

NATIONAL RADIO NEWS



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A New Aid to Musicians

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HE WON'T LET GO!

Off the coast of New England a fishing boat was being tossed about in a rough sea. Suddenly a seaman noticed a young man hanging to the mast, lashed by the biting wind. In horror the seaman ran to the Captain and exclaimed, "*Look, Captain, your son is up there in grave danger. If he lets go he'll be dashed to pieces.*"

The Captain looked up and calmly replied, "*He won't let go.*"

There is a moral in that little story. Many of us need to train ourselves to withstand set-backs. We must learn how to meet adversity. In every career, in every business, in every life, problems will present themselves. Some will be trivial. Some will be serious. Some will seem almost insurmountable. It is then we are put to the real test. To yield to strong resistance is a weakness. Someone has well said, "Only the game fish can swim up-stream."

Here and there we find a strong man. His problems are many and no different from those of others. But he keeps on hustling. He knows that he is master of his own destiny. Whatever his future shall be, he knows depends upon him and him alone. While others are willing to float with the tide, he is swimming up-stream. He doesn't know defeat. *He won't let go.*

You've probably heard this philosophy before. But if only one man who reads this will hitch up his belt another notch and say, "I won't let go," this page has been worthwhile. Because, in time, that fellow will be a successful man. I hope it is you.

J. E. SMITH,
President.

PORTABLE RECORDERS AS A PROFITABLE SIDE-LINE

By PAUL H. THOMSEN
N. R. I. Communications Consultant



PAUL H. THOMSEN

Any Radiotrician who is eager to take full advantage of his technical training should consider setting up a sound recording business as a sideline to regular servicing, public address or other radio work. Portable recording equipment of satisfactory quality is now available at reasonable prices from a number of different manufacturers; with the suggestions given in this article, a Radiotrician should have no difficulty in choosing the proper equipment and mastering the simple operating technique involved in making high-fidelity disc recordings which can be played back immediately on any ordinary phonograph.

The first step in setting up a sound recording enterprise is, of course, a thorough analysis of the market for recordings in your community, based primarily upon the volume of business you can reasonably expect from the different types of prospects once you have become established.

Prospects for Recordings. Any one who aspires to a career as a radio artist, entertainer or announcer is an ideal prospect for your sound recording services. By practicing before a recording microphone, these amateurs can listen to their own performances and thereby determine where improvement is necessary.

Teachers of music, singing, public speaking and foreign languages recognize the value of recordings in making it possible for pupils to hear themselves. Since most teachers cannot afford to own a complete recording system themselves, they are excellent prospects for a recording service and should be considered in your market survey. School teachers specializing in speech correction likewise find a recording service invaluable.

Successful radio artists occasionally desire to have recordings made, so they can hear exactly how they sound over the air.

Many orchestras today secure engagements in distant cities simply by having high-fidelity recordings made of a number of selections and sending these recordings as samples of their work. Orchestra leaders are generally willing to pay liberally for this service, since it eliminates the necessity of having the entire orchestra make a long trip on the mere chance of securing an engagement.

Recordings of speeches or of entire programs at important local celebrations in a community can often be sold to the sponsors of the celebration or to those participating. Class plays and other dramatic productions, as well as locally produced concerts, can likewise result in business for the owner of a portable recording system.

Sound recordings of entire wedding ceremonies are rapidly becoming as much a part of the getting-married procedure as are wedding photographs. Few indeed are the young couples who will turn down an opportunity to secure a living record of this all-important event.

Messages of congratulations, holiday greetings or simply cheery words of conversation are being recorded extensively today, and the finished discs sent to friends and relatives in distant places. Far superior to written messages or photographs are these vocal messages, for every inflection of the voice and every word is clearly distinguishable. Many parents are recording the voices and songs of their children to preserve for play-back in future years and to treasure along with childhood snapshots and bronze-plated baby shoes.

The field of criminology should also be considered. There is a demand for portable recorders among lawyers, who often desire to record secretly the conversations in a room or location for use as evidence in lawsuits and divorce cases. Detectives and other police officials often rent

recorders for use in recording conversations of criminals when it is impractical for the detective to hide in the room. Confessions of criminals, recorded with every inflection of the voice, often carry far more weight in court than even signed written confessions. Recorders are also being used for court reporting purposes, making permanent records of every word spoken during a trial.

Radio advertisers on local stations often desire to have recordings made of their programs as broadcast, to preserve for reference purposes, for improvement of the program, or as evidence that they are entitled to a refund in the event that the program is not handled properly by the broadcast station. An ordinary radio receiver of fairly high fidelity is used to bring in a desired program when it is to be recorded.



Fairchild-Proctor model F26 recorder in use. Made by Fairchild Aerial Camera Corp., 62-10 Woodside Ave., Woodside, New York City.

Oftentimes radio fans themselves will desire to have particular programs, such as the speeches of the president and of other notable people, or special broadcasts in which they are particularly interested, recorded so they can be played back at any desired time in the future.

This list will undoubtedly suggest to you numerous other uses for modern portable sound recording equipment in your particular locality. There is every reason to believe that recording can be a profitable side-line if you are located in a fairly large city or in a smaller city where unusual industrial, business, entertainment, educational or governmental activities may result in a greater than normal demand for your services.

Choice of Equipment. In this matter, I want to recommend first of all the purchase of a complete portable recording system from a single manufacturer, rather than the purchase and assembly of the individual components. My own experience and that of others in this field has shown that it is impractical for an individual to attempt to assemble a satisfactory sound recording system even when the individual components are of the best quality. As one manufacturer states, "the final recording is only as good as the weakest link in the chain from the mike to the cutting head;" furthermore, the final fidelity characteristics of a system depend not so much upon the fidelity characteristics of the individual components as upon how well the parts are matched to each other and upon how much equalization is present in the audio amplifier.

A complete portable sound recording system consists of a high-quality microphone, a high-fidelity audio amplifier, a motor-driven turntable, a cutting head, a play-back phono pick-up, and a loud-speaker for play-back. In general, the first consideration in the choice of a sound recording system is that of fidelity. Obviously, higher-fidelity equipment is needed for recording musical programs than for speeches where higher frequencies are almost completely absent. With systems purchased from reliable manufacturers, price is a good criterion of fidelity.

You must be prepared to invest at least several hundred dollars in your recording system if you expect to record musical programs successfully and secure business from those who desire to preserve every high-frequency inflection of the voice. True, you can get by with a system costing in the vicinity of \$150 when it is only necessary to record spoken words so they will be clearly understandable when played back, but such a low-priced system would eventually have to be replaced as your business expanded. Remember—the better your equipment, the easier it will be for you to secure business at a charge which will pay back your investment and give a good profit besides.

Factors Affecting Fidelity. The fidelity of a sound recording system depends essentially upon the frequency range and quality of the cutting head, the stability of the turntable, and the type of disc used, for all other components of a quality recording system will in general be capable of giving more than satisfactory fidelity.

In general, the cutting head governs the frequency range of the system, and consequently many manufacturers specify the frequency response of the cutting head rather than that of the entire system.

Any wobble in the turntable or any variation in its speed will result in unsteadiness of tone. This may not be noticeable in certain types of

recordings, such as of swing music, but will result in unsatisfactory recordings of classical selections.

The 60-cycle synchronous motor which is generally used to drive the turntable should be mounted in such a way that motor vibration cannot reach the turntable or recording head. The motor speed is considerably greater than that desired for the turntable, and consequently a speed-reducing mechanism must be employed. One popular drive method for portable systems is based upon the use of rubber-faced rollers which drive the rim of the turntable by friction. If the pressure on the roller is released immediately after each recording to avoid forming a "flat" on the rubber roller, entirely satisfactory results can be obtained. Another popular mechanism is the steel ball friction drive.

The turntable itself should be fairly heavy, with most of its weight concentrated in the rim in order to obtain maximum fly-wheel effect and thereby smooth out vibrations and variations in speed.

In a good portable recording system, the greatest source of noise is at the point of contact of the cutting needle with the record disc, and this varies with the type of recording disc used.

Recording Speeds. Sound recordings are made at one of two speeds, 78 r.p.m. or 33 1/3 r.p.m.; most recording turntables are provided with a lever or other mechanism for changing over from one speed to the other. The use of the lower speed gives a longer-playing record, but at the same time results in somewhat poorer fidelity and a higher scratch or noise level. With a 33 1/3 r.p.m. speed, 16-inch discs which will play for 15 minutes are generally used. With a 78 r.p.m. speed, 12-inch discs playing for 5 minutes are standard, but smaller-diameter discs than these can be used in either case when desired.

Records cut at 78 r.p.m. are always started at the outside of the discs, but with 33 1/3 r.p.m. recordings, it is common practice to start the cutter at the inside, at least 3 3/8 inches away from the center of the disc. The reason for this is quite practical, being based upon the fact that the needle used in playing a 15-minute record becomes considerably worn after a few minutes of playing, with consequent broadening of the point. The linear velocity of the needle in the groove is lower near the center of the record than at the outer edges, and therefore the sound track is more crowded (the distance between peaks in a groove is less) near the center of the disc. At the higher frequencies being recorded, the physical size of a worn-out needle point becomes comparable to the distance between peaks (the wavelength) on the disc, and these high frequencies are bridged over by the needle. A

new needle is more likely to follow the high-frequency fluctuations at the center of the disc.

Although some sound recording systems can be secured with only a 78 r.p.m. speed, I consider the extra cost of a dual-speed system well justified. A 15-minute disc is highly desirable when recording long programs, to avoid loss of part of the program while changing discs.

Pitch in Lines Per Inch. The playing time of a record depends not only upon the actual diameter of the disc, but also upon the number of lines per inch which are cut along the diameter. A feed screw which is driven by the turntable either through gears or belts moves the cutting head gradually outward or inward to space the grooves uniformly on the disc. Some systems



Vibro-Master model F recorder, made by Vibro-Master Successors, 2744 Broadway, New York, N. Y. Note use of heavy drapes over windows to improve acoustical qualities of room.

provide means for changing the speed of the feed screw with relation to that of the turntable in order to secure three or four different pitches from 90 to 150 lines per inch, while other systems provide for only a single pitch of approximately 110 lines per inch. The lower the pitch, the greater will be the distance between grooves on the disc and the greater will be the permissible amplitude to which the cutting head may be driven without overcutting into an adjacent groove.

A low pitch would be used where it is desired to record with maximum amplitude a program in which low or bass frequencies are quite predominant. A high pitch, on the other hand, would be used where it is desired to secure the maximum possible playing time at some sacrifice in fidelity and with shallower grooves. A single

pitch of about 110 lines per inch will generally be satisfactory for general recording purposes, however, so do not let the question of pitch influence your choice of a system.

Types of Discs Available. There are two types of discs, each having certain advantages and disadvantages, in general use today for instantaneous recording. It will be worth while to consider these in some detail, since the type of disc used has an important effect upon fidelity.

