Electrical Transcription

For Broadcast Purposes

This new art has been developed to a point where only an expert can distinguish between an electrically transcribed broadcast and a studio program. The author discusses this field and explains how the near perfection of today is achieved

By **Thomas Calvert McClary**

IN December, 1928, electrical transcription broadcasts made their entrance bow to the vast radio audiences of this continent. There had been broadcasts from phonograph records since the days of '21 and '22, of course, but the new type of recorded broadcast offered a tremendous advance over the old.

To the layman "electrical transcription" was merely a high-hat phrase for phonograph records. Recalling the pandemonium of noise received during the early days of radio when a great deal of the musical entertainment was limited to the broadcast of ordinary records, fans whose musical senses had, during the interval, grown accustomed to the best of programs, raised a howl of protest at the introduction of electrically transcribed programs that almost strangled at birth one of radio's greatest innovations—an innovation that alone has made it possible for the unseen audiences, particularly those in isolated sections, to receive as fine program material from local stations as from chain hook-ups. When it is considered that forty per cent. of the population of this country lives in rural districts, the true significance of good recorded programs is seen. Recorded programs, therefore, fill a recognized need.

Luckily for the public's enjoyment, responsible institutions and business interested themselves in electrical transcription and with the announcement that Bell Laboratories was working on its development, a doubting public, in whose breast is buried a deep respect and faith in this institution, none too graciously granted the new type of broadcast a fair trial.

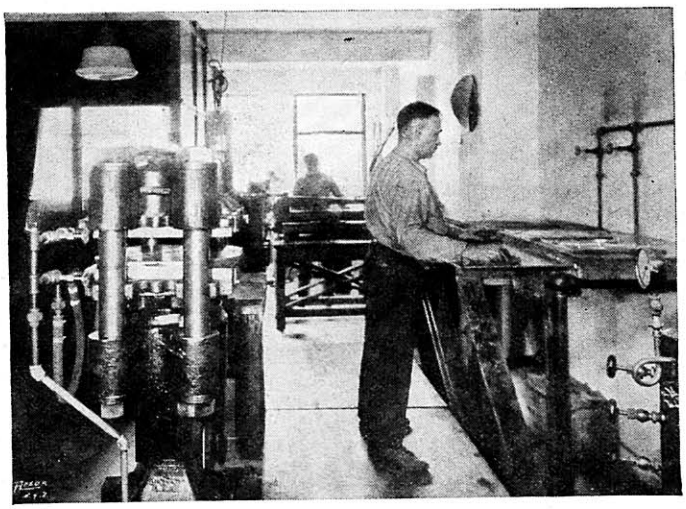
The public's attitude remained sceptical, however, and every defect and fault in the programs brought forth much derogative hooting of the "I told you so" species. It took well over a year and a half to win their approval, and it was not until last winter that national surveys proved conclusively that electrical transcription had definitely been accepted by radio owners.

However, difficulties could not seriously hinder a type of broadcast which had grown out of three very definite needs: the necessity for the advertiser to reach all sections of the country at the same chosen hour in each community in spite of the three-hour time difference from coast to coast; the necessity for the advertiser to reach isolated communities through small local stations and yet maintain the high type of program the product, public and general reaction to the company demanded; and the necessity for small stations to be able to broadcast sustaining programs equal in merit to the programs from chain hook-ups.

Obviously, the latter problem was serious. Chain broadcasts had raised the public's appreciation of good programs to such an extent that local stations, unable either to arrange or afford programs of comparative quality, were finding it increasingly difficult to furnish sustaining or local programs which would hold the listener interest.

The pioneers in electrical transcription broadcasting faced many technical difficulties which had to be overcome by extensive research and experimentation. While electrical transcription and ordinary phonograph records seem closely allied to the casual observer, it was found that their respective broadcast values were widely divergent. Records produced by the old methods sound well enough on a phonograph, but standing up under tremendous amplification is a different matter.

