Sound and holding it intact in a form that can be merchandized . . . a phonograph record, tape, a sound track, a transcription.*

*The function of Universal Recording Corporation is, essentially, to package Sound.*

That, briefly, is how the world's largest independent recording studio defines its business. Eleven years ago Universal Recording Corporation started in business with little more than an idea and some handmade equipment; today Universal has nine hundred active accounts, does the recording for such well known artists as Count Basie, Nat Cole, Wayne King, Duke Ellington, Burl Ives, Stan Kenton and Ralph Marterie; records commercials for leading advertising agencies; produces sound tracks for the industrial films of many of the country's largest corporations.

When we asked Bill Putnam, youthful founder and president of Universal, how his organization reached its present impressive position, he gave us this explanation:

"There are a lot of good technical men in this business. But a really top-notch mixer is a rare breed. He's got to be half-technician, half showman. Like a conductor, he has to be artistic enough to know what the performers are striving for . . . and frequently he can add his own artistry to their performance. He must have complete control over the recording facilities . . . that is, he has to understand their capabilities and limitations so well that he can actually package the sound he and the artist want to get."

Bill comes by his technical ability honestly. He majored in Communications Engineering at Valparaiso Technical Insti-

tute. For a number of years he worked as engineer and chief engineer at radio station WDAN in Danville, Illinois, and WDWS in Champaign. During the war, Bill took the civil service examination and was appointed Assistant Corps Area Radio Engineer for the Sixth Service Command. He spent most of his time coordinating the development and manufacture of top-secret electronic devices for the armed forces.

## Bill Putnam and Universal

In 1946 Bill founded Universal Recording Corporation . . . handling small jobs with modest facilities. Everything in those days was done on discs . . . there were no tape recorders. A few months after Universal opened shop, it was given a contract to transcribe all American Broadcasting Company programs, and during the life of this contract Universal recorded more than 20,000 programs. It was with these transcriptions that the practice of delayed broadcasts began.

As the business grew and kept pace with Universal's growing reputation, the company found it necessary to move to bigger and better quarters three times before they arrived at their present impressive air-conditioned plant on the fashionable Near North Side of Chicago. Here Universal has three large studios, dubbing room, mastering room, editing and assembly room, stereophonic editing room, high-speed duplicating room, clients' listening room, and a number of offices.

Probably as well as anyone in the business, Bill Putnam lives up to his own specifications of a good mixer. It is a fact that many of the country's best known recording artists insist that he be in charge of their recording sessions, and they will travel half way across the country to cut their

records at Universal. This is not hard to understand when you think of the hit records Bill Putnam has helped to produce: "Peg O' My Heart," "Mule Train," "Jealous Heart," "Melody of Love," and many other million-copy sellers. And, among other things, Putnam was one of the pioneers in the use of the echo chamber in pop recordings.

The appeal that Bill Putnam has for artists and record companies has a counterpart in the respect held by advertising agencies and their clients for Mason Coppinger, Vice President and Chief Engineer of Universal. Before Mase joined forces with Universal less than a year ago, he was Chief Engineer for Columbia Records in Chicago, where he had built up a loyal following among the people responsible for advertising commercials. Like Bill Putnam, Coppinger is one of the "rare breed" . . . a master technician with the instinct of a showman. He is also responsible for Universal's work in automatic and manual slide film sound tracks and the music library. (Universal has one of the largest music libraries in the midwest.)

## Stereophonic Recordings

Putnam and Coppinger are both enthusiastic about the future of stereophonic recordings. They have done considerable pioneering work in the field, and Universal is one of the few studios equipped to make stereo recordings at the same time as monaural. By making use of a separate mixing location in the control room, they can make both types of recordings simultaneously . . . without involving changes in the conventional studio set-up and without requiring additional time.

Coppinger points out the optimistic growth potential of this specialty. Sales of

# VERSAL RECORDING STUDIOS



Here is one of the best mastering men in the country. He is Bob Weber, in charge of the mastering room, who is inspecting the cut made by one of the Scully lathes. Universal uses Audiodiscs exclusively.