Cellulose-Coated Discs. This is the best grade of disc made today for instantaneous recording purposes, and consists of a heavy aluminum disc which is coated on each side with a special cellulose compound (cellulose nitrate is often used). This coating is soft enough to be cut by a steel or sapphire cutter needle and yet durable enough so it can be played with a steel reproducing needle immediately after cutting. The cellulose compound is carefully prepared and filtered to remove impurities which might dull the cutting needle and produce surface noise, and is applied in such a way as to produce a mirror-smooth surface of uniform consistency.

The use of an aluminum base for the cellulose makes the disc unbreakable and non-inflammable. The thread cut from the disc during recording is highly inflammable, however, and should be placed in a close metal container filled with water immediately after a recording is made.

The highest quality cellulose-coated discs are available in various diameters from 6 inches to 16 inches, with the larger discs naturally being considerably higher in price. Low-priced cellulose-coated discs in diameters from 6 to 12 inches are also available, these being intended for test recordings, and for uses where high-fidelity and permanence are not essential. The aluminum base on these discs is considerably thinner than on the standard coated discs, making the records flexible and less durable.



Many orchestra leaders make recordings regularly to aid in developing new arrangements, to study the work of individual musicians in the orchestra, and to use in securing new out-of-town engagements.

Either sapphire needles, hand-polished steel needles or diamond needles are required for cutting cellulose-coated discs. It is highly essential that the needle be sharp, properly ground and mounted at the correct cutting angle. The average cutting life of a sapphire needle is from 10 to 15 hours, after which it should be sent back to the factory for resharpening. These needles may be resharpened about eight times, according to one manufacturer. Hand-polished steel needles of high quality give results practically equal to those of sapphire needles for one or two 16-inch recordings, but surface noise increases rapidly with additional recordings as the needle becomes dull. The choice of needle will depend upon the nature of the particular job at hand.

Cellulose-coated records can be used at either speed, but will have slightly more surface noise at 33 1/3 r.p.m. Pressure on the cutting needle is quite critical, and must be carefully adjusted to give a groove depth of .003 inch; this will make the thread which is cut from the groove about the thickness of a human hair. On some recorders a counter-balance spring or weight is provided for adjusting the depth of cut, placing a weight of from one to three ounces on the needle, while others have in addition an advance-ball, which is a piece of sapphire about the diameter of the lead in a pencil, with a rounded and highly polished end. This advance-ball rides on the cellu-



Schools and colleges use recordings as aids in correcting speech defects and in teaching public speaking. Portable recorders such as this can be set up in any classroom.

lose surface of the disc, about 3/16 of an inch ahead of the cutting needle, and is so mounted as to maintain automatically a constant depth of groove throughout the recording regardless of variations in the density of the wax.

Surface noise on a properly cut cellulose disc is extremely low for about six playings of the disc, and as many as 100 playings are possible before surface noise makes the recording unsatisfactory for further use. Record-preserving fluids are available for application immediately after cutting; these tend to harden and lubri-

cate the grooves, reducing the wear which is caused by the reproducing needle. The use of a fluid such as this is recommended when discs are to be preserved for any period of time and are to be played back many times.

Aluminum Discs. Aluminum discs, with their surfaces polished to mirror brightness, are considerably lower in cost than coated discs but have a higher surface noise and do not give as true reproduction. Diamond-pointed cutting needles are required for aluminum, with one needle having an average cutting life of several hundred hours. Considerably heavier needle pressure is



Recording a radio program with a Presto Junior Sound Recorder. Favorite programs and speeches can be preserved; amateurs and DX fans can secure indisputable proof of reception of far-distant stations.



Concealed recorders are used by many business firms for training their new salesmen. Improvement is rapid when student salesmen hear their own faults.

required, from 15 to 18 ounces, and consequently recorders designed both for coated and aluminum discs must have some means of varying the needle pressure. One manufacturer supplies a special weight which is attached when cutting on aluminum.

Experience will enable you to determine when the fidelity available from a modern aluminum disc will be satisfactory for a particular job. Another point to bear in mind is that aluminum discs are more durable and have a longer life in any climate than coated discs; for this reason aluminum might be preferable when recording voices of children for preservation over a period of years. Non-metallic needles, such as those made of thorn, cactus, bamboo or fiber must be used when playing aluminum discs. Incidentally, pregrooved aluminum discs are intended only for the lower-priced home recording systems; you will always use blank discs. For professional quality recorders all have means for properly spacing the grooves.

The foregoing information, together with the analysis of the market for recording in your locality, should enable you to choose intelligently a suitable sound recording system for your particular business. Various systems which are considered suitable are illustrated in this article, but there are many others on the market which

will prove satisfactory. Select your unit carefully, after studying all available literature and information, for upon your choice hinges to a great extent the success of sound recording as a side-line for you. You can, of course, secure literature free on request from the manufacturers of sound recording equipment.

Recording Technique. Although the instruction manuals which are supplied with complete recording systems generally cover in considerable detail the exact procedure for making various types of recordings, there are a number of points in this procedure which I particularly want to stress.

It is always better to record in a room which has been arranged specifically for this purpose. This means that the walls have been sound-proofed by covering with an absorbent material such as Celotex, and drapes are available if necessary to prevent undesirable reflections of sound. With a portable system, however, recording technique will be much the same in the studio as at an outside location or in the home of a customer.

Continuous monitoring of the sound level at the cutter is essential to prevent this level from getting so high that the cutter needle breaks into adjacent grooves. A single exceptionally loud sound or crescendo of music can, if not offset by a reduction in the gain of the amplifier, result in cut-over and thus ruin a recording. The reproducer needle will swing through the cut-over section into the next groove and either skip an entire revolution of the recording or follow the same groove over and over again.

A rehearsal of the program to be recorded is recommended wherever possible. No disc is cut during the rehearsal, but the operator watches the level-indicating meter and notes where peaks

occur which may require a reduction in gain. When recording outdoors in locations where sudden loud noises may be expected, the recording will have to be done at a low enough level to prevent over-modulation or cut-over. This will, of course, bring up the noise level when the recording is played back at normal volume. Keeping the microphone as close as possible to the source of the sound being recorded and securing the cooperation of those in the vicinity to prevent unexpected loud sounds which might be picked up by the microphone, will result in a better recording.

Practically all complete recorder systems have provisions for plugging in headphones for monitoring purposes. The sound level meter itself simply indicates level without showing whether it is noise or a desired program; the headphones tell how much noise there actually is.

When the play-back loudspeaker and amplifier are mounted in a separate carrying case from the recorder, provisions are generally incorporated for plugging the loudspeaker into the amplifier for monitoring purposes; in this case the loudspeaker is in parallel with the cutting head. A loudspeaker can be used for monitoring only when the microphone is in a different room; otherwise there would be acoustic feed-back and howling just as in a P. A. system.

The same principles apply to the arranging of performers around a recording microphone as for public address systems and broadcast studios. A rehearsal for monitoring purposes is the best

possible check upon the arrangement of performers and should be made whenever possible.

Too much cannot be said concerning the importance of leveling the recording turntable. It is obvious that any tilt in the turntable will cause the cutter to swing more heavily to one side of a groove than the other, impairing the fidelity of the recording and lowering the maximum permissible amplitude without cut-over. A small spirit level is provided with some recording systems for this purpose; it is placed upon the turntable before a recording is made and the carrying case is blocked up with pieces of wood or cardboard (if adjustable feet are not provided) until the turntable is absolutely level in two directions at right angles to each other. If a spirit level is not provided with your system, you can purchase one in any hardware store.

Preliminary adjustments of a recording system are just as important as are preliminary adjustments in a high-priced camera, and forgetfulness in even one respect will ruin the results in both cases. In a typical all-purpose recorder you must adjust for the following things: 1, turntable speed; 2, pitch in lines per inch; 3, direction of travel of cutter (from center out or from outside in); 4, type and diameter of disc used; 5, type of cutter needle; 6, weight on cutter needle (aluminum discs require greater weight than coated discs); 7, depth of groove cut (an inexpensive micrometer caliper is recommended for this purpose, it being used to measure the thickness of the thread cut by the needle); 8, plugging in of power cords and monitoring phones or loudspeaker, and proper positioning of all switches; 9, adjusting cutter needle to correct angle for the type of disc used. Lower-priced systems will not have all of these adjustments, thereby simplifying the setting up procedure.

When starting to record, the cutter head should be lowered gently onto the disc while the turntable is running to keep shocks at a minimum. Just before you are ready to record, place a test record on the turntable and cut a few grooves without speaking into the microphone; a hissing or squealing sound heard when these grooves are played back indicates either that the needle is dull or is set at the wrong angle, and corrections are necessary before the recording can be made. When cutting a cellulose-coated disc, allow the thread to wind up around the center spindle when cutting from the outside in. Never let it become tangled around the cutting needle.

The lighter the pressure of the cutting needle on the record, the longer will be the life of the record; the most satisfactory pick-ups are those which require a pressure of only about 1½ to 2 ounces. With cellulose-covered discs, be sure to



Prestor Junior Sound Recorder in use. Made by Presto Recording Corp., 139 West 19th St., New York, N. Y.

The Laboratory Page

By GEORGE J. ROHRICH

The purpose of this department is to furnish supplemental experiments to students who have completed their Home Laboratory Course, but who wish additional laboratory experience. You are not required to perform these experiments, but you will gain increased knowledge by doing so.

Most of the material required will be that received as part of the Laboratory Course. Any other material necessary can be purchased very reasonably and will constitute an investment rather than an expense, as it will serve as replacements in service work or be useful in your shop later.



George J. Rohrich, Engineer
in Charge N. R. I. Laboratory

AN EXPOSITION OF EXPERIMENT NO. 11

Experiment No. 11 in the second experimental outfit tells you how to calibrate a voltmeter for use as an ohmmeter.

For the rapid servicing of modern radio equipment, the "ohmmeter" is fast becoming the most dependable instrument for testing the condition of the parts used in the various circuits. Most servicemen realize this, but from the amount of correspondence received on the subject of *calibrating* a voltmeter for use as an "ohmmeter," they believe the ohmmeter is a mysterious device and that the process of "calibrating" is even more secret.

This article will show that there is nothing mysterious about the matter. The procedure is just as simple as telling you how to calibrate a "ruler" or "yardstick," which is marked in "inches," for use as a "device" which measures "gallons" of water in a tank.

Let us draw a comparison between the "voltmeter" used in Experiment No. 11 and the "ruler" used in the tank. We note that the "voltmeter" has a *scale*. Likewise, the "ruler" has a *scale*.

Let us get a clear picture in our minds of a *scale*.

A *scale* is "a series of marks" placed on a measuring device. The scale allows you to measure the number of units of some quantity.

The scale of our "meter" is marked in "volts."

The scale of our "ruler" is marked in "inches."

The part, which evidently causes confusion at

times, is that a scale marked for measuring one kind of quantity, frequently can be used for measuring another kind of quantity. Thus, the meter with its scale marked in "volts" can be *calibrated* for measuring "ohms." Likewise, the "ruler" which is scaled for measuring "inches" can be *calibrated* for measuring "gallons."