Among many things causing even the best records made under the old methods to be inferior for broadcasting is the fact that it was not possible to transcribe the higher frequencies and there was a decided emphasis on the low. This prevents true reproduction and leaves the flat, muffled tone with the accompanying boom in the bass notes so often heard in inferior work. Only by recording the full range of frequencies can the character and personality of a program be faithfully reproduced, and research by the Bell Laboratories can be thanked for making this possible.



MAKING THE RECORDS FOR BROADCASTING

The first recording for electrical transcription is made on relatively soft wax, and from this is transferred to a "master" disc, from the "master" to a "pressing" and a "mother," from the "mother" to a "stamper" and, finally, from the "stamper" any number of final discs may be made. In one process a pressure of seventy-eight tons is provided by the press on the left

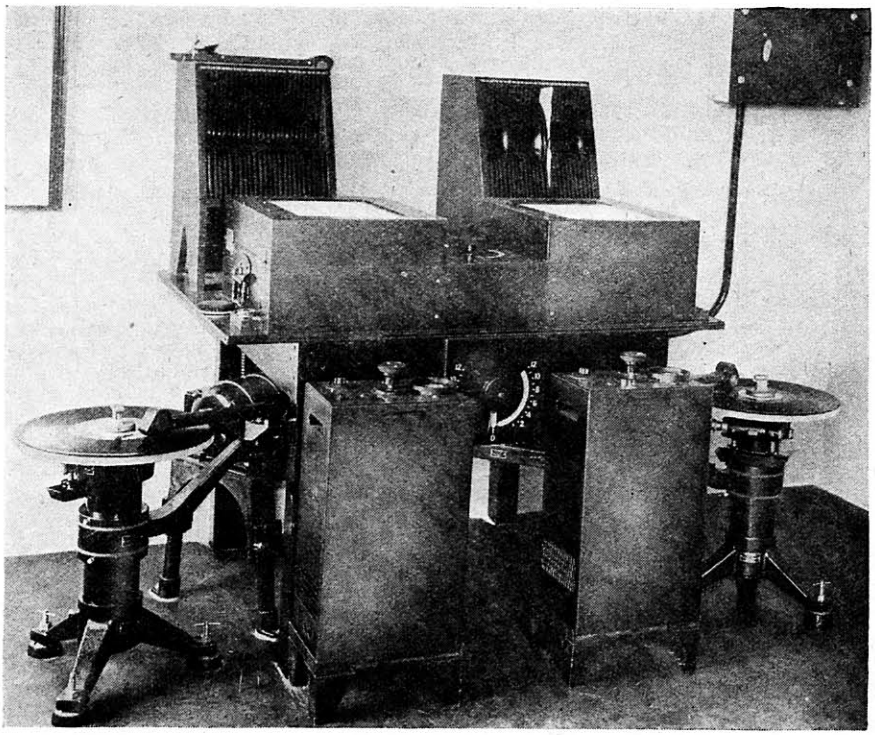
One of the first and foremost companies to interest itself exclusively in the arranging and manufacturing of recorded programs for broadcast purposes was the Sound Studios of New York, Inc. They are important in any discussion of the matter, for they took the lead at the start, and what they have accomplished is largely the history of this part of the industry. Through licenses which enable them to avail themselves of years of research and experimentation in the radio broadcast, telephone, phonograph and talking movie fields, and through the efforts of a field staff of over six hundred engineers, they have made possible much of the beauty and trueness of recorded programs as we know them today.

Some of the unlimited research necessary for perfection and progress in the field of electrical transcription may be guessed at by a glance into one of the Sound Studios during a performance. Instead of being solidly insulated with sound deadeners, as would be expected, the walls are covered only at

certain strategic points. The result is that, standing in one corner of the room, a person's voice from another quarter may be heard as a mere whisper, but by moving only a few feet it is heard loudly and distinctly. This planned variation is taken advantage of in the placing of microphones and for the placing of instruments and vocal talent. It took acoustical engineers twenty-six weeks to chart out, experiment and construct these studios. Since then, many changes have been made, and the results have proven so satisfactory that radio stations are beginning to adopt this type of studio.

