

"Instantaneous" Recording of Sound on Discs

A New Activity for the Radio Technician and Experimenter

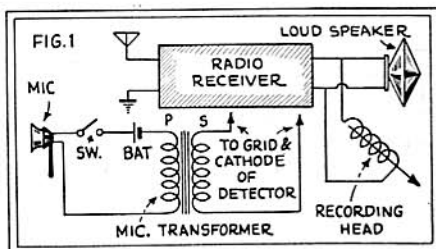
By GEORGE J. SALIBA

INSTANTANEOUS recording, or home recording as it is more popularly called, is a new art as compared with the method of making commercial records. In commercial recording, it is necessary to go through several operations before the finished record is obtained. Where only one record is desired, instantaneous recording offers the advantage of making this record in one operation. (See "Home Recording of Radio Programs and Speech," in the December, 1930, issue of RADIO-CRAFT.)

The midget radio set saved radio in 1930, and now this new art seems destined to surpass even the midget in tiding radio over the rough spots; at the same time it opens up a very lucrative field to the alert Service Man and radio dealer. Wherever there is an audio amplifier available, a recording system is waiting to be exploited.

The uses to which this instantaneous recording can be put are varied and many; and the profits to be realized therefrom

will be proportional to the foresight and ability of the Service Man or salesman who puts across the idea and makes the installation. Every home that has a radio receiver, every music school, music store, amusement park, department store, club, and broadcast station is a good live prospect. In short, the field of application for this novel method of making records is unlimited; and it remains only for the energetic salesman or wide-awake Service Man to familiarize himself with the technique of obtaining good results, then go out and demonstrate. The idea sells itself.



The general arrangement of the standard voice and radio recording-reproducing equipment.

Valuable Uses of Records

The uses to which instantaneous recording can be put are unlimited. Orchestras and bands are now being recorded, so that their technique may be studied carefully and improved upon. Singers, instrumental artists and music students everywhere are making this recording a regular part of their course; since they can thus watch their progress and note their improvement. Students of elocution record their talks and study their delivery. Records of broadcasts can be made, and, if necessary, encore programs can then be broadcast. Likewise, anyone who broadcasts can have his selections recorded for his personal file.

Vaudeville singers or musical acts will find this new art very much to their advantage; for they can use these records for advertising purposes and auditions at distant points. Another novel application of this instantaneous recording is in the making of "sound effects" for amateur theatricals. The ambitious producer can, after patient experimenting with the recording of different sounds, electrically reproduce them whenever desired; thus giving his presentation the realism of the professional theatre.

Still another idea and one which is presented to those owning home-movie outfits, is that the "domestic" photographer can make records to match the action of the pictures; thus producing a "talkie." A more advanced form of this idea is that two turntables be used, and a "continuous"

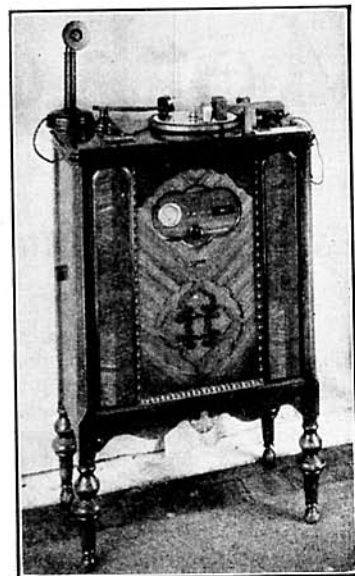


Fig. D

A home-recording model made by the Callophone Co.: left, two-button "mike"; right, special cutting head, for blank records. The reproducing pickup is behind the disc in the center; microphone panel above speaker in console.

show be arranged after properly "dubbing" the records (patching the sound together), by fading one record into another as each length of film (to which has been cemented the next length) is run through the projector.

Although the previously-mentioned issue of RADIO-CRAFT contained a description of the procedure of instantaneous recording (page 340, December, 1930), the writer asks the indulgence of the readers of this magazine while, as a matter of completeness, and prior to making an extensive study of this subject, we gloss over outstanding facts.

Recording Systems

Whether the recording equipment is utilized in commercial enterprises or for home use, the apparatus in either case is substantially the same. For home use the audio amplifier of the radio receiver, used in conjunction with an ordinary magnetic phonograph pickup and a microphone makes a simple but efficient and practical recording system. (See Fig. 1).

This system makes use of *pregrooved* records, which are now available at all music and radio stores. The *pregrooved* record, which is made up on either a metal or a celluloid disc, has a blank groove already cut into the surface; and this groove serves the same purpose as the feed screw used in recording on blank uncut discs; namely, to guide the recording head across the face of the record. The microphone transformer, being of the step-up type, amplifies the audio-frequency voltages; and this gain, combined with the *mu* or amplification factor of the detector tube, really adds a transformer-coupled stage to the audio amplifier.