Two things must be done to "calibrate" a device.

"Calibrate" means to determine the true value of (by methods of *comparison* or by methods of *calculation*) and record these true values of a quantity (by methods of marking numbers on the scales, or by methods of making a "table" or a "graph" where you list the true number of units *with respect to* the number of marks or units on the original scale.)

Therefore, "calibrate" means to *determine* and *record* the true meaning of the marks on any graduated scale.

The graduated scale may have numbered marks already, because it was calibrated *previously* for some *one* definite purpose. You may need to correct or check the original calibrations. Furthermore, most devices (meters or rulers) *can be used for several purposes*. You may need to calibrate the scale for another purpose than originally calibrated. That is the whole story in outline form.

Let us now study the procedures of calibrating in further detail. Notice that I said there are *two* methods for *determining* the true value of

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a quantity. The first is by *comparison*, the second is by *calculation*.

First we shall study the "comparison method" with the ruler placed in an empty water tank. The ruler is placed in a definite position for this purpose. It is placed upright in the tank so we can measure (compare) the depth of water registered on the scale of the ruler. Then we pour in a known amount of water, let us say, one gallon. In a particular tank where the dimensions are correct, these dimensions being correct by accident or by proper design, we might find that "one gallon" causes a depth of "one inch" to be registered on our "ruler." A further test (by *comparison*) would then probably show that "two gallons" causes a depth of "two inches" and so on. Our scale for "inches" then automatically will register the correct *scale* for "gallons." You will agree there is nothing mysterious about this method of *determining* and *recording* (calibrating) our ruler.

When calibrating the scale of the ruler by the comparison method while it is placed in a tank, we might expect more irregular or unusual conditions than described above. For example, the ruler may be reversed so the numbered scale of inches reads from top to bottom in the tank. If the scale is 12 inches long, then "one gallon" causes a registration at "eleven inches," while "two gallons" registers at "ten inches," "three gallons" registers at "nine inches" and so on. Now we must do one of three things: (1) re-mark the scale, (2) make a "table," or (3) make a "graph." Again you will agree there is nothing mysterious about *calibrating* this scale because you simply *determine* and *record* the true meaning of the marks on the scale.

Now turn your attention to Experiment No. 11. Here you have conditions which are similar to those described above. You have a scale on the meter marked in "volts." This numbered scale progresses from *left to right*, starting at 0 and ending at 50. After calibrating, if you were to record the "ohms" scale directly on the meter, your calibrated scale would read from *right to left*. The 0 of this "ohms" scale would be where 45 is on the "volts" scale, provided your battery produced this deflection while you measured no ohms.

Known amounts of "ohms" are between terminals 1 and 2 on the potentiometer. The true amount depends upon the setting of the dial attached to the shaft of the potentiometer. You have no ohms when you set this potentiometer dial to zero. Then you have 100 ohms between these terminals 1 and 2 when you set the potentiometer dial to its first mark. This *first* mark is not

numbered. Neither are the next eight marks numbered because only the tenth mark is numbered, and every ten additional marks thereafter, up to and including 100 marks for identifying 10,000 ohms. This is done for the sake of providing you with a neat and simplified dial.

You have 200 ohms between terminals 1 and 2 when you set the potentiometer dial to its second mark, with an added amount of 100 ohms included by advancing the dial to its third mark and so on. Thus you have 1000 ohms at the tenth mark, 2000 ohms at the twentieth mark and continuing until you have 10,000 ohms at the hundredth mark on the dial. This amount of 10,000 ohms is the highest amount available as furnished by the Institute for making your calibrations by means of the comparison method. Of course, you can obtain additional known resistors for extending your calibrations, or else you can resort to the method of calculation.

In experiment No. 11 you simply *determine* what your deflections are for a given quantity of "ohms" by holding the test prods on terminals 1 and 2 and observing where the needle points on the original "volts" scale. Then you *record* your observations for future reference in the "Table No. 1" which is provided for your convenience. Your calibrations will be most useful when you extend your table, so you have recordings for every 200 ohms.

In the Report Statement for Experiment No. 11 you put your "ohmmeter" to practical use in finding how many ohms of resistance are contained in the headphone. You place the test prods on the terminals of the headphone. Your meter deflects to approximately 33 on the "volts" scale, which you look up in your table extended to include this calibration and find that you have 1200 ohms. Or you obtain 33 on the "volts" scale and then transfer the test prods to terminals 1 and 2 on the potentiometer, rotating the potentiometer dial until you again get a reading of 33, after which you will see that the dial registers 1200 ohms.

There is a second method for *determining* the true amount of the quantity you record. This involves *calculation* with the aid of arithmetic. For example, there are 231 cubic inches in a gallon. We can now reason and later use this fact that the number of square inches on the bottom of a tank, when divided by 231 will give us the number of gallons for each inch in depth.

Similarly, we can find by calculation how many ohms will be indicated by a deflection which is read on the volts scale. The formula is given on the bottom of page 6, at the end of Exp. No. 11.

Portable Recorders as a Profitable Side-Line (Continued from page 8)

apply the preservative solution immediately after recording if long record life is desired.

With aluminum discs there is no thread cut out from the surface; the needle simply presses the groove into the aluminum. No preservative solutions are required for aluminum discs.

With modern electric phonographs, high-quality steel playing needles give best results on cellulose-coated discs, but fiber or thorn needles can also be used. With the old-fashioned acoustical phonographs, where the reproducer and needle are at the end of a tone arm which is a part of the horn, steel needles which are bent at an angle should be used to offset the weight of the heavy pick-up unit and reduce record wear. These bent needles can be obtained from almost any modern manufacturer of recording equipment. Straight non-metallic needles should be used for play-back of aluminum records on all phonographs.

The fact that a recording system gives satisfactory results when first used is no guarantee that it will continue to perform properly. Each and every part of the system must work perfectly at all times and therefore the apparatus should be checked at regular intervals for deterioration or possible signs of trouble. Furthermore, a recording system is a delicate piece of scientific apparatus and must be treated as such; rough handling, particularly of the cutter head and pick-up, can ruin the fidelity of the system and necessitate extensive repairs.

Play-back. When doing commercial recording, it is usually necessary to play back the disc immediately for the customer. The quality of your work will be judged by the sound of this first play-back, and therefore every piece of apparatus used in the play-back must be capable of as high fidelity as that originally used in recording. Furthermore, the play-back should be in a room having favorable acoustics.

Recording Radio Programs. In recording radio programs it is, of course, possible to place the recording microphone near the loudspeaker of a radio receiver, but this is not conventional practice. Far better results are obtained by removing the microphone entirely and making connections across the voice coil of the receiver loudspeaker for direct feed into the microphone input terminals of the recording amplifier. The voltage across the voice coil is usually of such a value that a proper recording level can be obtained by adjusting the receiver and amplifier gain controls. Since no microphone is used, the receiver loudspeaker can be used for monitoring purposes and therefore need not be disconnected. With this set-up the fidelity of the radio receiver will affect the fidelity of the recording.

Making Duplicate Records. Duplicate records can be made by playing the original recording on a separate turntable and connecting the pick-up to the microphone input terminals of the recording system. This process can be repeated until the original record becomes noisy or drops off materially in fidelity, but naturally the process involves considerable time.

A number of firms offer inexpensive record pressing services to small recording studios or to persons requiring several copies of any particular recording. The process used is much the same as that followed in making ordinary phonograph records. The surface of the original cellulose-coated disc is made electrically conductive by spreading over it a thin layer of an extremely



Vibro-Master model F recorder, made by Vibro-Master Successors, 2744 Broadway, New York, N. Y. Note the sound level-indicating meter in the center of the inclined panel.

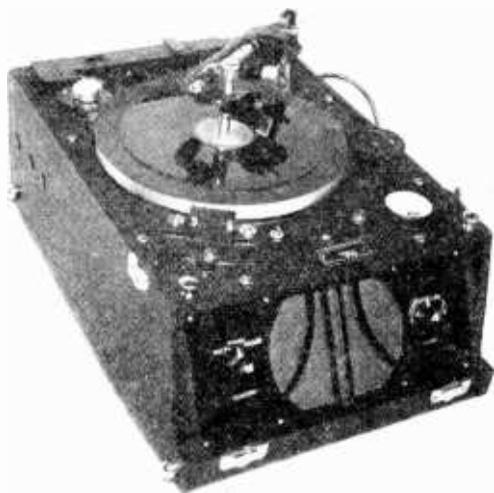
fine conducting powder such as graphite. The disc is then placed in an electroplating bath and copper plated to a thickness of approximately 1/16 inch. The copper covering is then carefully removed from the disc and placed in a special hydraulic press, where a plastic material is pressed into the grooves of the disc and then hardened by steam and heat treatments to produce an exact duplicate of the original recording. Practically any desired number of duplicate discs can be made from this master copper disc. When records are to be duplicated by this process, record on only one face of the record and allow ample margin inside and outside of the recorded area on your disc. Duplicates can be also made when the original recording is on an aluminum disc.

How to Determine Charges. Charges for recording service are determined in much the same way as charges for radio servicing work. An example

will best illustrate how this should be done.

Let us assume that your total initial investment in sound recording equipment exclusive of needles and discs is \$400 (yes, it takes cash to break into this profitable side-line). You can expect an average life of two years from this equipment, for at that time you will either have to pay for a complete overhaul of each part of the system or invest in new and better equipment; this means that the depreciation of sound recording equipment is rather high, and a proportionate amount of the initial investment must be charged off to each recording.

Estimate the number of recordings which you can reasonably expect to sell in this two year period,



Presto Model D recorder, made by Presto Recording Corp., 139 West 19th St., New York, N. Y. The photo on the front cover of this issue shows this model in use.

basing your estimate upon the initial market survey made before you bought the equipment. Let us suppose that this estimate amounts to 400 records in two years; this means that your charge must include \$1 for depreciation on each record.

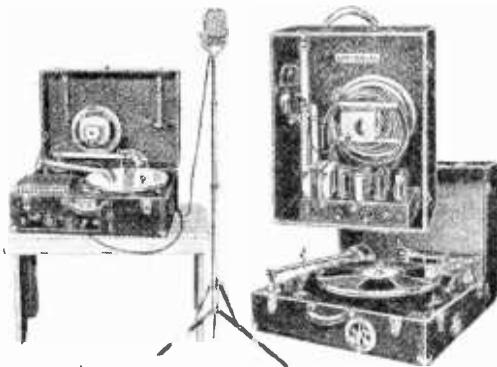
The overhead of your sound recording side-line is the next thing to figure. This should include a proportionate share of your rent, heat, telephone, electric bills, all advertising expense chargeable directly to the recording business, and all other expenses which are not specifically incurred on any one recording. This overhead might well figure up to be \$100 also for a two-year period, making the charge per record for overhead about \$1.