The Recording Process

When recordings are being made, several microphones may be used to pick up the program. The "mixing," or balancing, as it is termed (that is, causing the pick-ups of the various microphones to assume proper proportion to their place in the program), is done in the control room, after which the program passes through properly equalized circuits and is cut into the large 16-inch, 33⅓ r.p.m. discs on the double synchronizing turntables. This "mixing" makes for better tone value and eliminates the necessity for sections of the orchestra or vocal group to tone down during any part of the performance in order to accentuate or emphasize another section. Sometimes the voice which you eventually hear standing out clear and full against the soft background of the orchestra can barely be heard in the studio during the actual recording of the piece.



EQUIPMENT AT STATION WOR

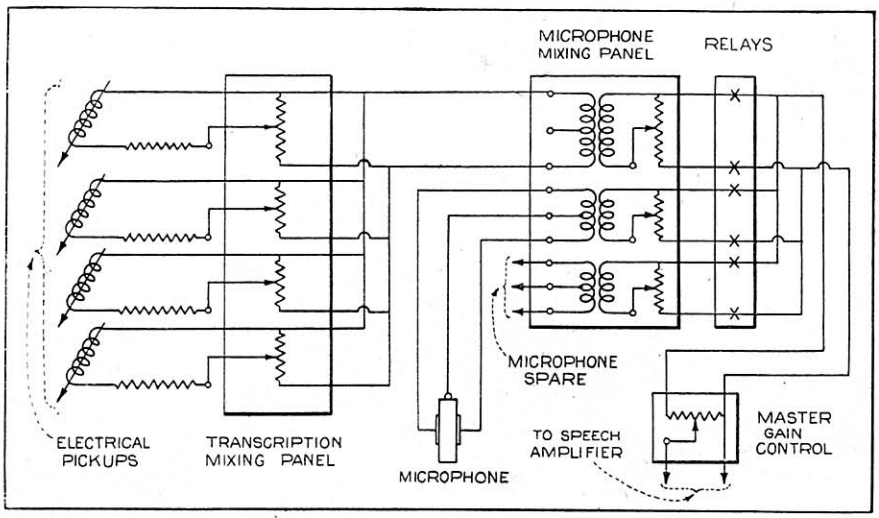
Equipment employed in reproducing electrical transcriptions is a far cry from the primitive phonograph used in studios a few years back. Today's equipment must be of the highest precision in order to maintain the high quality of reproduction made possible by modern methods of recording.

Immediately after the recording is finished one of the wax discs is played back to the assembled group of artists, technicians, directors, producers, sponsors of the program, engineers, harmonic experts and others interested in the utmost perfection of the program, for their okay. If any flaw is detected from the standpoint of any one of the group, the recording is discarded and another made immediately. If it receives the okay of all involved, however, the duplicate disc which was cut at the same time is taken to the galvano baths, where the cut side is electroplated as it swishes back and forth on the end of a long rod. From this is taken the resulting reversed plate called a "master."

The master is then taken to the pressing room, where two pressings are made. These are composed of earth-shellac material identical with the final discs. The material is first heated and then placed in the press with the master. Here, under seventy-eight tons pressure, it is again heated and baked. Once again the group of experts interested in the perfection of the program assembles to approve or disapprove of the recording. If all is satisfactory, the master is in turn electroplated and a "mother" taken from it. The master is then filed away for safe keeping in the event something disastrous happens to the mother.

The mother plate now has indented lines (having been made from the master, which was the reverse of the wax). It is necessary to make another reverse for pressing the final discs. So it too is electroplated and the resultant "stamper" taken therefrom is used for the final pressings. If anything happens to the stamper, the master is brought forth and the process repeated.