A weight (about 10 oz.) should be attached to the recording head to prevent the needle from jumping the groove, as it tends to do when modulated. The weight also serves the purpose of pushing the needle

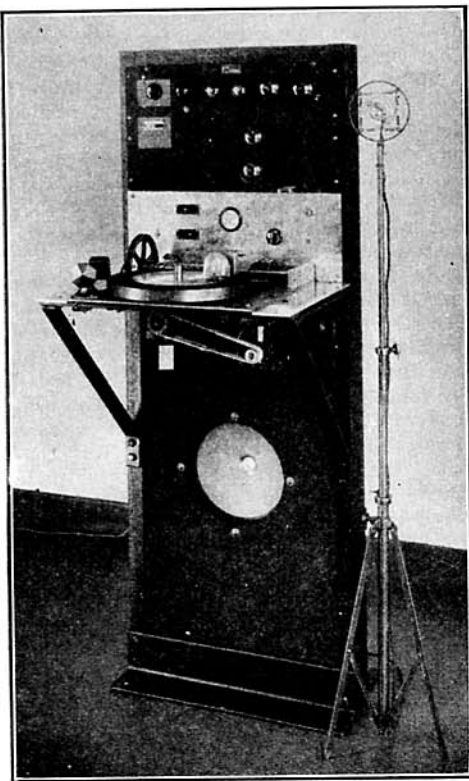


Fig. E

The Callophone studio equipment: top panel, three-stage amplifier and pack; then, microphone panel; shelf with turntable, feed-screw, cutter and pickup; driving motor; and, lowermost, reproducer. Blank, ungrooved discs are used. Right, two-button microphone and stand.

deep into the groove, thus making available more mass to work against; with the subsequent result of more volume in the reproduced record.

Only home-recording needles should be used for recording and playback. These needles, which have a relatively dull point, with a red shank to differentiate them from regular phonograph needles, can be obtained at all radio and music stores.

In recording from the microphone, the switch Sw. is closed, and the volume control of the radio set is turned way down; and *vice versa* when records are to be made from the air. With a little patience and experimenting the home recorder can achieve results that will be almost on a par with commercially-pressed records.

These pre-grooved records at present are obtainable only in the six-inch size and have



Fig. C
The Presto portable recording kit, with case closed for carrying. Below, it is shown open.

a playing time of one minute and ten seconds. The home recorder who wishes to make larger records, must resort to blank ungrooved discs, which necessitate the use of a feed-screw to guide the cutting head across the face of the disc. Figs. A, B, and C show different views of a recording kit, for cutting blank discs, which is intended for homes where a motor-driven turntable is not available. A microphone, microphone amplifier, selector switch, volume control, feed screw, recording head and pick up, electric motor, and turntable, are all neatly mounted in this very convenient portable case.



Fig. A (above)
The portable kit arranged for recording; the pickup arm is resting in off position, and the cutting head and feed screw are in operation. Microphone at the left, 27 microphone amplifier tube at upper left. At the right, in Fig. B, the cutting head is seen put away in its recess, and the pickup in its operating position. The disc at the lower left is the switching mechanism.

High-Quality Recording

Commercial instantaneous recording naturally requires a more elaborate set-up. The prime requisite is a good audio amplifier, which should be of the three-stage transformer-coupled type, and have a fairly flat characteristic from about 30 cycles to 9000 cycles. The turntable should be thoroughly "filtered;" so that any mechanical flutter in the motor or any back lash in the gears will not be transmitted to it.

A high-quality double-button carbon microphone is absolutely essential and, to insure its efficient operation, a D.C. 0-50 milliammeter should be provided, so that the current in each button may be read.

A good loud speaker, preferably of the dynamic type, should be used for monitoring purposes, and, lastly, a "volume-indicator panel" is necessary in order that all the records shall be made at the same level, thus insuring a positively good result. Some will argue that a volume-indicator panel can be dispensed with and the loud speaker used for level indication; but the recorder will find that the average human ear, no matter how acute the sense of

tribute their bit to the engineering necessary for good sound. Their composition, the manner in which they are cut, the type of cutting tool used, and the *modus operandi* of the playback, while they have been discussed in the December, 1930, issue of RADIO-CRAFT, will be viewed in the light of later developments.

Materials for Recording

At the present time there are several materials available for instantaneous recording: namely, gelatin, aluminum, celluloid, and zinc. Gelatin records are of the blank type requiring a feed-screw for cutting. A special cutting stylus is used and, before recording, the surface is treated with a lubricant, such as vaseline, in order to preserve the keenness of the needle. After the record is made it is again treated with this grease in order to attain reproduction without extraneous noises. Playback is effected by means of a steel needle whose point has been ground smooth and round. An excellent record can be made with this substance; but it possesses the disadvantage of being brittle. Great care must be exercised in putting the record on the turntable and removing it; otherwise the record will crack. Water must be kept away from this record, because gelatin dissolves in water.

Aluminum, like gelatin, also requires a feed-screw for recording. A diamond needle or a special steel needle is required for recording, and a fibre or a thorn needle is used for playback. The aluminum record possesses the advantage of being unbreakable and can be preserved indefinitely. The recording is excellent, the low frequencies and the high recording equally well. If sufficient weight is not used on the recording head, the groove will be shallow and, consequently, difficulty will be experienced in making the playback needle track. This needle must be very sharp, otherwise poor reproduction results.