Page Twelve

You must also consider the actual expense involved in making a particular recording. This must take into account the cost of the cutting and play-back needles, the cost of the discs used (this of course varies with the type and diameter of disc), the cost of any discs used for test purposes or rehearsals on a particular job, and any transportation expenses involved where you make the recording outside of your studio. If you use your own automobile, figure a flat rate per mile for it, which includes depreciation and wear on tires and other parts as well as the actual cost of gas and oil. Naturally this actual expense incurred on a job will vary a great deal with the number of recordings made, so let us assume a value of \$1.50 for our example.

Next you must figure the charge for your time and that of any assistants whom you employ. This can well be the same hourly rate used for computing radio servicing charges; here again, the greater the number of recordings made with a particular set-up, the less time you will have to charge to each recording for preliminary work. An average charge per record for your own services could well be \$1.50.

This still leaves out the profit on your original investment. I like to figure this by adding 10%



Left: Universal complete single-unit portable recorder. Right: Universal two-unit portable recorder. Both made by Universal Microphone Co., Ltd., Inglewood, Calif.

to the charge as computed without considering profit; in this example, then, the profit would be 10% of \$5, or 50 cents, and the average charge per record would be \$5.50. This is not at all an unusually high price for a 12-inch disc, particularly where only one or two records are involved. Your charges may range from \$1.50 for a 6-inch disc to \$10 or \$15 for 16-inch disc recorded at 33 1/3 r.p.m.

(Page 15, please)

Portable Recorders as a Profitable Side-Line (Continued from page 12)

You will, of course, have to offer special rates for making large quantities of recordings, such as when recording a series of radio programs, an entire celebration or other special event, an entire class play, concert or recital. Furthermore, if there are other sound recording studios in your vicinity, you will have to give some consideration to the prices which they charge. By this I do not mean that you should match their prices or go under them, for that might mean operation at a loss and eventual failure of your recording business. There are other ways to offset competition—by advertising heavily yourself, by offering better equipment, better studios and better service, and by getting out after business instead of waiting for it to come to you.

Collecting the Money. Before closing, I'd like to emphasize the importance of arranging terms of payment before making any recordings; you can have a contract form printed or mimeographed for this purpose, giving a carbon copy to the customer. This will avoid misunderstandings as to price. If the back of your blank contains instructions for playing and storing the recording, specifying needles to be used and the number of playings which can reasonably be expected, your contract blank will prevent customers from becoming dissatisfied when the record begins to wear. Collect your money before releasing the recording whenever possible, for the recording is of no value to you if returned later when you attempt to collect. You might well consider giving a supply of the correct needles for the record and the phonograph on which it is used, as a good-will gesture.

—n r i—

Short Waves Have Many Unique Jobs

1. Sterilization of liquids, such as water and milk, and of many other food products.
2. Sterilization of containers when high temperatures cannot be used.
3. Reduction or control of mold or fungi, as on seeds and bulbs, foods, and wall surfaces.
4. Treatment of certain superficial skin diseases.
5. Partial or complete sterilization of air, in connection with air conditioning and dust precipitation.
6. Preservation of certain foods against decay.
7. Speed-up of plant germination, accompanied by electric soil heating.
8. Sterilization of hospital areas during delicate operations.

Radiomerriments!

- Bleeder*—An ancient barber.
Characteristic Curves—Curves displayed at beaches.
Choke Coil—Primitive instrument of torture.
Microphone—One millionth part of a headphone.
Mu—Cat call.
Multivibrator—A Hawaiian dancer.
Padder—A machine for stuffing mattresses.
Phone Jacks—Special tools used to lift telephones, headphones and gramophones.
Resistance—What the boss puts up when you demand a raise.
Switch—Chinaman's pigtail.
Test Prods—Pointed rods used to wake up sleeping radio operators.
Trimmer—A lawnmower.

—n r i—

Audi discs Show Perfect Uniformity

Some time ago the non uniform quality of available discs became very objectionable. A group of recording engineers of long experience began a search for a material that could be depended on. They found a unique direct recording blank being made in France. The art of direct recording originated in Europe, and years of careful research by the finest lacquer chemists culminated in an outstanding and unique formula and process.

This was the surprised reaction at the first cut. With the usual slight adjustment of pressure a fine quiet groove was formed. The thread was cut easily, steadily, even near the center. No tendency to cut light and heavy. A groove of shiny uniformity. No need to finker with cutting angles.

A high fidelity magnetic pickup was used, standard shadowgraphed red shank needles and two ounces pressure. First tests were made with music recordings. After two hundred playings the record was still good. Various frequencies, including 9000 cycles, were recorded. Even at 9000 cycles the wear was too small to be measured properly—the effect of changing needles (which vary very slightly in output) was greater.

During this test an interesting discovery was made. Some other records would grind a flat on the end of the needle in a few playings, visible to the naked eye. In fact even in playing one record the wear would cause a loss of level at the high frequencies as the point enlarged. A complete wear test on an Audi disc using only one needle showed no abrasive wear visible under the microscope!

These discs are now made available to recording studios through Audio Devices, Inc., 1600 Broadway, New York City.



Maximilian Rex of the Ferde Grofe Orchestra uses the Amperite Kontak microphone on his violin.

"AMPLIFICATION is an airplane which can lift millions of listeners to higher peaks of musical experience" is the opinion of one of our leading symphony conductors, Leopold Stokowski.

An idea of the reproduction quality of the new Amperite Contact unit can be gained from the fact that it was used by the Philadelphia Symphony Orchestra to reinforce a mandolin solo. The unit is flat within ± 2 db from 40 to 9000 cycles per second. Its operating principle is magnetic.

Although the violin is one of the most versatile instruments, its use has been reduced to practically large symphony orchestras where enough violins to give the necessary dynamic power can be afforded. Violinists therefore learned to play the more demanded saxophones. The reason for the unpopularity of the violin in dance orchestras is due to its limited power output. Sound engineers removed this objection by giving the violinist amplification.

The difference in tone and volume between a
Page Sixteen

THE AMPERITE CO.

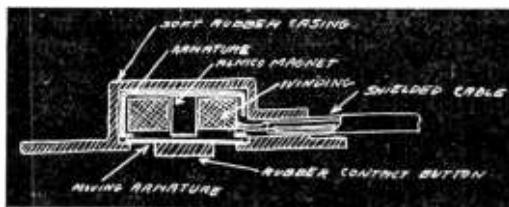
A New Aid To

\$50.00 violin and one costing \$200 is comparatively small—and in most cases it is a matter of opinion. With the aid of the new Amperite contact microphone a \$50 violin can be given the tone and volume of one costing several thousand dollars. It also gives the violin the dynamic power of the brasses. A few violins can give a small orchestra the effect of a symphony. A "hot" violinist can obtain effects unobtainable by any other instrument. Instead of decreasing, the use of amplification will increase the employment of violinists—their more powerful instruments will increase their usefulness and field.

When the contact unit is attached to the piano of a dance band, the piano becomes more audible and gives the band more fullness—especially when the floor noise level is high.

An unusual and fortunate use of the contact microphone is in helping the deaf to enjoy playing or hearing musical instruments. This is accomplished by attaching a contact unit to practically any musical instrument, feeding it into a low gain amplifier or radio set and then to an ear phone or bone conductor.

Recording of a piano has always been difficult—especially when special rooms are not available. By putting a single contact microphone on the sound board of the piano, better recording can be obtained than with any regular type of microphone. Of course outside noises will not be picked up.



Construction of the new Amperite Kontak Unit.

CONTACT MICROPHONE

To Musicians

A violin, ukulele or guitar solo will give unusual quality when recorded with an Amperite contact mike. It will give results that are really unobtainable with ordinary microphones.

Not limited to the professional field, servicemen will find the contact unit a very easy sale in any home where an instrument is played. Attach the unit to a musical instrument such as a violin, ukulele, piano, etc., connect it to the radio and request the musician to play with the contact unit connected. The better tone and volume of the instrument will be immediately noticeable. A demonstration is all that is usually necessary to close the sale. It is an extra sale since it does not compete with anything else the serviceman sells. When the unit is taken off, the instrument will sound rather flat.

Practically any number of Kontakt units can be connected in parallel and fed into one input. In other words, a unit can be attached to each of twenty-five instruments and all fed into one amplifier. In many cases, each musician prefers to have a separate amplifier for his own instrument. A compact low gain amplifier with a speaker on it is placed next to the musician, giving a perfect illusion of the music coming only from the instrument.

Being very small and unusually rugged, the

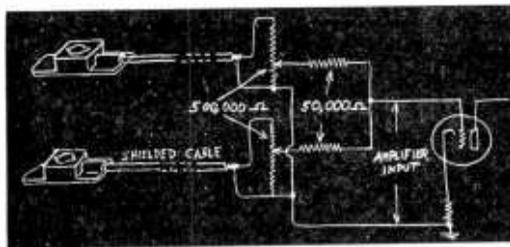


Edgar Stanstreet, pointing to the Amperite Kontakt microphone he used with the Philadelphia Symphony Orchestra in playing a solo in the symphony "Song of the Earth."

Kontakt unit can be attached very readily without tools to practically any instrument. Having an output of -45 db it will operate directly into any low or high gain amplifier and most radio sets.

The field that the Kontakt unit opens to the P.A. man and the help that it gives to the musician can be gained from a typical installation, as follows:—A ten piece band, for example, using two violins, a cello and a piano—the rest brass and drums; Kontakt units were placed on the two violins, the cello and the piano, bringing the output up to that of the brass. The orchestra now sounded as if it were a small symphony of approximately 25 men, whereas before the strings were hardly heard.

Those interested in the contact microphone can receive full particulars by writing to Amperite Company, 561 Broadway, N. Y.



The Amperite Kontakt microphones can be connected in parallel or mixed as shown above. In parallel any number up to 25 can be used in one input.

Radio Warning at Railroad Crossing

A new device invented jointly by a former railway claims attorney, and a radio consultant, to prevent accidents at railway grade crossings, has just passed a successful test with a perfect score.

The device consists of an automobile radio receiver which performs the dual service of warning the automobile driver of an approaching train and furnishing the usual broadcast programs.

The warning signal is emitted by a small compact transmitter, located at the grade crossing and actuated by approaching trains, as are the warning bells and gates. The transmitter is designed to minimize the radiation field, so that the range is limited to a short distance of about 100 feet from the antenna. The latter is strung along the road for about one quarter mile on each side of the crossing, so that the driver has ample time to stop the car, regardless of speed.

The portion of the receiver used for amplifying the warning signal is automatically turned on when the car is started. Reception of broadcast signals is optional at all times but they are automatically shut off or blocked out by the warning signal from an approaching train, so that the unmistakable warning tone commands instant attention. A distinct and different tone is emitted for trains moving in opposite directions on double tracks to prevent drivers from crossing the tracks just after one train has passed and another is approaching from the opposite direction.

