audio record

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CUSTOM PRESSINGS FOR THE BROADCASTING INDUSTRY

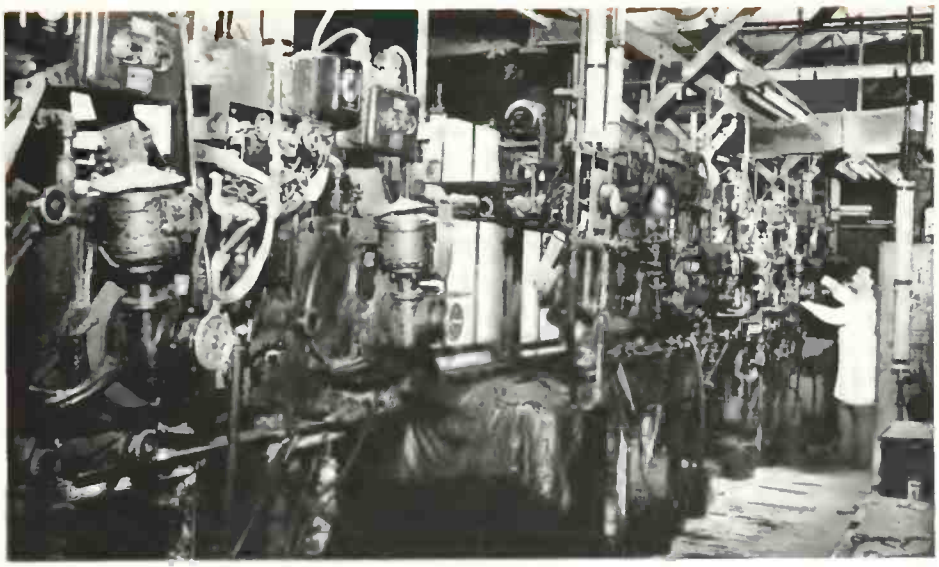
Allied Record Manufacturing Co. Now World's Largest Producer of 16" Transcriptions

In February 1951, the K. R. Smith Company — leading manufacturer of custom pressings and transcriptions on the East Coast — officially joined hands with the Allied Record Manufacturing Company, of Hollywood. This combination of Resources and facilities makes Allied the world's largest producer of custom transcriptions for the broadcasting industry. The Hollywood plant has grown steadily over the past 17 years, and now processes about 90 per cent of all transcription pressings produced on the West Coast. And the new K. R. Smith Division, with its own well-established plant in New York City, is currently handling the processing work for over 80 per cent of the broadcasters in the East.

Mr. Smith, manager of Allied's Eastern Division, has been in the transcription and phonograph record processing business for 25 years. He attributes the growth of his Company largely to the fact that the emphasis has always been on fast personal service in meeting both the normal and emergency needs of the industry. It often takes a miracle of production skill to turn out hundreds of top quality Vinylite pressings in time to meet the emergency deadlines that are the rule rather than the exception in radio work. And it takes a lot of personal service and follow-through, too, to solve the pressing problems that are the order of the day at both of Allied's processing plants.

Despite the requirements for high-speed production, the quality of transcription pressings must be maintained at a much higher level than that which would be acceptable for ordinary phonograph records. Although Allied's transcriptions are produced to NAB Standards, these are considered as basic minimum requirements

(Continued on Page 2, Col. 1)



Bank of special high-speed copper plating machines at the New York processing plant of Allied's K. R. Smith Division. These platers, which cut plating time by more than 60%, are a development of the Western Electric Company, and this is the only plant in the country which is licensed to operate them.

The First Electronic Language Lab

Pioneer Tape Recorder Installation at The American University Proves of Great Value to Students and Instructors

Competent authorities have long realized that the *best* way to learn a foreign language is *by ear*. But it was not until the advent of the tape recorder that this method of language instruction really came into its own. During the past few years tremendous strides have been made in the use of tape recordings for language study — culminating in the so-called "electronic language laboratory".