An Audiodisc is placed by Bernie Clapper on one of the four synchronized lathes in the dubbing room. This is a custom-made machine; all recording heads and turntables are driven by one motor unit in perfect synchronization.

stereo tape recorders have leaped phenomenally within the last year. Universal is in a position to provide substantial economies for the producers of pre-recorded tapes.

### Three Large Studios

Each of the three studios is an independent facility completely equipped with its own control room, Ampex No. 300 and No. 350 tape recorders, 10 and 14 mike position control consoles. There are program equalizer panels, separate echo chambers, filter effects and specially designed amplifiers for feeding cue to studio, for dubbing over backgrounds, and adding voice, etc. The echo chamber facility in each control room is designed so that separate echo can be added to any mike position at will... in any degree desired by the mixer.

The largest of the three studios is approximately 4,000 square feet with a 25-foot ceiling. It is equipped with a unique arrangement for varying the acoustical properties of the room... from an extremely dead sound stage to a "live" studio. This is ideal as a scoring stage or recording room for large orchestras or groups up to 100 pieces.

### Control Room Console

The heart of the control room is a special console which has twelve mixing channels, eleven preamps and six amplifiers. Two completely isolated output program channels allow simultaneous stereo and monaural recording by feeding from left and right stereo bridging jacks ahead of the program amplifier and using a "combined" position to feed fixed monaural. There is a provision for a split channel for recording background music and vocal separately and

mixing them on playback. Two identical power supplies, designed for continuous duty cycle operating at 60% of load rating, are provided with instantaneous switchover in case of component failure. Ten plug-in equalizers provide for varying the response of each channel. Frequency response is  $\pm 1$  db from 20 to 20,000 cycles per second. Noise is equivalent to an input signal of 125 DBM or less. Output impedance is 150 ohms.

### Dubbing Room

The dubbing room for reference discs and acetate copies contains a custom-made machine which produces four identical acetate or lacquer copies at one time. All the recording heads and turntable speeds are synchronized, driven from one master motor unit. With this installation, it is possible to produce identical copies at a production rate far in excess of any equipment available commercially.

### Mastering Facilities

All transcriptions are made on Audio-tape, all master discs on Audiodiscs. There are two Scully lathes in the mastering room for cutting masters of standard 78 and 45 rpm phonograph records, radio transcriptions, LP and EP records. Special program equalizers provide great flexibility in correcting deficiencies in various program tapes, making it possible to hold the highest quality on the finished master, whether record or transcription. Custom-designed and custom-built 60-watt recording amplifiers and feed-back recording heads contribute to quality control of the masters.

### Editing and Assembly Room

The editing and assembly room is a com-

pletely self-contained independent facility with three Ampex tape machines and a three-speed turntable. There is provision for patching into any of three echo chambers. A program equalizer panel lets the engineer produce any variety of tonal equalization, and a five-position mixing panel permits him to produce "composite" tapes from any of the four program sources.

### Duplicating Facilities

The duplicating department contains one "master" Ampex unit and six "slaves." (A seventh slave unit is on order.) Tape can be duplicated at either 30 or 60 inches per second. Mass production of pre-recorded tapes for home use is done at the faster speed. The performance of each machine is checked with a trial run every morning and is serviced every week. One reel out of each run is tested for quality... each time from a different machine.

Among the customers of the Duplicating Department are VM Corporation, (sample tapes for their recorders), Pentron Corporation (pre-recorded tapes) and Sears Roebuck for point-of-sale recordings. With its complete facilities, Universal is able to "package" a complete deal for its customers. They can control the quality of a pre-recorded tape from the actual recording, through the editing and preparation of the master reel, to the mass production of the commercial item.