The price of the improved auto radio will be practically the same as that of an ordinary auto radio and the cost of the small low power transmitters at the crossings is also very low, so that the item of cost cannot stop the immediate installation of positive protection, by the railroad companies, bus companies, trucking companies, and privately owned automobiles.

It is estimated that at least 95% of the 4,484 grade crossing accidents, with a toll of 1,875 deaths and 5,136 injuries in 1937, could have been prevented, had such an invention been in operation during that period.

(June, 1938—*Scientific American*)

You Can't Fool Johnny

Teacher: "I have went. That's wrong, isn't it?"

Johnny: "Yes, ma'am."

Teacher: "Why it is wrong?"

Johnny: "Because you ain't went yet."

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7 Arcturus Midget Tube Types Announced

As a logical advance in the art of small tube manufacture which began with the introduction of its Coronet tubes several years ago, The Arcturus Radio Tube Company, Newark, New Jersey, has introduced a new line of midget glass tubes. The following seven Arcturus types are now available in the midget line, with others already in course of development: 6A8GT; 6K7GT; 6Q7GT; 6J7GT; 25A6GT; 25L6GT and 25Z6GT.



These new midgets are specifically designed for the currently popular small sets and may be used with uniformly fine results wherever space is at a premium. Exceptionally rugged and sturdy, they make possible new standards of performance and durability in a confined space. Electrical characteristics are identical with those of the same type numbers in "G" or metal tubes. The new Arcturus midgets range from a height of 2 $\frac{3}{4}$ " to 3" depending upon the type. They are, of course, designed for use with standard octal sockets.

Additions to N. R. I. Ham List

Chong Foong—VS3AD—Alor Star, Kedah, Malaya

Andrew Gillespie—WSNTH—Conemaugh, Penna.

Robert F. Meade—W9QKS—Kansas City, Mo.

Art Leitner—W9QLG—Cannelton, Ind.

Gerald W. Peterson—W6PVI—Logan, Utah

Walter Hartman—W9RFM—Marathon, Iowa

E. B. Haas—W7EHU—Everett, Wash.

John N. Larson—WSPWU—Belton, Mont.

Paper Condensers Molded in Live Rubber

Paper condensers molded in live rubber jackets are now offered by Aerovox Corp., 70 Washington St., Brooklyn, N. Y., in meeting superior electrical characteristics demanded for r. f. functions.

The insulation resistance and voltage breakdown characteristics of these live-rubber encased con-



densers are excellent. Severest laboratory tests indicate a life several times greater than that heretofore associated with compact paper condensers.

The new units are available in capacities up to .25 mfd. in 200-volt, .1 in 400-volt, .05 in 600-volt, and .01 in 1000-volt. Prices are fully competitive with phenolic resin molded types.

Metal-Clad Bakelite Insulated Fixed Resistors

Maximum mechanical and electrical security is provided by the unique construction of the metal-clad bakelite-insulated fixed resistors now offered by Clarostat Mfg. Co., Inc., 285-7 N. 6th St., Brooklyn, N. Y. The resistance wire, wound on a special heat-resistant bakelite core, is permanently imbedded in moisture-proof bakelite which



in turn is encased in a metal jacket. The positive contact between wire and bakelite, and in turn with the metal jacket, provides exceptional heat dissipation. The new Series MPT Clarostat fixed resistors measure $1\frac{1}{2}$ " long by $\frac{1}{2}$ " wide by $3/16$ " thick. They are available in resistance values from 10 to 10,000 ohms. The wattage rating is 3 watts. Pigtails facilitate their use in point-to-point wiring.

RADIO THAT REMEMBER—24 HOURS A DAY

As the latest contribution to the modern haunted house in which electricity automatically performs most of the chores that formerly required human hands, Radio engineers of the General Electric Company have developed an "electrical memory" which endows the family Radio set with almost frightening talents. During its demonstration the engineers described the new process as "time-tuning." Briefly it means that the performance of a Radio receiver during every fifteen minute interval of a full twenty-four hour day can be predetermined.

"The effect of time-tuning is that of adding a silent master of ceremonies to the household," declared P. P. Hadlock G-E engineer. "This ghostly individual will awaken the family by turning on the Radio in the morning, and will remember to shut off the power at the appointed time at night, even if everybody has fallen asleep. Selected programs will automatically be tuned in at their scheduled time during any twenty-four hour period, and in between times the Radio will shut itself off if it has not previously been directed to continue. Lacking the human frailty of the average listener, who often intends to tune

in a specific broadcast, but doesn't, the electrical memory device is infallible—it can't forget."

The new development consists of a simple but ingenious Radio time control unit which permits the preselection of favorite programs, throughout the entire day and night, on five different stations. The preselector is divided into ninety-six fifteen-minute time intervals. In practice a user consults Radio programs for the ensuing twenty-four hours, moves the correct slider-contacts into position—and the automatic control takes complete charge.

The cycle will be repeated each day unless further changes are made in the setting. A self-starting electric clock in the center of the control panel maintains absolute accuracy in automatic operation once it has been set and an electrical connection made.

The pretimer does not interfere at any time with the normal operation of the Radio receiver, and stations may be manually tuned if desired. Afterwards the receiver will revert to the schedule which has been laid out for it.

Radio Tube Defined by Radio Mfrs. Ass'n

Many local Better Business Bureaus have had occasion in the past year to investigate advertisements of Radio sets in which dummy tubes, ballast devices and resistors have been included in the total tube count. In some instances sets advertised as "14 Tube Radios" were found to have as many as 7 or 8 resistors encased in glass or metal sheaths to resemble "tubes." Manufacturers and dealers selling such sets attempted to justify the tube count by claiming that no standards had been established to define a "Radio tube."

The difficulties in handling such matters have now been overcome through the approval and adoption of the following official definition by the Board of Directors of the Radio Manufacturers Association:

"A Radio tube is a device used in Radio equipment in which an electric or magnetic field causes or controls the electronic or ionic conduction through a vacuum or a gas. This definition shall not be construed to include dial lamps used for illumination only, ballast or other resistance devices."

All local Bureaus will check Radio set advertising by dealers in their cities to determine whether the tubes advertised comply with this definition. If dummy tubes, resistors, etc. have been included in the total tube count, Bureaus will require that such devices be excluded.

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Extension Cord Knot-Replacer

Increasing interest, particularly among Radio manufacturers, is being shown in the new patented combination snap-in rubber bushing and strain relief which is being manufactured exclusively by the General Electric construction materials division, Bridgeport, Conn. For use with appliance cord sets, it is molded directly onto the cord and gives two-way stoppage—no pulling-in or pushing-out. It will snap quickly into position in the appliance frame or casing since one side is fluted and allows the bushing to compress during assembly operation.

While the combination bushing and strain relief can be used successfully with any appliance where the cord set is fixed permanently, it has found particular favor among Radio manufacturers because of the necessity for protecting sets against damage from insecure cords. With the snap-in bushing both the cord and appliance are protected. The tying of knots and other methods of strain relief are unnecessary. The cord is held secure, is easy to assemble, and neat in appearance.

Page Twenty-two

Did You Hear This One

Everybody's heard the one about the man who couldn't sleep at night because his bedsprings picked up all the Radio programs on the air. Well, the WOR press department has gone that one, two or three better.

Not long ago a troubled gentleman stepped into the WOR transmitter building and told the boys there that he couldn't sleep nights. Every time he'd start to doze off he'd begin to hear Radio programs. They would wake him up. When he woke up he couldn't hear them. So he'd try to doze off again. Then they'd wake him up again. A vicious circle it was, all night, every night.

Then the WOR engineers began to question the fellow. They found out that he lived pretty close to the 50,000-watt transmitter at Carteret, New Jersey. Also that he worked in a machine shop which specialized in the grinding of paper cutter knives. The grinding of paper cutter knives is a process which requires carborundum grinding wheels. (We certainly feel foolish telling you this, but it comes into the story later on.) In the evenings this fellow used to read in bed, by the light of a small lamp which was attached to the bed frame. And he had gold fillings in his teeth.

That was all the WOR engineers had to know to solve this case. You, we imagine, and we, anyway, are still in one heck of a quandry, and getting pretty restless, too.

According to the engineers, the thing worked out like this. First, the fellow got carborundum dust in the fillings of his teeth. Then he went to bed. When he finished reading, he snapped off the bed light, thus removing the partial Radio short-circuit caused by the filament of the lamp, and allowing the bed frame to become an antenna. After he would fall asleep his jaw would relax, so that his mouth acted as a crystal detector.

In fact, this combination of circumstances made the fellow about as perfect a Radio receiving set as the old crystal model your brother Alf built in the cellar back in 1924.

Taking pity on the fellow's plight, the engineers decided to help him out. They didn't buy him a new bed or move his lamp or anything like that, as you might expect. They bought him a new toothbrush so he could clean the carborundum dust out of his fillings every night before retiring. The fellow was so pleased he gave WOR a free testimonial.

"It's nice being able to sleep again," was what he said, "but I do miss some of the programs. They were awfully good!"

Our congratulations to the guy in the WOR press department who dreamed the whole thing up.

(From June 15, 1938 issue of *Tide*)

Novel Radio Items

—BY L. J. MARKUS—

P. A. System Shoos Lovers!

Another use for outdoor P. A. installations is suggested by a news item which appeared recently in an Atlanta newspaper. This describes how two churchmen stationed themselves at a local cemetery, armed with megaphones, to drive off young couples who sought romance at night along the cemetery drives and paths. The loud admonition from the darkness: "The eyes of the Lord are in every place, beholding the evil and the good" proved most effective in clearing the cemetery.

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Midget Television Transmitter!

A miniature television transmitter capable of sending a still picture of geometric design has been developed by the National Union Radio Corporation to aid Teletricians in adjusting television receivers. This 10-tube instrument, small enough to be carried under the arm, will provide for television receivers a modulated carrier signal which is the equivalent of the modulated R.F. signal used by servicemen in adjusting ordinary sound receivers.

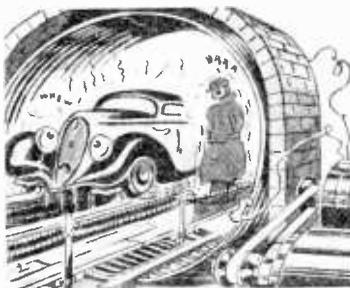
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Electric Eye Protects Aviators!

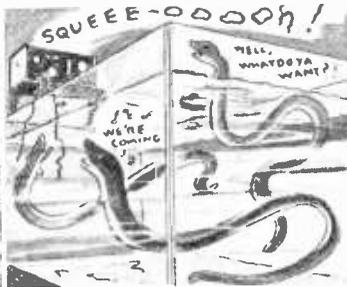
A photoelectric illumination control unit is now being used to turn the WCCO antenna tower



RADIO REPLACES HURDY-GURDY! Tony, the hurdy-gurdy man, has gone modern and can now be seen pushing a baby carriage along the streets of New York City, bowing and smiling as he tunes in modern jazz music on the small battery-operated Radio receiver which has replaced his hurdy-gurdy. Bamboo fishpoles support the antenna, and the ground wire trails behind on the street.