The largest installation of this type — at Georgetown University — was described in the January issue of Audio Record. Our readers will also be interested to know that another electronic language laboratory has been in operation since October 9, 1950 — at The American University in Washington, D. C. This is believed to be the first laboratory of its type in use by any college or university in this country. Although it preceeded the Georgetown installation by about one month, the American University's laboratory follows the method of language instruction which was inaugurated by Georgetown University's Institute of Languages and Linguistics.

In this new method of instruction, tape recordings are used to give students many extra hours of supplementary drill in listening and responding to recorded exercises. The fundamentals of the spoken language, and grammar which is taught inductively, are presented to the student in regular classroom lectures. After each lecture he obtains the much-needed practice in the language laboratory periods. The student thereby receives many more "contact hours" with the spoken language than would be possible under the older system using the same instructional staff. The necessity of endless repetition on the part of the instructor is avoided by the obvious method of using recorded language drills. The tape recorder has proved to be ideally suited to this job.

(Continued on Page 7, Col. 2)

audio record

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Custom Pressing

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

only, and no pains are spared to maintain consistently higher quality in every pressing that is turned out for broadcast use.

At the K. R. Smith Division, two different types of processing are used — depending on the number of pressings required and the replacement value of the original master recording.

Where a limited quantity of pressings is required and the master recording is "expendable", single-step processing is employed. In this operation — described in Steps 2 to 12 on the following pages — the metal matrix (negative) made directly from the lacquer master, is simply faced by chromium plating, and is used as the stamper. This is, of course, the quickest and most economical method, but it does not give any protection for the original recording. When the plated matrix is stripped off of the lacquer master (Step 6), the latter is often destroyed in the process. For all practical purposes, therefore, it must be assumed that the lacquer master *will* be destroyed during processing, and that it can not be used again for making a new matrix when the stamper wears out. Actually, as many as 500 pressings can usually be made from the master matrix. But, to be conservative, this single-step processing is normally used only where about 200 pressings or less are required.

Where more than 200 pressings are to be made, or where the original master must be kept available for possible future use, three-step or "full protection" processing is used. In this method a metal "mother" is made by plating the master matrix — giving an exact duplicate of the original recording, in metal instead of lacquer. This metal mother is then plated in essentially the same manner as the original lacquer master to produce the negative stampers. The gold sputtering or silvering operation, however, is omitted, since the surface is already conductive. The matrix and metal stamper are chemically treated to permit a clean separation of the subsequent plate. Many stampers can be made from one metal mother without any loss of quality.

One item of the processing equipment at the K. R. Smith Division plant is of particular interest, as it is unique in the record-making industry. That is a battery of special, high-speed rotary copper plating machines. In these compact electroplaters the plated disc and copper anode are spaced only a fraction of an inch apart and rotated in opposite directions, while the electrolyte (acid copper solution) is circulated between them under pressure. It is thus possible to build up a uniform copper backing .060" thick in 4 hours, as compared to a plating time of 18-24 hours for conventional tank plating methods. The electrolyte for a bank of high-speed platers is circulated in a closed system from a supply tank, in which the solution is constantly maintained at the proper concentration. Conventional tank plating is also used where time permits, giving additional plating capacity and making the high speed platers more readily available for the rush jobs.

Silvering and gold sputtering are both used at the Smith plant, depending on the preference of the client.

To make sure that every pressing measures up to the most exacting quality requirements, rigid tests and inspections are continually made in every step of manufacture. As a typical example, every tenth pressing is played all the way through on specially designed monitoring equipment. Any imperfections which might develop in the stamper can, therefore, be "caught" with a minimum of waste production.

Although Allied specializes in transcription processing, many high quality phonograph records are also produced in the two plants. In addition Allied is equipped to record on disc or tape, ship products to broadcasters and dealers, store metal masters for future use, and can arrange to prepare scripts, make orchestral arrangements, secure talent and technicians and furnish recording studios throughout the United States.