We asked Bill Putnam and Mase Copinger why Universal used Audiotape and Audiodiscs exclusively. The answer tied in with the half-engineer, half-showman nature of the two men. In the first place, they had complete confidence in Audio's consistent standard of quality. As Bill put

(Continued on Page 6, Col. 3)

## The Tape Recorder at Goucher College (Continued from Page 2, Col. 3)

### 7. Physics

- a. To tape and play back experimental and example work in the field of sound for research and classroom functions, some of which are too expensive for constant laboratory re-production.
- b. To tape special disc recordings of Peabody Institute experiments with various musical instruments for use in introductory sound course. These experiments are not likely to be repeated and discs are deteriorating. They present, for example, the noise effect of dampened strings which in combination with what might be called frequencies, illustrate, in part, the peculiar qualities of a piano.

### 8. Political Science & Field Politics Center

- a. The additional equipment listed will permit the Center to:
  - 1) record in different locations at the same time;
  - 2) record desired programs on radio and TV which run at the same time;
  - 3) record surveys, interviews, and polling techniques in the field where no AC power supply is available;
  - 4) record aspects of different research projects simultaneously rather than alternately;
  - 5) meet the public demand for material on local government and politics by expanding recording schedule beyond present limited operations;
  - 6) begin audio aspect of new research project on role of community or improvement associations in local government.

### 9. Psychology

- a. Additional equipment will permit greater student use of recorders to tape interviews.
- b. Equipment will be used to record group processes for analyses in classroom teaching.

### 10. Sociology & Anthropology

- a. Recorders will be used in a projected community study which will rely on interviewing as the primary research technique.
- b. Recorder and playback operations will be taught as a part of the course

dealing with methods and techniques of urban social research.

- c. Equipment will be used to record small groups in the Social Psychology problems course dealing with both the influence of social groups on personality development, and social inter-stimulation and response.
- d. Recorders will be used for summer research among American Indians and isolated or underdeveloped areas in Maryland and neighboring states.

### 11. Speech

- a. To use equipment as a tool for correct production of the sounds of English speech in the Speech Clinic for foreign students and American students with special speech problems or defects.
- b. Using the twin track recorder to permit the instructor to comment on vocal quality and enunciation of previously recorded student work. The student will play back the entire tape and will benefit from more professional attention to her individual development.

### 12. College

- a. A regular program of recording certain College and College Community events will be established. This was not possible before without jeopardizing the recording activities of particular academic Departments.
- b. Special College services may be instituted such as the Library load of tape to students and individuals or groups in our community who possess the necessary playback equipment, or the loan of equipment to the occasional blind student whose own machine is temporarily unavailable.
- c. The Public Relations office of the College will now be able to prepare tapes on College events or special programs of community interest for release to local radio stations.
- d. The President, Alumnae Association officers, faculty, and staff may use this equipment to provide tapes of special messages or lectures to Alumnae groups throughout the country.

The uses we have listed represent both inauguration, growth, and expansion. They concern a major portion of the College which is stimulated by what, for most, have been advantageous but theoretical and future possibilities.

## WALTER TOSCANINI AWARDED "GOLDEN REEL" FOR HIS WORK



Mr. Toscanini accepts congratulations from Sigmund Spaeth, well known music critic and author (back to camera). William Speed, Audio Devices president, stands between Spaeth and Toscanini.

A "golden reel" was presented recently to Walter Toscanini, in recognition of the outstanding work he has done toward preserving and helping prepare for release recordings of the NBC Symphony concerts conducted by his father, the late Maestro Arturo Toscanini. The award was given by William C. Speed, president of Audio Devices, at a reception honoring Mr. Toscanini at the St. Regis Hotel in New York. The presentation reel given to Mr. Toscanini contained the 100,000th reel of Master Low Print-Through Audiotape. This tape, which has improved storage qualities because of reduced "leakage" of signal from one layer to another, has been used by Mr. Toscanini and his associates in the course of their editing of the Toscanini recordings.

### Here's the World's Largest Studio

(Continued from Page 5, Col. 3)

it, "It's pretty embarrassing to run a whole recording and then find that your tape missed something... that doesn't happen with Audiotape." Service... the fact that Audio can give fast delivery on Universal's emergency requirements... is another important factor.