AUTO BAKING OVEN NEVER GETS HOT! Conveyor systems in an auto manufacturing plant move freshly-painted car bodies through a huge coil of wire carrying 360-cycle alternating current. Eddy currents induced in the car body provide heat to bake the enamel from the inside out. The oven itself is made of insulating material and therefore remains cool. Eddy currents are often present in Radio parts.



OSCILLATOR CALLS ELECTRIC EELS! Experiments in the New York Aquarium showed that electric eels could be lured from one side of their tank to the other by immersing in the water the output leads of a 1,000-cycle, 500-volt Radio oscillator, and now scientists are wondering if electric eels can really understand Radio signals. Measurements showed that these eels could deliver up to 40 watts of power.

lights on at dusk or on cloudy days when the towers are not clearly visible to aviators. The electric eye faithfully turns off the lights again when good visibility is restored, thus keeping power bills at a minimum.

— n r i —

Truthful Radio Receiver Advertising!

A radio store advertisement in a Peoria, Ill., newspaper offered a 5-tube broadcast receiver for \$5.95. Underneath the illustration of the receiver was this statement: "That's all this radio is worth. It works!"

— n r i —

Electric Ear Listens for 24 Hours!

Sound-recording machines capable of operating continuously for more than a day at a time have recently been developed. Sounds picked up by the microphone are amplified and fed to a special cutting head which engraves lateral-cut sound tracks on an endless loop of ordinary movie film. As many as twenty-eight sound tracks, each resembling an ordinary phonograph record groove, may be placed side by side on a single loop of 16-mm. film and played back immediately after recording. A number of these "electric ears" have been sold to Soviet Russia, where they are used for detective purposes.



N.R.I. ALUMNI NEWS

P. J. Dunn	.....	President
Dr. Geo. H. Thompson	.....	Vice-Pres.
Allen McCluskey	.....	Vice-Pres.
Earl Merryman	.....	Secretary
Louis L. Menne	.....	Executive-Secretary

A PARTIAL LIST OF LEADERS IN THE N. R. I. ALUMNI ASSOCIATION

The next issue of the News will contain the customary ballot for you to express your preference for candidates for the various offices to serve during 1939. This is always a very interesting event.

Your present Officers have served you well. They deserve your support. Pete Dunn, however, will not be a candidate for reelection as President. Pete declared himself on that point when he was installed in office this year. Pete likes the work, is tremendously enthusiastic about it, but, because he has served four consecutive years, feels that he should step aside to give someone else an opportunity to serve as President. He will not relinquish his activity in the Alumni Association by any means. Pete will be a candidate for Chairman of the Baltimore Chapter for the year of 1939. He is eligible for a National office at any time and undoubtedly he will be back in harness before many years pass by.

The purpose of this is to give other hard-working and deserving members of the Alumni Association the recognition they deserve. So that you might have a much wider field from which to choose your candidates, we are listing the names and location of a considerable number of men, all of whom are well qualified to hold office in this progressive organization. They are Radio servicemen, either part time or full time, and outstanding citizens in their communities.

Page Twenty-four

Even this attempt to give our members a wider field of candidates from which to choose is not entirely satisfactory, for it is impossible to list all of the men who are good material for leadership. However, this is at least a step in the right direction.

With the exception of Pete Dunn, all of the present Officers will be candidates for reelection. You probably will want to select your new President from among the four Vice Presidents now in office. On the other hand, you may want to make entirely new selections, and it is to be of assistance to you in this connection that the following names are submitted for your consideration. Study the list carefully. Retain it until you receive the next issue of NATIONAL RADIO NEWS, in which will be the official ballot, for this list can be a valuable guide when you are ready to mark your ballot.

Carl E. Slater, Coolidge, Ariz.
Isaac T. Hudgens, Magnolia, Ark.
R. H. Rood, Los Angeles, Calif.
C. H. Woodruff, Olive, Calif.
John R. Kelley, Denver, Colo.
Fred G. Conklin, Hartford, Conn.
George W. Howell, Wilmington, Dela.
S. H. Daniels, Orlando, Fla.
W. S. Holloway, Tucker, Ga.
Oliver B. Hill, Moscow, Idaho.

(Page 30, please)



The Service Forum

Conducted by

J. B. Straughn, N. R. I. Service Consultant

Send in your service notes. We will re-word them for publication. To qualify your note for the NEWS you must have observed the same trouble on two or more identical receivers.

GENERAL ELECTRIC MODEL T-12

Locate the electrolytic condenser mounted on top the chassis and check the voltage between it and the chassis before and after the distortion occurs. If the voltage increases during distortion one of the resistors shunting the speaker field is defective. The one connected to the low potential end has a value of 280,000 ohms while the one connected to the grounded end of the field has a value of 50,000 ohms. To be safe, replace both.

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MODEL 628 G.M. AUTO RADIO

SET WILL NOT OPERATE IN CAR

I have had two of these receivers in, with the same complaint in both instances. The owners had been to other servicemen who were stumped. Grasping the antenna with the hand the set would operate in the car, adjusting the antenna compensating condenser was hopeless. The set plays perfectly on the bench but adjusting the antenna compensating condenser makes no change on the output meter. Taking the bottom cover off the set I found a 1500 ω resistor shunted across the antenna compensating condenser to ground. This makes the antenna constants fixed which are not suited to the antenna constants of the car. By removing this resistor which is not in the original circuit, the antenna compensating condenser was made operative.

A. E. BARWOOD, South Africa.

----- n r i -----

DELCO AUTO RADIO MODELS 643 AND 641

HUM

If these receivers are fairly new don't waste time testing filter condensers or others. Take off the bottom cover of the set and you will observe a red wire coming from the filter condensers running past the socket of the GASG tube. Rerouting this wire at the point where it passes the GASG will stop this hum.

A. E. BARWOOD, South Africa.

INTERMITTENT DISTORTION

SILVERTONE MODELS 4165, 4485, 4565 AND 4585

WHISTLE AT 930 KC.

A whistle, due to a beat between the second harmonic of the I. F. (930 kc.) and a 930 kc. signal may be noticed. In localities where the 930 kc. station is one that is frequently listened to, it will be desirable to shift the whistle to some other point where it will not be objectionable. This may be done by shifting the I.F. frequency of the receiver. Determine at what point between 900 kc. and 960 kc. the whistle will be least objectionable. Divide this frequency by 2 which will give you the new I.F. frequency at which the I.F. amplifier should be aligned. For example if it is determined that a whistle at 920 kc. would not be objectionable, the I.F. should be realigned at 920 divided by 2 or 460 kc.

----- n r i -----

SILVERTONE MODELS 4165, 4485, 4565 AND 4585 DISTORTION AT LOW VOLUME

On some of the early production models a 50 micro-microfarad condenser was connected from the high side of the volume control to its movable arm. If distortion which occurs only at low volume levels exists this condenser should be removed from the circuit.

----- n r i -----

SILVERTONE MODELS 4165, 4485, 4565 AND 4585 ELIMINATION OF MOTOR BOATING

If the two grid leads from the variable condenser to the 6K7G R.F. tube and the 6L7G translator tube are too close together, motor boating may occur. To eliminate motor boating, simply separate the leads.

----- n r i -----

SILVERTONE MODELS 4165, 4485, 4565 AND 4585 CONSOLE SPEAKERS

In later production the speaker of console models was mounted on felt cushions instead of being screwed directly on the baffle. For shipping purposes this cushion mounting is made rigid by screwing the two wooden strips, that hold the

(Page 27, please)

Here and There Among Alumni Members

Our good friend F. A. Luning of Willoughby, Ohio, crashes through with the news of a swell son. Here's hoping he proves to be as good a Radiotrician as his dad. And congratulations, Mr. and Mrs. Luning.

— n r i —

Robert G. Kugler of Springfield, Ohio sends us some nice photos of his test panel which he built as outlined in an article by our Don Looney in the NEWS. He says it is "a honey."

— n r i —

"I am now in possession of a Commercial First Class Radiotelegraph license, endorsed for Radiotelephone First Class. Not a single question in either phase of the examination, covering both branches, was asked but what it had not been covered by lesson text furnished by N. R. I.," says Richard E. Fricks of Portsmouth, Va.

— n r i —

It is hard to keep up with this fellow, John R. Kelley, who has had one promotion after another. He is now back in Cheyenne, Wyo. with Rudy J. Tyler, Inc. He didn't like to give up his association in Denver with Walter J. Floyd and other N. R. I. men, but the new job was too attractive.

— n r i —

Lige Crumbley of McDonough, Ga., who operates the Radio Shop at that place, is happy to report his wife has returned from the hospital after a serious illness. Moreover his Radio earnings enabled him to pay the Medicos in full, which is saying something.

— n r i —

James H. Richmond of Mt. Vernon, Washington says he is on the jump from early morning to late at night taking care of his fast growing Radio business. He serves six stores besides taking care of his own customers.

— n r i —

Members in the vicinity of Glen Allen, Va., who knew Thomas J. Kelly, Sr., will be sorry to know he passed away recently. He was a strong member of the Alumni.

— n r i —

Things are mighty good for H. M. Torbert of Carrollton, Ala. His business has increased 85% since the first of the year.

— n r i —

W. v. Bruggen of Groninger, Holland thinks this page is tops because it enables him to know what his fellow members are doing, even though separated by thousands of miles of land and water. Bruggen is quite a Radio man in his native Holland.

— n r i —

Another strong booster for the Alumni is Fred J. Fellowes, who is interested in establishing a Local Chapter at Winnipeg, Man., Canada. It's a fine spot for a Chapter.



Hey! Doesn't anything ever happen to some of you fellows? Many write to say this page is swell, but ye editor wants news — news — news. How about a little help?

— n r i —

Ed. Goetsch of Milwaukee, Wisconsin keeps right on going, recession or no recession. During the last year he has bought a lot of new equipment, a Dodge truck and added \$786.00 in stock—all out of earnings.

— n r i —

Robert G. Reed of Indiana, Penna. is an Associate Member, Institute of Radio Engineers. He is developing a system of Carrier-Communication for mines and offices.

— n r i —

From New Zealand comes word from Maurice R. Thompson that he was able to obtain a very fine position with the leading Radio firm in Brisbane, Australia. Says his membership card did the business.

— n r i —

John Wm. Morton of Wilmington, Delaware studied Radio as a hobby, yet he cleared \$860.00 in his spare time during the last twelve months. What a hobby.

— n r i —

Harold Thurston of Saginaw, Michigan recently received a Radiotelephone operator's license, 1st class. He made a grade of 94.3%.

— n r i —

While we think of it! A message was phoned to Chief Dowie from the Amateur, Army Section, War Department, Washington, D. C. to convey a Radiogram from William Lofstrom, WSCUF, Nelsonville, Ohio, which read, "Regards to all the gang at N. R. I." Right back at you, Lofstrom, "Regards to you from the gang."