To assist professional recordists in making the best possible master recordings, Allied has recently produced a new, up-to-the-minute edition of its popular handbook, "Suggestions for Professional Master Recording". For a free copy of this publication, write or call K. R. Smith Division, Allied Record Manufacturing Company, 619 West 54th Street, New York, N. Y. — or Allied Record Manufacturing Company, 1041 North Las Palmas Avenue, Hollywood 38, California.

Bank of supplementary copper plating tanks, at the Allied plant. These tank platers are used for non-rush production, increasing the availability of the high-speed plating machines for high priority work.

Complete audio testing of all metal "mothers" is just one of Allied's many exacting quality-control measures. In addition, *every tenth pressing* is played all the way through, to catch any imperfections which might possibly develop in the matrix or stamper.

Thousands of metal masters are catalogued and stored in Allied's huge transcription library, for the convenience of customers in ordering additional pressings. Each master is carefully packaged for full protection against dust, dirt or mechanical damage.

HOW TRANSCRIPTIONS ARE MADE

(Photos and Data, Courtesy of K. R. Smith Division, Allied Record Manufacturing Co.)

1. ORIGINAL MASTER RECORDING

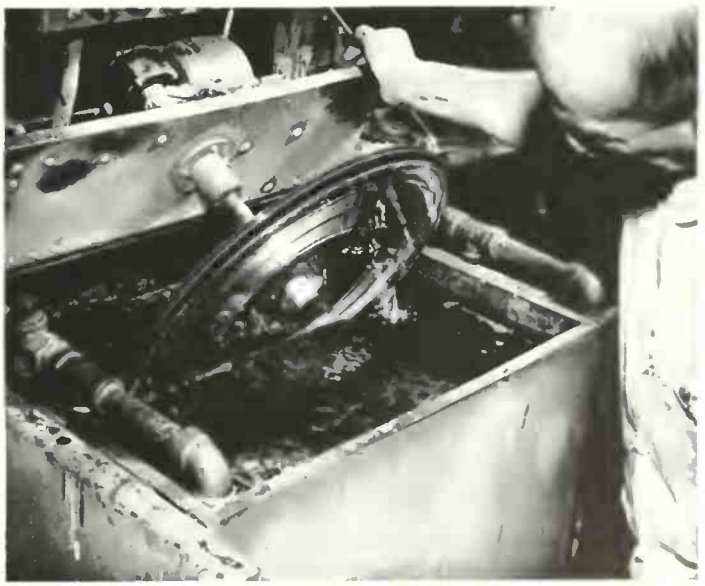
Discs used for master recording (such as Master Audiodiscs) require the utmost in surface perfection as no pressing can be any better than the master from which it is made. Master discs are larger in diameter than the final transcription or record size, to give the extra clamping surface needed for processing and pressing. 12", 13¼" and 17¼" masters are used for 10", 12" and 16" pressings respectively. Only one side of a master can be processed. The final recording, therefore, must be cut on only *one* side of the disc.

2. GOLD SPUTTERING

To make the surface of the disc conductive for subsequent plating operations, it is cathode sputtered with gold. The disc is placed in an evacuated chamber, mounted on a water-cooled platen between a gold leaf cathode and an anode. A dc potential of 3000 volts is applied and a glow discharge takes place between cathode and anode. Molecules of gold released from the cathode by secondary emission are deposited on the recorded surface of the disc in a fine homogeneous layout about .000001" thick. The entire sputtering process takes about 20 minutes.