The large 16-inch 33⅓ r.p.m. discs grew out of the regular 12-inch 78 r.p.m. records which were found to be unsatisfactory for broadcast or talking movies. At 78 revolutions there are variations detrimental to the program, and it was found that the high speed crowded frequencies and limited the efficiency of recording to full audio scale.



A TYPICAL OPERATING SCHEMATIC DIAGRAM

Schematic diagram of the special equipment employed at the broadcast station to permit the use of high-grade electrical transcriptions

"Editing" Recordings

Recordings need not be made in sequence, as are studio programs, but may be made in sections, split up and correctly re-recorded at a later date, in much the same way movies are made. For instance, if three symphony selections, several vocal, a talk, announcements, etc., are to be incorporated into the complete program, each separate group of recordings may be made at different times or in different studios at the same time. The symphony selections can all be played and recorded in one studio while perhaps the announcer is going through his duties in another and the vocal selections are being made in a third. When each section of the program has been approved the recordings may be "dubbed" onto another disc in their correct order, and the complete program is ready.

This type of broadcast has decided advantages inasmuch as events happening miles away may (*Continued on page* 619)

Electrical Transcription

(*Continued from page 565*)

be incorporated in one program and collections of talent otherwise impossible are brought together. Thus if it is desired to have the whistle of a train, the crash of thunder, the roar of waterfalls, or any number of sounds not possible to reproduce accurately in a regular broadcast, these sounds may be recorded at the source and dubbed into the program at a later date.

From the broadcast station standpoint electrical transcription broadcasts offer both advantages and disadvantages. The advantages are that the desired type of program may be put on the air at any desired time, and listeners may be offered programs comparable with the best chain broadcasts. On the other hand, record bootleggers with the ancient cry of "just as good at half the price" have misled many advertisers into releasing recorded broadcasts of inferior quality. The result is shown in the fact that many stations absolutely refuse to broadcast electrical transcriptions excepting at their own option, and many more have an additional charge of from ten to forty per cent. for recorded broadcasts unless such meet with their approval, when the charge is dropped.

Their troubles do not stop there. Broadcast equipment must be of the proper type, with the same frequency response as the sound system used in the original recording to get maximum efficiency from the programs. The best equipment is expensive—beyond the reach of many stations. Ordinary phonograph pick-ups are out of the question, as they are unable to take the load, and the result is the same as an overloaded studio broadcast.

Station equipment is similar to the sound system at the recording studios. The most up-to-date uses double synchronizing turntables on one of which the electrical transcriptions are placed, revolving at 33⅓ r.p.m. if they are the large discs. The impulses are picked up, carried through the modulator and amplifier systems, and put on the air exactly the same as a studio broadcast.

The 16-inch discs play for approximately ten minutes, allowing ample time for the changing of discs. At the end of the first section of the performance the other synchronizing turntable is started and as the last notes of one disc are heard the operator switches the broadcast onto the other disc, which is turning at exactly the same speed, by use of a "fader." This eliminates any break whatsoever in the program other than the called for in toning down at the end of each disc and beginning of the next.

Gustave Haenschen and Frank Black, vice-presidents of Sound Studios, high priests of the broadcast program and creators of such outstanding achievements as the Palmolive, General Motors, Chase & Sanborn Choral Orchestra, Happy Wonder Bakers, Armstrong Quakers, Peters' Parade, Gold Medal, Chevrolet and many other famous national broadcasts, are credited with having been

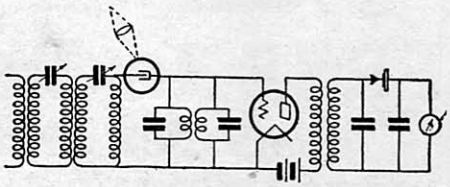
(*Continued on page 620*)

Latest Radio Patents

(*Continued from page* 602)

two oscillatory circuits of the same periodicity but each of the circuits having a different ratio of inductance to capacity; opposing the electrical effects produced in the two circuits against each other in their actions on a third circuit; and transmitting the resultant electrical effect produced in the third circuit to a detector and amplifier.