— n r i —

H. A. Corbitt of Austin, Texas graduated in 1932. Recently he sent in the enrollment of Mrs. H. A. Corbitt. Here is another partnership which is going to stay in the family.

— n r i —

Another fine member is lost to us, William Berkenfeld of Union City, N. J., passed away recently. A hard worker and a successful one, it is tough to have him go all too soon.

— n r i —

Sam Juricek, Secretary of Chicago Chapter, is a top notch bowler. He rolls with the big shots and is itching for the bowling season to open.

felt cushions, tightly to the baffle. In order to obtain the advantage of the felt cushions and better tone, the screw at each end of the two wooden strips should be loosened about one turn, thereby allowing the speaker to have its non-rigid mounting.

—————n r i—————

SILVERTONE MODELS CONNECTION TO CATHODE OF TUNING EYE 4165, 4185, 4565 AND 4585

Examine the slate colored cathode lead of the 6G5 tube. If it is connected to the cathode of the 6X6G it should be removed from this position and connected to the cathode of the 6Q7G. The latter connection is the correct one. An indication of incorrect connection is that the volume will increase when the tuning eye tube is removed from its socket.

—————n r i—————

SILVERTONE MODELS REPLACING OSCIL-LATOR TUBE 4165, 4185, 4565 AND 4585

There are two separate types of 6G5G tubes, one being shielded and the other unshielded. By appearance you can easily tell them apart as the shielded type has a perforated mesh screen surrounding the other elements. This screen is about an inch in diameter and comes very close to the inside of the bulb. The unshielded type does not have this perforated mesh screen and the plate of the tube is solid and quite visible. It is important that only the unshielded type with the solid plate and without the perforated mesh screen be used in the oscillator socket. Use of the shielded type will upset the calibration of band F and interfere with proper performance.

—————n r i—————

SILVERTONE MODELS CONDENSER DRIVE SLIPPAGE 4165, 4185, 4565 AND 4585

A front bearing bracket was provided for the condenser drive shaft in the later production models to overcome slippage of the condenser drive. This slippage occurs because the rear bearing alone does not provide sufficiently rigid mounting for the drive shaft. This bracket part No. 1014615095 can be added when necessary to sets not having it originally. It is mounted between the dial and the dial mounting bracket by means of the lower two dial mounting screws.

—————n r i—————

PHILCO MODEL 511-513 CONDENSER REPLACEMENT

If either of the three R.F. plate by-pass condensers break down they may be replaced with .1

mfd. 600 volt tubular condensers. However the condenser cases also contain 100 ohm resistors and these may be added externally following the wiring diagram.

H. S. TYLER, Massachusetts.

—————n r i—————

GENERAL ELECTRIC SLIPPING DIAL MODEL S22

A groove will be worn in the rubber friction dial and you should then remove the dial, loosen the screws holding the shaft to the chassis, remove the rubber roller from the shaft and reverse it. Replace the dial while holding the shaft and roller firmly down against the dial and tighten the shaft holding screws. A drop of oil on the bearings and slight loosening of the screw at the rear of the condenser plate will prevent recurrence of the trouble.

—————n r i—————

GENERAL ELECTRIC MODEL H-31 NOISY

This is often due to a defective primary winding on the first I. F. transformer. A check of this winding with an ohmmeter will show up the difficulty as a variation in resistance. Sometimes it is possible to unwind one or two turns and locate the bad contact. However the break may be on the inside of the winding and if so a new coil must be installed.

—————n r i—————

WINCHARGER SERVICE NOTES

There are several reasons why a low charging rate in the Wincharger battery charging equipment may exist. These are: BRUSH SETTING. The brushes are set at the factory for maximum output at low speeds, but this setting sometimes shifts in transit. The proper setting is for the third brush to be one commutator segment away from the lefthand brush when viewed from the rear. OIL ON COMMUTATOR. This results from tipping the equipment when mounting. It is preferable to use oil after the equipment is mounted in place. The trouble can be cleared up by sanding the commutator with No. 00 sandpaper. GROUNDED ARMATURE. The most common cause is the practice of letting the Wincharger operate without a load (battery disconnected). The armature can also be grounded by permitting the plant to revolve enough to twist off the generator wires. Proper connection of the large spring which stands vertically along the mounting shaft will prevent this. LOW GENERATOR SPEED. If trouble still exists after checking the above possibilities it may be due to the fact that the armature is revolving too slowly. In this case the installation should be looked over to determine what can be done to mount the propeller in greater wind velocity areas.



New York Chapter

We have had some very interesting talks by our own members. Mr. Irving Gordy one of our newer members, particularly gave an exceedingly interesting and instructive talk. He knows Radio and knows how to pass the information on to others. Members such as Mr. Gordy help a great deal in keeping things moving and our meetings are always lively and beneficial.

About two years ago a new member joined us. His name is Mr. Alfred Stock. At that time he was doing part time Radio servicing. Some months later Mr. Leo Donziger joined us. Donziger and Stock got chummy right away. These two men cultivated a real friendship and about six months ago they opened a service shop at 564 East 43rd Street, Brooklyn. This business grew very rapidly and just recently they purchased another shop at 145 Highland Avenue also in Brooklyn. This is the type of members we have in the New York Chapter.

We are getting ready for an active fall season and will have some interesting news next issue.

— n r i —

Baltimore Chapter

Meetings have been suspended until September, but the last summer meeting is one which will long be remembered by those who attended.

About sixty fellows turned out to take part in the fun. But it wasn't all play by any means. Messrs. Straughn, Thomsen and Cook of N. R. I.'s Instruction Department gave a practical demonstration of "Effect to Cause Reasoning." They furnished each one present with a diagram and questionnaire. The questionnaire contained a list of eleven defects, such as open condensers, leaky condensers, shorted tubes, etc. Each was asked to write down his opinion of the effect on reproduction which would occur when these defects existed in the set. The papers were then collected and graded by Mr. Thomsen and Mr. Cook while Mr. Straughn actually went through the procedure of introducing all of the defects, letting those present hear how closely they came to hitting the nail on the head, and giving valuable service pointers on locating such troubles in actual service work.

There were four cash prizes for those who were

Page Twenty-eight

more nearly correct. The first prize was carried off by John W. Ganz, second prize was won by Charles Haubroe, third prize was a tie between W. Giese and W. W. Jensen, so the Chapter came through with an additional prize to take care of all the winners. It was a real contest and extremely interesting and beneficial.

A resolution was introduced by Mr. J. B. Gough, one of our charter members, to extend a rising vote of thanks to Mr. J. E. Smith, President of N. R. I., for his fine cooperation in making this meeting possible. Amid applause the resolution was unanimously adopted.

After the business session was completed the fellows were just in the right mood to enjoy the refreshments which were on hand in plentiful quantity. Pete Dunn acted as chief cook and bottle washer and you may be sure that no one was neglected. Pete is the ideal host.

Chairman Jensen expressed great satisfaction with the progress made by the Chapter. He emphasized that the next meeting is scheduled for September 20 at which time another big program will be offered and everyone is cordially and urgently invited to attend.

— n r i —

Honorary Member Is Candidate for Governor

Honorable Howard W. Jackson, Mayor of Baltimore and candidate for Governor of the State of Maryland, is an honorary member of Baltimore Chapter of the N. R. I. Alumni Association.

Major Jackson has been present at a number of Baltimore meetings and on several occasions was one of the principal speakers. Pete Dunn, President of N. R. I. A. A., who is a very strong booster for the Mayor promises to have him present at the next meeting of the Baltimore Chapter on September 20.

— n r i —

Detroit Chapter

Our attendance has been very good and our members have been getting some worthwhile information from our meetings. They are arranged in advance on a definite basis with something to do each meeting and an allotted time in which to do it.

Our next meeting is scheduled for September 9, the second Friday of the month, continuing every second and fourth Friday as usual. The meeting place is, as always, 11305 Woodward Ave. We have big plans for this fall and will have some real news for the next issue.



Chicago Chapter

Only one meeting in July and August instead of the usual two a month. But we are coming back on full schedule beginning in September.

We have had a good season. The Chicago Chapter has grown a bit. We have quite a number of new members, most of whom are taking an active interest and adding considerably to the effectiveness of the Chapter. Within another year some of them may be in a position to inaugurate new activities and new policies, to the benefit of all concerned.

We have heard a number of interesting and highly informative lectures on all phases of the Radio service business. Its technical aspects, from antenna to loudspeaker, advertising, salesmanship, bookkeeping and general business practices have all been covered. Round table discussions have settled a great number of questions, especially pertaining to technical problems, and have been very interesting. The "question box" has been a life saver in specific instances, especially to some of the newer men who have been able to bring their problems before men with years of experience. The old-timers have benefited too, answering these questions tends to keep the rust from gathering.

A start has been made on a group advertising scheme, and several thousand circulars have been printed and distributed. While it is a bit early to give an accurate estimate as to their results, we believe that the idea is sound and will produce results.

Plans are under way to stage a Chapter picnic in the near future, and to those who have attended such affairs in the past no more need be said. Those who have not, have a treat coming and seem to be looking forward to it with keen anticipation.

Taken by and large, the year has by no means been a failure. True, our attendance hasn't been as large as it might, but it has been sufficient to maintain interesting and instructive meetings. We have undoubtedly overlooked opportunities and made mistakes in some of the things we have done, but we have accomplished enough to make the Chapter and its activities more than worthwhile.

Mr. L. L. Menne, Executive Secretary of the N. R. I. A. A., Mr. Joseph Kaufman, Educational Director of N. R. I. and Mr. Stuart M. Armstrong, Assistant Advertising Manager of N. R. I. attended the annual conference of the National Home Study Council held in Chicago. They had hoped to be in town for a meeting of the Chapter, but our schedules did not coincide. However, your editorial staff met with Mr. Menne in the Hotel LaSalle for a quick review of our activities and those of other Chapters and later all of us attended a banquet which was opened with a half hour of pleasing music by five charming ladies and closed with a rousing fine talk by Mr. "Cy" Frailey, of the staff of Northwestern University, School of Commerce. His talk was titled "Goat Feathers," which we learned everybody has, because they are the unimportant and useless things all of us do to waste time. Mr. Frailey advised all his hearers to go home and do some goat-feather picking. It was a very sound and inspirational talk which we wish all members of the Chapter could have heard.

The meetings at the homes of members are working out nicely. You can always get information regarding meetings by phoning Chairman Bennett, Greenleaf 4900 or Editor Morehead, Edgewater 6177.

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Philadelphia-Camden Chapter

A short review of the latest N. R. I. lessons starting with lesson No. 6 is going over big. This is being conducted by Librarian Al Wysozczanski on the third Thursday, before the regular talk or demonstration scheduled. Secretary Al Schiavoni gave a very good talk on the component parts of the Philco 37-11, having an extra large size drawing at the time. Members were also interested in a talk on External Radio Noises, and several practical experiences of their suppression, delivered by Chairman Charley Fehn.