Celluloid for recording is obtainable in either blank or pregrooved discs. When the blank is used, a sharp diamond needle is necessary to cut the grooves, and a thorn or fibre needle is used for playback. The pre-grooved disc requires a special home-recording needle for both recording and playback. With the latter type record, it has been found that the high frequency notes are missing after the first or second playing; this is due to the fact that celluloid is resilient and tends to come back to its original shape. The volume is a trifle lower

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Fig. B (below)
Kit arranged for playback.



are; and he tells his friends to get a kit and he will help them build it. This means business for you and that is what you want.

A stock of used and new parts is not "to be sneezed at"; and that will be better as short waves and television become more popular.

The best way to get yourself a real live mailing list is to get a bunch of station logs with your name and business on them. Get a high-class log that every set owner will like; then, when a customer comes into the store, give him one and ask him to write the names of a number of his friends on the pad, as you want to mail one to each of them. Also, have the Service Men work the same idea. A list of this kind has very little deadwood in it, and you do not have a lot of losses from sending advertisements to people who have no radios.

Radio service used to be referred to as a "game"; but that day is past and, fellows, if we want to survive we have to dig and specialize in our line. Forget competition and make ourselves stand out above the others in the same line. It takes time, but it can be done; and don't be discouraged. Good times are coming.

Now, I am not advertising RADIO-CRAFT or the Gernsback Publications—but they have done more for the radio Service Man than all other books and magazines published (and I take them all) and the serious perusal

of them will do more to keep you up to date than any other one thing.

From the illustration heading this article, you will see that I am an invalid and that my means of transportation is a wheel chair in my place of business. For the outside I have a special-built automobile which I have driven 90,000 miles in six years; so you see that I get some pleasure out of life also. I absolutely do not trade on my physical condition and my first job, on meeting a strange customer, is to make him forget my condition and do business on a straight business basis, and to let him know that I want no favors or edge on my competitors.

I went broke in the auto service business eleven years ago and started in the radio business by building crystal sets. I have followed the business right on, having constructed 667 custom-built sets and serviced over 9,000 sets in that length of time. I am married and have made some money by using my head and one arm; so, fellows, you can make it if you try hard and use the old bean as well as both arms and legs. I do not want you to think me egotistical, but I am telling you what you can do if you concentrate and try hard.

I may later write some articles on service kinks and the methods I have found for quick servicing of different sets. I am no "flying service man"—and I have not been able to find one.

"Instantaneous" Recording

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after a few playings, an effect also due to the resiliency. These records can be played back about fifty times.

The nitrate celluloid (pre-grooved) which is the kind used generally for recording, is highly inflammable and great care should be exercised in keeping it away from any flame. It should be stored in fire-proof containers. The acetate celluloid, which is non-inflammable, also makes fairly good records; but, at present, it is obtainable only in blank discs.

The pre-grooved zinc composition record is the oldest instantaneous record and was originally used for home recording by means of the sound box in the acoustic phonograph. Recording was then accomplished by placing the disc on the turntable and singing or talking in a loud voice into the horn. At best the reproduction was faint. These records can now be used for electrical recording with fairly good results. An ordinary phonograph steel needle is used for both recording and reproducing.

This about completes a preliminary discussion of the absorbing subject of instantaneous (home) recording; it is planned that subsequent articles will bring to light many interesting and valuable bits of information. Meanwhile, every owner of a home-movie camera, phonograph, radio set, or home-recording outfit (in fact anyone with practical interest in this subject), is invited to correspond with the writer on ways and means of getting the best effect in sound. For instance, you may want to know where to obtain certain sizes or types of records, pick-ups, motors, etc., or how to accomplish a certain result; and all this

information you may obtain by addressing your inquiry to the Sound Recording Department of RADIO-CRAFT. We are particularly interested in receiving suggestions, and discussing plans by which sound recording may be profitably and interestingly applied.

Service Man's Open Forum

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that I do not sell radios. The free test offer brings many calls that I otherwise would miss because of the fear of a stiff service call charge. Where the trouble is simple and is fixed in the customer's home, a minimum charge of one dollar plus materials is made. If the set must be taken to the shop, I make a careful check of it, and then quote a price for the job. In a few cases the prospect decides not to have the work done, in which case the free test call is a loss to me. However, this seldom occurs.

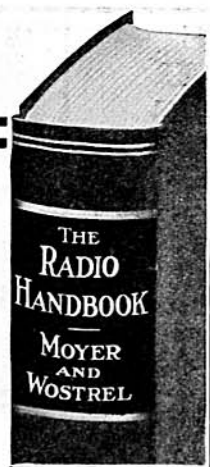
The worst part of it is on the calls where a new tube does the job. In order to hold my trade against the tube-tester toters, I charge only for the tube. However, my records show that the bulk of calls are due not to tubes, as some advertisers wish us to think, but to shorted condensers and open resistors. Many keep an extra tube or two on hand and when the set quits try changing tubes—this self-service cuts out a lot of tube replacement calls.

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