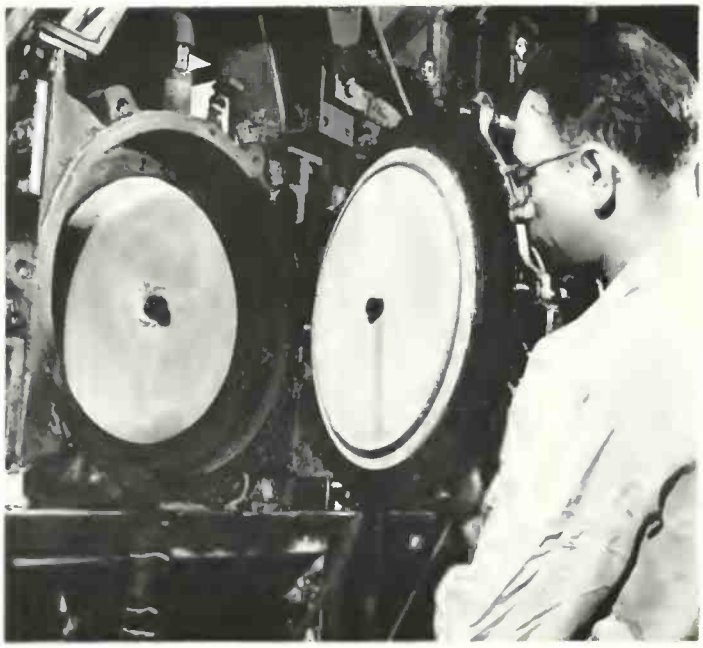
3. SILVERING

Silvering, instead of gold sputtering, is frequently used as an alternate method of metalizing. This process, which is similar to the silvering of mirrors, involves the chemical deposition of finely divided silver particles from an ammoniated silver nitrate solution. The disc is covered simultaneously with the silver nitrate solution and a special catalyst, causing the metallic silver to be precipitated in a thin layer on the surface. The silvering, which is done under carefully controlled temperatures, takes about 10 minutes.



4. COPPER PRE-PLATING

After gold sputtering or silvering, the disc is electroplated with a thin layer of very fine grained copper. The disc is rotated in an acid copper plating solution, while a direct current of about 30 amperes per sq. ft. builds up a plate about .001" thick in about 30 minutes. Extreme fineness of grain is necessary in the layer of copper which is in contact with the gold or silver surface. This process is too slow to be used for building up the full thickness of the copper backing.



5. COPPER BACKING

After pre-plating, the metallic layer on the disc is built up to the required strength and thickness by additional electroplating of copper on the pre-plate. In the special high-speed platers shown above, the disc and copper anode are spaced close together and rotated in opposite directions in a sealed chamber, with acid copper electrolyte circulated rapidly between them under pressure. A copper plate .060" thick is built up in 4 hours, as compared to 18 to 24 hours for ordinary tank plating.

6. STRIPPING

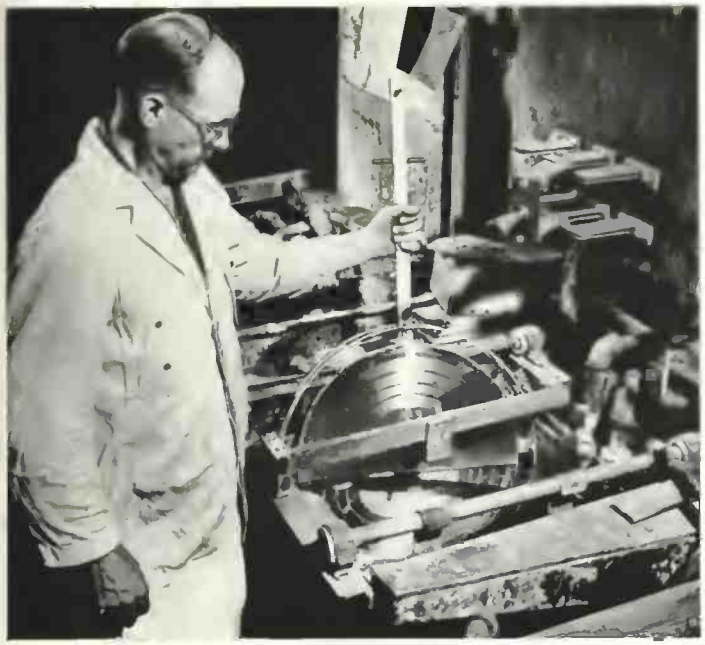
The finished metal matrix (negative) is separated from the lacquer master (positive) by mechanical means. A sharp tool is inserted between disc and plate at several points, and the disc is carefully pulled away, leaving the metal matrix with a gleaming, flawless gold or silver finish. The lacquer master is often destroyed in this process, and if full protection for the original is required, a metal "mother" is made from the matrix (as described on Page 6) by further electroplating operations.