Vice Chairman Joe Strano has shown himself to be a real optimist. Having married not so long ago, he now has purchased a new home. Joe Reinhardt and Treasurer Clarence Stokes have purchased an operating garage business. They named it the Philcam Garage. Joe is stationed at the garage and Stokes claims he will do a rattling business in auto Radio. These boys now have a combination business card with Philcam Radio Sales & Service on one side, and Philcam Garage on the other.

There is only one meeting scheduled during July and August, but two meetings a month are scheduled beginning September. We expect to pop things open with a humdinger meeting September 15th. Details will be announced in due time.

A Partial List of Leaders in the N.R.I. Alumni Ass'n (Continued from page 24)

C. B. Morehead, Chicago, Ill.
 Edward Sorg, Chicago, Ill.
 J. Verlin Hunt, Richmond, Ind.
 Leonard E. Close, Mt. Pleasant, Iowa.
 Harry Laborde, Perry, Iowa.
 William B. Martin, Kansas City, Kans.
 Karl Sonenberg, Cloverport, Ky.
 W. B. Parrish, Frankfort, Ky.
 Cecil Johnson, Alexandria, La.
 Robert Beaulé, Lewiston, Maine.
 Robert C. Beall, Seabrook, Md.
 Omer Lapointe, Salem, Mass.
 Rex B. Smith, Sault Ste. Marie, Mich.
 Jorgen R. Martinson, Minneapolis, Minn.
 Harper Johnson, Jr., Senatobia, Miss.
 Claude West, St. Louis, Mo.
 Wm. Darlington, Butte, Mont.
 Floyd A. Roberts, Scottsbluff, Nebr.
 C. D. Parker, Lovelock, Nev.
 E. Everett Darby, Woodsville, N. H.
 Peter L. Munier, Passaic, N. J.
 Wm. Prescott, Rochelle, N. J.
 James E. Graham, Hobbs, N. M.
 Charles W. Dussing, Syracuse, N. Y.
 Glenn A. Williams, Cuba, N. Y.
 Alison A. Lonax, Spencer, N. C.
 Arvid Bye, Spring Brook, N. Dak.
 Frank Moore, Portsmouth, Ohio.
 C. A. Drotloff, Youngstown, Ohio.
 W. G. Cordell, Oklahoma, Okla.
 Henry W. Freeman, Portland, Ore.
 Clarence Stokes, Philadelphia, Penna.
 Albert Melezak, Pittsburgh, Penna.
 Clyde D. Kiebach, Reading, Penna.
 Karl R. Smalley, Cranston, R. I.
 Horace C. Main, Georgetown, S. C.
 Noel J. Lawson, Aberdeen, S. Dak.

Sam Juricek, Chicago, Ill.
 Charles J. Fehn, Philadelphia, Penna.
 Joseph Barrette, Brooklyn, N. Y.
 T. J. Telaak, Buffalo, N. Y.
 L. J. Kunert, Middle Village, N. Y.
 C. H. Mills, Detroit, Mich.
 W. W. Jensen, Baltimore, Md.
 J. B. Gough, Baltimore, Md.
 Wilmer Giese, Baltimore, Md.
 J. A. Willett, Baltimore, Md.
 Clarence Steed, Washington, D. C.
 A. Schiavoni, Philadelphia, Penna.
 A. H. Ketelhut, Benton Harbor, Mich.
 T. J. Bowman, Altavista, Va.
 Harry W. Merchant, Arlington, Va.
 W. A. Bunch, Miami, Fla.
 W. P. Brownlow, Johnson City, Tenn.
 J. E. Collins, Paris, Tenn.
 J. D. Wood, Archer City, Tex.
 L. H. Watkins, Ogden, Utah.
 H. E. Monroe, Middlebury, Vt.
 J. Walton Colvin, Orange, Va.
 R. F. Keil, Seattle, Wash.
 Howard C. Dittman, Wheeling, W. Va.
 William Wiesmann, Ft. Atkinson, Wis.
 Ivan H. Thompson, Laramie, Wyo.
 Alvin L. Campbell, Burdett, Alta., Canada
 J. H. Southey, Vancouver, B. C., Canada
 Henry H. Sutton, Flin Flou, Man., Canada
 Fred J. Fellowes, Winnipeg, Man., Canada
 Wallace G. Conrad, Halifax, N. S., Canada
 C. M. G. Smith, Barrie, Ont., Canada
 George Duff, Ft. Williams, Ont., Canada
 G. C. Gunning, Smiths Falls, Ont., Canada
 J. L. Huard, Drummondville, P. Q., Canada
 Paul Provost, Montreal, P. Q., Canada
 E. H. Symons, Regina, Sask., Canada

— n r i —

Directory of Chapters

Baltimore—J. A. Willett, Secretary, 2411 Armath Ave., Baltimore, Md.
 Philadelphia-Camden — Clarence Stokes, Treasurer, 3405 Kensington Ave., Philadelphia, Pa.
 New York—L. J. Kunert, Secretary, 66-11 74th St., Middle Village, L. I., N. Y.
 Buffalo—T. J. Telaak, Chairman, 657 Broadway, Buffalo, N. Y.
 Toronto—Ed. Witherstone, Secretary, 363 Nairn Ave., Toronto, Ont., Canada.
 Chicago—Sam Juricek, Secretary, 4223 N. Oakley Ave., Chicago, Ill.
 Pittsburgh—Albert Maas, Secretary, 9 S. Howard Ave., Bellevue, Pa.
 Detroit—C. H. Mills, Secretary, 5458 15th St., Detroit, Mich.

Page Thirty

Directory of Officers

(To Serve Until January, 1939)

President—P. J. Dunn, Baltimore, Md.
 Vice-Presidents—
 Earl Bennett, Evanston, Ill.
 P. E. Oliver, Detroit, Mich.
 Dr. Geo. B. Thompson, Los Angeles, Calif.
 Allen McCluskey, Birmingham, Ala.
 Secretary—Earl Merryman, Washington, D. C.
 Executive Secretary — L. L. Menne, National Headquarters, Washington, D. C.

— n r i —

"To cultivate fraternal relations among the Alumni of the National Radio Institute, to promote the welfare of each alumnus by interchange of helpful information, to foster the spirit of unity and loyalty to our Alma Mater."



From U. S. Naval Station, Cuba

NATIONAL RADIO NEWS delights me a lot. "Radio Marches On," "A Tribute to Radio's Heroes," and "Make Extra Money Installing Push-Button Tuners" all are nice reading.

LOUIS ANTOUCHE,
Guantanamo Bay, Cuba

----- n r i -----

Thinks News Is Tops

NATIONAL RADIO NEWS, to my way of thinking, contains just about everything a serviceman can hope for. I really think it's Tops.

WILLIAM PRUTZMAN,
Reading, Penna.

----- n r i -----

Many Letters Such as This

Your article on Servicing Universal A.C.-D.C. Receivers in the April-May issue was the best I've read in a long time. I enjoyed it immensely.

A. K. VALLO,
Monessen, Penna.

----- n r i -----

Another Vote for Electronics, Inc.

Just a line to tell you how much I enjoyed the story of Electronics, Inc. I enjoy all the stories in the NEWS, but I especially like Electronics, Inc.

J. KENNETH PALMER,
Mouth of Keswick, N. B., Canada

----- n r i -----

Information Was Practical

The NEWS is swell. That article on A.C.-D.C. midgets helped me on two jobs.

RUSSELL MCKEE,
New York, N. Y.

Service Notes Are Big Help

Let me say a few words about our NATIONAL RADIO NEWS. I think it's swell. Print Electronics, Inc. as often as you can. The service sheet is a big help. The day I get the N. R. NEWS I drop everything else and read the NEWS through.

ADAM CHERAMIE,
Delta Farms, La.

----- n r i -----

These Letters Please Us Greatly

Just received my fourth copy of NATIONAL RADIO NEWS and enjoy its complete coverage of important Radio developments. Mr. Haas' eulogy of "A Tribute to Radio's Heroes," was especially enjoyable and Mr. Kaufman's "Why N. R. L. Teaches Theory" was encouraging. Keep up the good work.

EDWARD WINLAND,
East Liverpool, Ohio

----- n r i -----

More Cheers for Jay and Ozzie

Many, many thanks for the second episode in the life of Jay and Ozzie of Electronics, Inc. May we have another soon? The NEWS is getting better and better. I just cannot see how so much news can be crammed into so small a space.

GEORGE J. GILES,
Claude, Texas

----- n r i -----

Now Calm Yourself, Mr. Alger!

May I at this time thank you for the timely article on servicing A.C.-D.C. Universal receivers. Also the article on Push-Button Tuning was of great interest to me. The only complaint that I can make concerning the NEWS is that I nearly have a nervous break-down waiting for the next issue.

EARL C. ALGER,
Johnson City, N. Y.

Page Thirty-one

New WGY Antenna Is Taller Than Washington Monument

From a new steel antenna tower 70 feet higher than the Washington monument, General Electric's station, WGY, in Schenectady, N. Y., will soon be radiating its 50,000-watt signals to the four corners of the country.

The lofty steel structure, nine feet square, rests on a porcelain insulator but 20 inches in diameter at its base. This porcelain unit insulates the "live" tower from the ground, for the entire tower, ladder and platforms included, is the active antenna or radiator. The porcelain insulator bears a total weight of 500,000 pounds and before installation was tested by the Bureau of Standards to an ultimate strength of 2,180,000 pounds.

The tower is supported by eight massive steel guy lines, two attached to each of the four sides of the tower. Four guy lines are attached at 250-foot level and four at 500-foot level. These lines are stretched out 450 feet from the tower to concrete anchors buried deep in the ground.

Each cable is strung with seven insulators to prevent any diversion of signal strength from the antenna. At the point of attachment to the tower the guy starts with a 700-pound insulator; and then at intervals along each steel cable, breaking the cable into segments, are six other insulators, each weighing 300 pounds.

While the tower itself occupies relatively little land, the complete antenna system with the ground system covers 20 acres. Thirteen miles of copper ribbon, one inch wide and fifteen-thousandths of an inch thick, are buried 18 inches under the ground and radiate out to a distance of 625 feet from the base of the tower in all directions.

A 1000-watt flasher beacon at the top will give warning to aviators, and in addition there will be constantly glowing lights at different levels of the tower. To provide greater visibility during dull and misty days, the tower has been painted in alternate sections of orange and white.

— n r i —

\$60,000,000 to Servicemen

Basic statistics of Radio, as of January 1, 1938, compiled by the popular magazine, "Radio Today" revealed that Uncle Sam's annual bill for Radio is \$912,000,000 a year. Of this amount \$60,000,000 passed from set owners to servicemen for repairs and servicing. These staggering figures speak for themselves.

NATIONAL RADIO NEWS



FROM N. R. I. TRAINING HEADQUARTERS

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L. L. MENNE, EDITOR

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