Bill Putnam is impressed with the original research Audio is responsible for in this highly technical field. He is keenly and personally interested in Audio's work in correcting "print-through"... a problem which until now has been common to all tapes. (Ed. Note: This research led to the development of Master Low Print-Through Audiotape which reduces print-through — magnetic echo — by 8 db.) Says Bill: "I accept Audio's LeBel as one of the real technical authorities in the field... when he has something to say, I listen."



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

**STEREO DISCS**

The last few months have seen intense interest in stereo reproduction, with enormous growth in stereo tape sales and use, and widespread excitement about stereo discs. We seldom use such extravagant terms, but nothing weaker would fit the stereo session at the recent Audio Engineering Society Convention, with about 500 present. Interest is certainly boiling.



C. J. LeBel

We detect in the general public's thinking the assumptions that stereo discs are new, and that the stereo disc and its reproduction equipment will necessarily be lower in cost than are stereo tape and equipment. These assumptions are not entirely sound.

Stereo disc is a very old idea; a vertical-lateral system was patented by Bell Telephone Laboratories about 1937. The patent also described the latest disc, in which one channel is carried by a motion 45° to the left of vertical, and the other 45° to the right of vertical. This produces a balanced system, in which the transmission characteristics of the two channels are alike; in the vertical-lateral system the distortion characteristics are unlike.

The following discussion will suggest that both tape and disc stereo have problems, and that while the problems are sometimes unlike, they promise to be equally troublesome.

**Tape**

Tape admittedly has been higher in cost than some would enjoy, but not enough to prevent an estimated twentyfold increase in stereo sales in the last year. This cost has been raised by the relatively small quantities involved in a pioneering effort; larger production should yield lower cost.

Equipment has been higher in cost than one would like, but the head output voltage is low and therefore demands good amplification. And, of course, two channels cost twice as much as one.

Overall interchannel leakage seems sur-

prisingly high by motion picture standards — only about 35 db below signal — but this seems to be inaudible in home stereo.

On the other hand, tape is free from ticks and pops: tape hiss is not as objectionable in stereo as are disc ticks and pops.

**Disc**

The cost of a stereo disc has been forecast as being no higher than that of a monaural disc; this is only partly true. Apart from amortizing the necessary capital investment, better quality control of processing will be needed. Ticks and pops do not have a stereo character. When they are heard as distinctly "left handed" or "right handed," they can be very disconcerting. Discs which are virtually free from ticks and pops can be made — have often been made — but complete consistency of quality inevitably raises cost. Incidentally, how many of us care for our discs so well that storage and use do not produce a tenfold increase in ticks and pops?

Next comes the question of component quality and cost. A stereo pickup will consist of two separate pickup structures plus a suitable linkage to attach the stylus. Each pickup will act as a load on the other, and the linkage forms an overall compliance-load. If we are to retain the stylus loading and frequency range which the high fidelity field demands, extraordinarily light structures and linkage will be required — much higher level engineering than is presently required for a given quality rank. The low fidelity mass production field will not be worried about such problems.

To retain a given pickup quality level with near the ordinary grade of engineering, it will be necessary to sacrifice output voltage — which suggests that more pre-amplification will be needed, and thence better amplifier engineering to keep hum down.

No attention has hitherto been paid to the vertical rumble of popular priced turntables — only lateral rumble was reproduced by a lateral pickup. It will be interesting to hear what happens when both types of rumble are reproduced on a low cost turntable.

The claim has been made that since the stereo disc can be played by an ordinary non-stereo pickup, all disc production will be stereo, and the monaural disc will become obsolete. This is wishful thinking, for the average lateral pickup of today has relatively little vertical compliance — too little to permit it to yield adequately to the vertical component of a stereo groove. On most existing monaural pickups, the stereo groove will be cut to bits in a very short time. We definitely believe that both stereo and monaural discs will be in the catalogs for quite a while.