9. CENTERING

Precise location of the center hole is extremely important, as even a few thousandths of an inch deviation can cause objectionable wows in the finished pressings. The exact center of the disc is located by microscope or dial indicator, and a center-hole insert is soldered into the metal matrix accurately centering the disc for all subsequnt operations. The original center hole can not be used for this purpose because of its tendency to become enlarged during the plating operation.

10. BACK TURNING

The back of the metal matrix must be made perfectly smooth, as any high spots in the plating would push through to the surface in the subsequent pressing operation. The disc is mounted on a lathe and the back is machined to extreme flatness by removing a thin shaving of metal from the entire surface. Grinding can also be used for this purpose instead of machining.



7. ELECTRO-CLEANING

After the metal matrix is separated from the original lacquer disc, its surface must be thoroughly cleaned to remove any traces of grease or other impurities. This is done by immersing the matrix in a strong alkaline solution, agitated by means of an electric current. This method is superior to polishing with rouge, because it cannot affect the frequencies originally recorded on the master.

8. CHROME FACING

Since gold and silver have an affinity for Vinylite plastic, the face must be chromed to prevent sticking in the press. This is done by electro-plating a thin layer of chromium over the gold. With a silvered disc, the silver is removed and the chrome is applied over the copper pre-plate. The chromium plate is so slight that it does not effect the frequency response at 15,000 cycles, yet it is sufficiently hard and durable to permit making as many as 2000 pressings without wearing away. The flash chromium plating operation takes about 9 minutes.

11. PRESSING

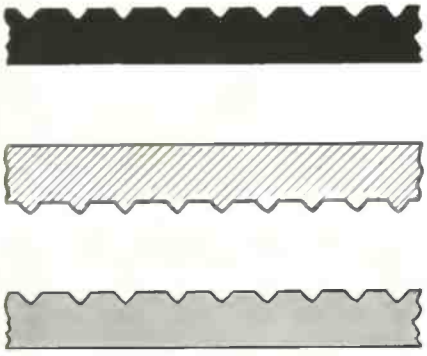
Two metal matrices, or "stampers", are mounted in the record press, one for each side of the transcription. Labels are inserted, a preheated "biscuit" or preform of Vinylite plastic material is placed between the "stampers" and the press is closed. The two stampers are forced together hydraulically at a pressure of 1800 to 2000 pounds per square inch. The pressing cycle is automatically controlled, and takes from 25 to 75 seconds, depending on disc size and type of material being molded.

12. THE MOLDED TRANSCRIPTION

After the disc is removed from the press, the excess Vinylite is trimmed off and the edges are polished. It is then ready for shipment. The 12 operations shown here illustrate the "single-step" method of processing, which is used only where a small number of pressings is needed. The three-step, or "full protection" method is much more frequently used. The actual operations are essentially the same, but many more steps are required. This is illustrated diagrammatically on the following page.

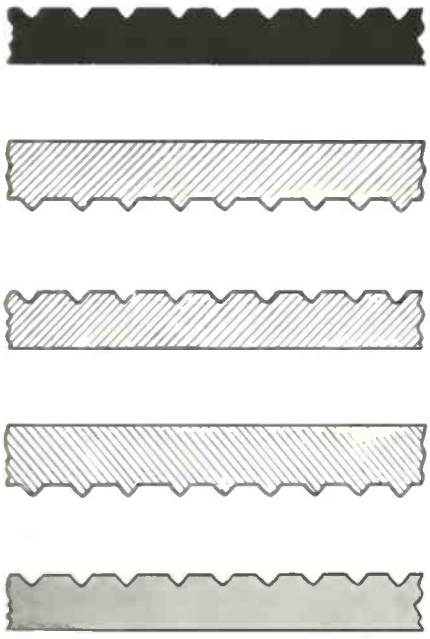
HOW TRANSCRIPTIONS ARE MADE

SINGLE-STEP PROCESSING



Although as many as 500 pressings can usually be made from one metal matrix, the single-step method of processing is normally used only where about 200 pressings or less are required — and where the original master recording is "expendable". Since the lacquer master is frequently destroyed when it is separated from the metal matrix, the recording can not be duplicated after the matrix has worn out.