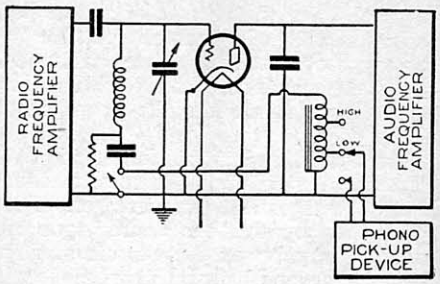
1,822,061. METHOD AND MEANS FOR MEASURING LIGHT INTENSITIES. WALTER VAN BRAAM ROBERTS, Princeton, N. J., assignor to Radio Corporation of America, a Corporation of Delaware. Filed Apr. 6, 1929. Serial No. 353,036. 12 Claims.



8. A system for measuring light intensity which includes a light-sensitive element which passes current in other than direct proportion to applied voltage in the presence of constant illumination, means for applying a frequency of predetermined value thereto, means for subjecting said light-sensitive element to light of unknown intensity, thereby producing currents of a frequency other than that originally impressed, means for amplifying the currents of the frequency produced by said element, and means for indicating the light intensity reaching said element from said amplified currents.

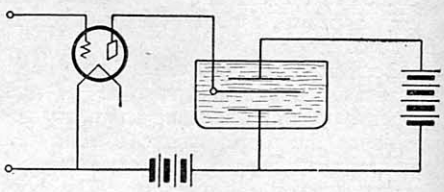
1,822,653. PHONOGRAPH COUPLING FOR RADIO RECEIVERS. ALFRED H. GREBE, Hollis, and PERCIVAL D. LOWELL, Jamaica, N. Y., assignors to A. H. Grebe & Co., Inc., Richmond Hill, N. Y., a Corporation of New York. Filed June 28, 1930. Serial No. 464,584. 4 Claims.

1. In a radio receiver having tuning means, a vacuum tube detector, a transformer arranged for excitation from a phonograph



pick-up, and means automatically operated by the adjustment of said tuning means to utilize said detector tube as an amplifier of the signals generated by said phonograph pick-up.

1,823,703. LIGHT CONTROL DEVICE. EMIL RUPP, Berlin-Frohnau, Germany, assignor to General Electric Company, a Corporation of New York. Filed Dec. 26, 1929, Serial No. 416,732, and in Germany Feb. 22, 1929. 5 Claims.



1. A light control device including a doubly refracting liquid affected by an electrostatic field, a cathode and an anode mounted in said liquid, and a control electrode arranged between the cathode and anode to control the position of the cathode drop in said liquid.

Electrical Transcription

(*Continued from page* 619)

largely responsible for the high quality of art in the better electrical transcription field. One of their major contributions has been the organization of a sound library estimated at over half a million dollars value.

Out of the six hundred and eleven stations in the United States, ninety-five per cent. use electrical transcription or record broadcasts at some time during the day. Of this number 126 are equipped with the most modern sound systems for the use of transcriptions, and more are installing it as time goes on. Many have partially up-to-the-minute systems. While the best results can be broadcast only by the use of both the best sound system and the best transcriptions, even stations without a thoroughly modern system are now able to offer sustaining programs of merit.

There are many advantages in electrical transcription. More time and thoroughness can be given to the making of the program, eliminating mistakes and defects prior to broadcast. Programs can be gathered from widely separated points or over periods of months and incorporated into one. Otherwise impossible combinations of talent can be arranged, sound effects are real, and small stations have the best of the world's musical library within their reach.

During the past month decided progress has been made in the transcribing of programs, the major one being the elimination of almost all of the record "scratch." Glancing into the future, we see the day when television programs will be broadcast from records, and, in the home, a record attachment for the television receiver by means of which you will save the outstanding programs, building up your own library to play back at any desired time.

No longer can stations give inferior entertainment and use the excuse that better could not be arranged. Good programs, even outstanding ones, can be had —by air mail, if necessary.