Finally, overall interchannel leakage is about 35 db below signal — about the same

as tape, and thus equally unobjectionable.

At the present time, leading American phonograph record manufacturers are testing handmade samples of the new Westrex type 3A dynamic (feedback) cutting heads. By appropriate circuit arrangements, these can be arranged to cut either a vertical-lateral (fig. 1) or a 45°-45° (fig. 2) stereo groove, and record manufacturers are cutting experimental discs of both types from their stereo tapes. After the engineers have agreed on the more desirable type, and a *de facto* standard exists, everyone will be able to get into production. Stocks of discs should be available in about six months. Everyone is determined to avoid the confusion which would result from having two incompatible types of stereo discs — no one wants a situation like the "battle of the speeds" of some years ago.

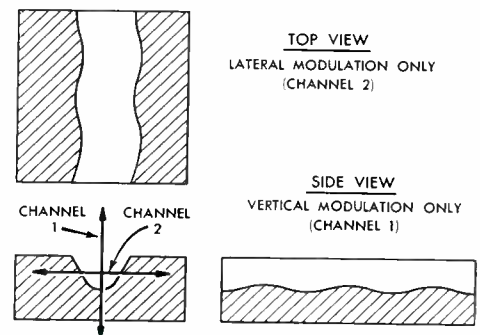


Fig. 1 — Vertical-lateral stereo groove

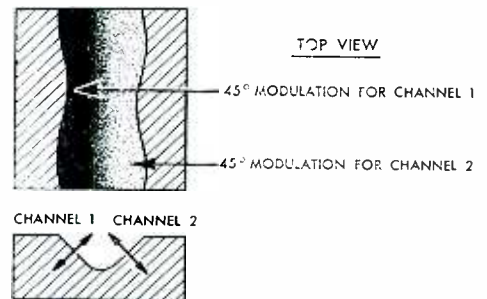


Fig. 2 — 45°-45° stereo groove

**Summary**

The problems of stereo disc reproduction are rather formidable, and we foresee a rise in the ratio of price/quality in such systems. Low cost but low quality stereo disc equipment is probably not over six months away. There is a strong probability that high quality reproduction equipment for stereo disc will cost at least as much as for stereo tape, and possibly more. Whether the formidable mechanical problems of high quality stereo disc reproduction equipment can be completely overcome at reasonable cost cannot be answered at the present moment. It seems to us that there will be peaceful coexistence, as there is now in the monaural field. The mass stereo market will probably be in disc, whereas the high fidelity field will probably prefer tape.



**AT Livingston  
Studios...**

**recorded tapes get a  
quality boost with Audiotape**

Say "recorded tape" and chances are someone will say "Livingston." Livingston Audio Products in Caldwell, N. J., was one of the pioneers in the recorded tape field. Today, the Livingston library includes over 160 monaural tape titles and more than 90 stereos. And the list is expanding every month.

Art Cooper, executive vice-president at Livingston, says, "In this high fidelity age, the key to success in the recording business is quality. Our engineers have chosen equipment which they feel is the finest available. We make inspections and maintenance checks on this equipment every hour. And we approach magnetic tape in the same way—constantly testing and checking the quality. Our studies have shown that Audiotape consistently delivers outstanding performance. That's why we've been an Audiotape customer for years."

Livingston is just one of the hundreds of professional recording studios which rely on Audiotape for the finest sound reproduction.

The complete line of professional quality Audiotape offers a base material and thickness to meet every recording need. And no matter which type you select, you can be sure you're getting the very finest tape that can be produced. There's a complete range of reel sizes and types, too, including the easy-threading C-Slot reel for all 5 and 7-inch Audiotapes. Why settle for less, when professional-quality Audiotape costs no more?

**IT'S audiotape**  
TRADE MARK

*it speaks for itself*

**AUDIO DEVICES, INC., 444 Madison Ave., N. Y. 22, N. Y.**

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