THREE-STEP PROCESSING



The three-step, or "full protection" method is generally used where more than 200 pressings are to be made, or where the master recording must be kept available for possible future use. The metal "mother" is made by electroplating the matrix, and the stampers are made by electroplating the "mother". Many stampers can be made from one metal "mother" without any loss of quality. Gold sputtering or silvering is not required when plating the matrix and "mother". The surface is chemically treated to assure a clean separation of the finished plate.

PHONOGRAPH RECORDS

As far as the individual operations are concerned, phonograph records are made in exactly the same way as transcriptions. However, where many thousands of records must be made from one master matrix, a number of "mothers" are made, from each of which many sub-master matrices are produced. Additional "mothers" are made from the sub-master matrices, so that hundreds of stampers can be produced.

Most high-quality phonograph records are made of Vinylite. Less expensive records, known as shellac pressings, are made from a mixture of diatomaceous earth and shellac, with small amounts of coloring agents, plasticizers and lubricants added.

With the advent of the new Long Playing microgroove records, small 45 rpm records, and new light-weight reproducers, quality standards for phonograph reproduction have been radically improved. To measure up to these standards, pressings for the improved phonograph records must be of transcription quality. This has placed greater emphasis than ever before on the quality requirements for master recording discs.

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

TAPE LIFE

C. J. LeBel

Occasionally we find inspiration for an article in our correspondence file; a subject that prompts many letters is generally a live one. This paper is correspondence-prompted.

There is a growing tendency to store material of historical interest on magnetic tape, material that is likely to be of priceless value ten or twenty years from now. We deplore this tendency, even though the basic idea is not unsound — for it is almost always done with gross disregard for chemical and physical realities.

The life of tape has two aspects: magnetic and physical. As to the life of the magnetic record itself, we find no information in the literature. We may expect a slow loss of magnetism with time as with all permanent magnets, but we cannot tell whether it will be proportional or whether it will affect the peaks more (and so create distortion). Conditions in the magnetic circuit are such as to lead us to expect that the demagnetizing effect will be significant, but we cannot yet judge whether it will be serious in ten years, or in fifty.

One effect has already been noticed, a tendency toward magnetic printing. We are inclined to blame this on the tendency to over record, a tendency which has other bad effects. If the peaks are recorded at a level higher than that corresponding to 2 per cent harmonic distortion, the tendency for magnetism to transfer between adjacent layers becomes significant, raising the apparent noise level. Many studios and broadcasters are recording peaks in this danger region. Tape storage at high temperature will enhance the effect greatly.

The physical life of tape concerns us more deeply. A weak, distorted, or noisy tape can still be used, but if it breaks every few feet during reproduction, it is useless.

The cellulose acetate we use as a base has existed in its present composition for over twelve years. Laboratory samples made then are still in good condition, but some tape has been known to become hopelessly brittle in two or three months. Which fate will meet your most prized recordings? It depends entirely on your storage conditions. Motion picture film has for many years been successfully stored under controlled conditions, and the studio will have to adopt the same practice if long life is to be achieved.

Some years ago we pioneered in developing kraft paper as a tape base material; that we were right in our judgment may be inferred from the fact that every other tape maker has followed our example. In the closely akin form of condenser paper, this material has existed for many years, with satisfactory life characteristics. However, in a condenser it is well protected from adverse influences, and long-term mechanical strength is not as important. From data on the life of book paper, we may expect it to react adversely to improper storage conditions.

We, therefore, suggest that tape of historical importance should be stored at 65 to 70°F., and a relative humidity of 50 to 70 per cent. If this is difficult, at least keep in a humidifier can such as is used for 16 mm. film, and store in a cool location. If you insist on storing the tape, without protection, in a hot dry closet, you may expect its life to be reduced at least 90 per cent.

Language Lab

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

The American University language laboratory consists of two adjoining rooms, each equipped with tape recorders and listening positions. The larger room contains 27 listening booths, each equipped with a six-position selector switch, by means of which any one of six simultaneous audio programs may be received. In this way students studying different languages can have laboratory periods at the same hour. Each student simply selects his particular language by means of the selector switch. At the back of this room are located three tape recorders, (Brush Soundmirrors, Model BK-414U). These machines supply the audio signal to three of the six channels.

In the adjacent room, there is a large soundproof recording booth — used by the instructors and students for making tape recordings. This room also contains eight additional listening outlets, each equipped with a six-position selector switch. The other three recording machines are also located in this room, supplying the audio signals to the remaining three channels. The audio output signal from any one of the six tape recorders may be received at any listening position in either of the two rooms.

The electrical controls and wiring for this language laboratory were purchased from the International Business Machines Corporation, and are of the type used at the United Nations meetings for simultaneous translation.

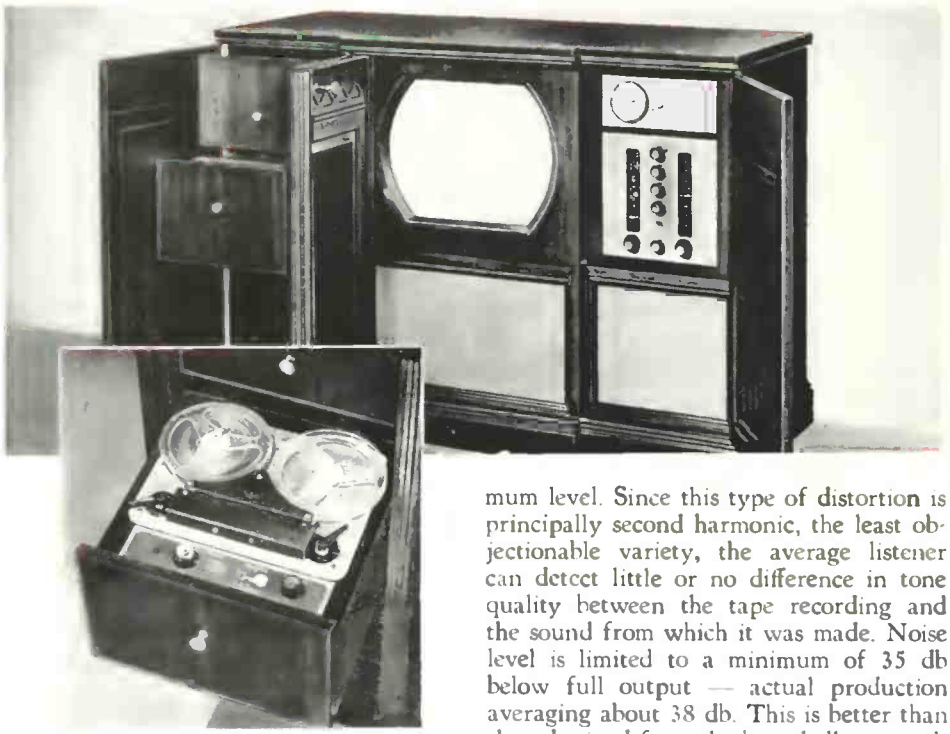
This multi-lingual tape recorder system has proved to be of great value to both students and teachers. As its advantages become more widely recognized, installations of this type will certainly increase in number. In the not too distant future we may find a well equipped language lab in every college and university in this country—and in many progressive high schools, too.

◀ Section of the main listening room during a regular language laboratory period, showing 14 of the 27 individual booths. The sliding fronts of the booths, which are normally up for this type of work, were lowered to show the students.

(Photos by Miss DeAnne Hays, Bethesda, Maryland)

Operator monitoring a language recording from one of the three Brush "Soundmirror" tape recorders at the back of the main listening room (above), at The University's electronic language laboratory. ▶

ALL THIS AND RECORDING TOO!



New TV-FM-AM Radio-Phono-Recorder Combination Console Offers Complete Facilities for Home Entertainment

DuMont's new Westminster Series II Console has been described as the world's most comprehensive instrument for home entertainment. It takes but a glance at the multiplicity of services provided to agree that this is a pretty valid claim.

This unit is of particular interest because, to the best of our knowledge, it is the first commercial console type instrument to include provision for high quality home recording on magnetic tape.

The tape recorder, housed in a separate draw-out compartment, is arranged to provide the following facilities: record from microphone — record from TV sound — record from FM radio — record from AM radio — record from 78, 33-1/3 or 45 rpm records — play back any recording through console speaker — monitor while recording (through console speaker).

The tape recorder has an International Electronic Corporation transport mechanism made by Universal Molded Products, of Philadelphia. DuMont's specifications call for a frequency response which is flat within 3 db from 70 to 7000 cycles. This is a minimum performance requirement, and actual measurements on representative production units show a response that is within the 3 db limit for a somewhat wider range — usually from 60 to 8000 cycles. Distortion is less than 5% on a signal recorded and played back at maximum level. Since this type of distortion is principally second harmonic, the least objectionable variety, the average listener can detect little or no difference in tone quality between the tape recording and the sound from which it was made. Noise level is limited to a minimum of 35 db below full output — actual production averaging about 38 db. This is better than that obtained from the best shellac records and entirely comparable to that obtained from Vinylite microgroove pressings.

Maximum simplicity of tape threading and machine operation were essential requirements in the design of this equipment. The tape mechanism, which is the same as that used on the "Reelest" portable recorder, is entirely self threading. The tape is simply dropped into a slot and a threading lever automatically brings it into proper alignment and contact with the three magnetic heads — one for play and record and two for erase.

The recorder is of the dual track type with a speed of 7½ inches per second and automatic reversal providing up to one full hour of recording on a 7 inch reel. A neon recording level indicator provides for simple adjustment of optimum recording volume. An automatic timing mechanism, which will turn the set on or off at a predetermined time, can also be adjusted to operate the recorder automatically on a pre-arranged schedule.

It is interesting to note that DuMont dealers have been making excellent use of the recording feature to help sell the Westminster sets. By recording appropriate sales talks they actually let the equipment speak for itself — a feature which adds greatly to the effectiveness of the sales room demonstration.

The development of this instrument makes a significant trend in the ever increasing popularity of magnetic tape recording for home entertainment.

NSRG

These initials stand for National Scholastic Radio Guild, an association of high school radio and/or TV workshops over the country. Through NSRG, member workshops receive each year:

1. News of other workshops— in four bulletins of *The Radio Workshop*.

2. Four non-royalty scripts.

3. Information on technical and engineering developments.

4. News of new books and pamphlets on radio-TV.

5. Announcements and invitations to conferences on radio workshops.

6. Membership pins and cards, and a suggested workshop constitution. Membership fee: $4 per year per school. For membership blanks, write: National Scholastic Radio Guild, 7 East 12th St., New York 3, N. Y.

NEW LINE OF TRANSCRIPTION CASES

"Compco" Fiber Shipping Cases Designed to Give Extra Safety for Discs

The Compco Corporation, 2251 West St. Paul Avenue, Chicago 47, Illinois, has recently announced a new line of sturdy, light-weight transcription shipping cases. They are available in 10½", 12½" and 16½" sizes (1½" deep), for 10", 12" and 16" discs respectively. The cases are of tough, non-vulcanized fiber, with steel reinforced corners, strong 1" web straps, and compartments for 4 film strips. Prices and additional data can be obtained from the manufacturer.